Information System's Project Management and the Phenomenon of Trust

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Abstract

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The aim of this research was to investigate how the continual low success rate of IS projects could be improved through an evaluation of success and failure factors.

A literature review revealed a comprehensive but uncoordinated history of research into the identification of the critical factors. This proved to be inconclusive, but did indicate that project management contributed more to the failures than the technology.

A model for expressing the complexity of IS project environments is proposed to aid project teams with their strategy. Also, the criteria for measuring success of both project management and IS projects has been extended.

Although many disciplines had considered trust as a success factor, this was missing within the domain of project management. To examine the effect of trust in an IS project environment a game termed Project Paradox was designed and run. A lack of trust was found to be compounded by conflicting objectives inherent within IS projects.

It is recommended that the issues relating to trust should be considered and managed as an integral part of a risk analysis. To enable this to be realised in practice a framework for a Trust Audit is proposed. The thesis concludes with a number of research initiatives aimed at improving the success rate of IS projects.

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Chapter 1

1.0 Introduction

Accurate and timely information systems (IS) are becoming increasingly critical to the efficient and effective operation of public services, private organisations, the Government and the subsequent impact upon individuals. Implementing new, or changes to an existing IS are often managed using the structure of projects that require a different set of skills and knowledge compared with traditional line or functional management. However, a problem was identified more than two decades ago by DeMarco (1982) who reported that the success rate for IS projects was low. In an attempt to understand this phenomenon, research studies have been conducted by for example, Cerullo (1980), Gobeli and Larson (1986), Pinto & Slevin (1987), Morris and Hough (1993), Ward (1994), Fortune & Peters (1995), Ballentine et al (1996), Cavell (1998), and Wateridge (1996). The results from these researchers and other more recent reports from Cooke-Davies (2002), Pinto (2000), Gray (2001) and Yeo (2002) have generated views of what are believed to be the most likely success factors, from several different perspectives. Some factors, such as the need for high user involvement, clearly defined objectives and senior management support are identified by more than one author. Despite the existing knowledge about IS projects, the success rate continues to be reported as low.

1.1 Examples of IS Project Failures

Public sector IS projects are subject to audit; the results that are published include information about these failures. Collins (1994) identified a number of Government IS projects that have failed. Over a five-year period, the total cost of these failed projects was quoted at £5,000m. Table 1.1 provides an example of some the costs involved.

Department	Costs
DHSS	£2 million
Customs	£85 million
House of Lords	£1.4 million
MoD	£950 million

Table 1.1 **Examples of Government Failed IS/IT Projects** Source: Collins (1994)

Other Government Departments that also reported having failed IS projects were the National Audit Office, Police, Inland Revenue, Foreign Office, Department of Health, Royal Art Collection and Trade and Industry. The broadcast by Collins (1994) included figures from the Public Account Committee that suggested 8 out of 9 major of the UK Government's IS projects were failing.

Flowers (1996) conducted a study that sought to review failed information technology (IT) projects in both the public and private sectors. Some researchers use the term IT when describing IS projects that are supported by technology; often referred to as IS/IT projects. Some of those projects studied by Flowers (1996) are listed in Table 1.2 below.

The Performing Right Society PROMS	Cost £11m £8m wasted
The California Department of Motor Vehicles	£29.3m project was halted
Computerised reservation system	£142m write off 1993
London stock exchange TAURUS project cancelled	£75m wasted.

<u>Table 1.2</u> **<u>IT Project Failures</u>** Source: Flowers (1996)

Gallagher (1995) reported examples of project failures following a major research study by the Standish Group, who investigated the numbers and associated costs of failed IS projects in the United States of America (USA). Table 1.3 provides a summary of the Standish Group results.

Only 16 % of projects started are successful
52.7 % of projects are 189% over budget
Average overrun on time is 222%
31% of IS projects are cancelled before complete

<u>Table 1.3</u> **<u>IS Project Failures in the USA</u>** Source: Gallagher (1995)

Some of the findings indicated that in 1994 the USA invested more than $250bn each year on 175,000 projects. From these, $81bn would be lost due to cancelled IS projects and $59bn in cost overruns.

Four years following the original Standish Group findings, the study was repeated. Scollick (1999) reported the analysis of those results taken from the 2,400 projects, focus groups, interviews and group sessions from the follow up research. The results indicated that in the four years between 1994 and 1998 the number of IS projects which were completed but missed an objective such as they were late or over budget had '... remained about the same' also that IS projects continued to fail, and that the '... rate of success was not improving'. Therefore, despite the research that has been carried out the success rate of IS projects has not improved. In the majority of cases the reasons and suggested causes of those failed IS projects were attributed to some aspect of project management, rather than a failure of the IS/IT used.

In order to verify the problem of failed projects, for three consecutive years during the early stages of this research, examples of reported failed IS project were collected from the Computing Journal. Those have been compiled into Tables 1.4, 1.5 and 1.6 respectively and illustrate how the press frequently keep IS failures in the public eye. There is, therefore, evidence that both public and private sectors have examples of failed IS projects.

One observation to be made from the examples in the Computing Journal is that almost all projects publicised have been from the public sector. Why should this be? Is it that public sector IS projects are more likely to result in failure than those in the private sector?

One answer to these questions could be the openness in which the public sector operates. The public sector is required to make available to public scrutiny the results from the audits of their IS projects. The National Audit Office and the Public Accounts Committee would further investigate spectacular failures.

It is also possible to indicate how some government projects are more likely to fail from the start. For example, the Government can introduce new legislation that requires an IS to be implemented within a fixed date. Given unlimited resources available to such projects it may be possible to meet a pre-defined target date. However, in reality those Government projects would also have a limited set of resources. Thus, by fixing the time for delivery while having limited funding and staff, the probability of success is naturally reduced.

4 Jan National Blood Transfusion System. Hours after letting £5m contract estimate was possibly 100% inaccurate

18 Jan LITS RAF Logistics project £400m possible loss one stage 300% over estimate

1 Feb Police Forces V IBM National Automated Fingerprint Identification system (NAFIS) £1.25m damages awarded

8 Feb Performing Rights Society (PROMS) to collect royalties UK musicians and publishers, £16m damage claim against LBMs for poor project management

28 Mar Barclays Registrars System £12m to develop failed to achieve standards to connect with CREST

4 Apr & 22 Aug Magistrates Courts Standard Specification (MASS) 6yrs cost £45m cancelled

18 Apr NHS Hospital Information System (HISS) Estimate first 3 systems 2 years at £2m actual cost £32m

25 Apr Project ABC National Australian Bank (NAB) estimate £40m actual £200m stopped after 1 of 4 implemented

16 May DfEE Teachers Pension Agency Cost £2.7m supplied by Hoskyns reported to have failed to deliver a workable system in a reasonable time project terminated.

13 Jun 96 DTI unveils guide to stop procurement disasters

25 Jun Child Support Agency (CSA) cost £10m project likely to be scrapped

4 Jul NHS numbers project Cost £10m to create unique number for babies, extra £4m needed to make work, after 6 month 7,500 duplicate numbers were created, 500 duplicates in 1 week

25 Jul European Space Agency (ESA) Ariane 5 self destructed after 39 seconds of launch, No test ever conducted, no single person in charge, project manager error.

1 Aug ICL charged £1.6m for failed community charge software to St Albans City and District Council

8 Aug 96 RAF Lits £400m Logistics Project RAF considers bale-out over 'inept' IBM Lits management

15 Aug 96 Civil servants jeopardise IT projects

22 Aug 96 Big bang policy blamed for PFI project failures

19 Sep Driver and Vehicle Licensing Agency (DVLA) ghosting problem, 6 cars found with same registration number

26 Sep £8.6 m Police National Computer (Phoenix) contract paid in full before start 3m records to be input at 46,000 per day, actual 765-7,000 per day After 300,000 records input project cancelled

27 Oct DSS Drops £25m Analytical Services Statistical Information Systems (ASSIST) 2yrs into a 10 yr. project

7 Nov 1996 Hyder writes off £35m spend on IBM Welsh super-utility Croeso £100m customer services

14 Nov 96 IBM trips on rocky road of project management, £45m Lits.

28 Nov Law Society National Solicitors data base 'scandalous mess' Estimate £2.5m actual £10m poor project management

12 Dec 1996 Executive in the firing line for over-ambitious Hiss Hospital information systems trial Nottingham trial was a complete waste of time and money: £30m wasted

<u>Table 1.4 Computing: Monthly Reporting of Failed Projects 1996</u>

30 Jan DSS warned by Select Committee to improve Benefit Fraud detection system before new Government Payment Card System costing £1bn, e.g. 14% of child benefit claims have no National Insurance Number (NIN)
20 Feb Inland Revenue could cost taxpayers up to £600,000 after sending out up to 20,000 unnecessary demands for interest to those who had paid by the correct date.
6 March Inland Revenue confesses to a system blunder admitting that it mismanaged the computer generated mailing to the first wave of self-assessing taxpayers.
3 April Government Child Support Agency (CSA) computer system costing £600m to be scrapped after Government admitted the need for a new system. CSA and the contractor EDS blamed the introduction of an early new DSS infrastructure system.
10 April MoD reports that almost £4m of ammunition may have fallen into the wrong hands after a computerised accounting system failed to keep up with operations in Bosnia.
24 April Police Finger print recognition system. A consortium of 37 police forces won £1.2m from IBM UK over failure to develop a fingerprint recognition system that attained only 40% accuracy rates compared with the 70% target. UK longest running IT legal dispute escalated to be worth £33m.
1 May Department for Education and Employment (DfEE) received an undisclosed settlement from Hoskyns (Cap Gemini) after the Public Account Committee accused them for 'causing assessment delays' in a £2.7m contract'.
1 May Whitbread Beer Company lost £1m over a fixed price data warehousing project, delayed for 12 months reported due to 'project was badly specified and badly managed'.
1 May Privatised Electricity Systems faced delay, Logica warned Office of Electricity Regulation (Offer) delivery date for software had slipped. Also Cap Gemini describe deadline to deliver 25m electricity accounts as 'tight'. A source closely connected to utilities deregulation said ' No-ones listening to warnings'.
26 Jun Price Waterhouse IT Directors Report UK Financial survey overall 25% of firms reported a success rate less than 50%
24 Jul DoT to cancel £30 m contract after years of delay for a project to register planned road works for UK Utilities Users tell government they have lost confidence in DIGITAL's ability to deliver. DIGITAL say they delivered to a specification agreed by DoT.
21 Aug MoD system hit by 7-year delay. RN Joint Tactical Information Distribution System costing £205m. Reported waste of £2b from annual £9b defence budget due to delays caused by bureaucracy.
25 Sep Midland Electricity dump an IBM billing system which had taken 5 years to develop 6 months before the new Deregulation of suppliers to start. Contract termination under way, Midland Elec. says IBM not to blame.
16 Oct. Big 4 retail banks say 15 years of IT investment has failed to raise profitability and made them more vulnerable in the market place. Poor cost benefit analysis blamed as key contributory factor.
13 Nov. Alarming data loss hits NHS records. One example describes a hospital IT system backed up cancer research data weekly, deleted the original and discovered the back up had failed.
18 Dec Crown Prosecution Services CPS scrap a budgeted £8m court system, which had taken 7 years and £16m expenditure to build.

Table 1.5 Computing: Monthly Reporting of Failed Projects 1997

29 Jan Home Office Immigration and nationality Directorate £70m system faces delay. Deal was a Private Finance Initiative PFI so contractor Siemens will not see benefits until project is complete and will incur financial penalties in the form of lost monthly revenue. Reason for delay, extra time required testing system before real casework could begin.

19 Feb Air traffic control centre Swanwick £350m project, 2-year delay caused by a series of software hitches.

5 Mar Microsoft rejects first project from Bill Gates private investment in Cambridge University. Anti theft technology decided by Microsoft to be too big brother. System designers were trying to design a system that was the exact opposite.

2 Apr Prime Minister Tony Blair announced costs of £400m for Central Government to complete millennium projects. This figure is 300% bigger than before. An estimate suggests final cost could be 300% more than the latest £400m.

21 May 1000 customers exposed to potential credit card fraud. Worldwide Computer Auctions web site had direct link to company database giving credit card details.

4 June Report of the Crown Prosecution Service CPS abandoned case tracking service; system was 3 years late and 100% over budget.

2 July Nat West banks in-house software upgrade project to 5000 PC's on 300 servers had a 'glitch' resulting in 1,750 branches from being able to provide information to customers. Software upgrade generated repeated requests for services until the system overloaded and crashed.

6 Aug. Barclays Bank Gloucester data centre system crashed closing down cash machines after a systems upgrade project was installed with the objectives of increase capacity and improved reliability.

3 Sep. Fox Meyer declared $5billion bankrupt attempt to claim $500m claim form producers of SAP after mis-representation of their integrated package software which could only deal with 6 warehouse invoice systems compared with stated 23.

22 Oct Project by Microsoft to increase the desk top operating systems share of internet accused of 2 anti-trust cases by US Department of Justice and 20 State Attorney Generals. Case alleges A third party America on Line were approached asking 'how much do we need to pay you' with a view of 'screwing-up' Netscape.

5 Nov MoD project Trawlerman a system for the intelligence staff produced by Data Sciences loses £34million. Project started in '95 was released in'98. Project was late and declared already obsolete. Original specification failed to identify links to other computer based information systems.

17 Dec Assistant Director of campaign group Taskforce 2000 warns a year before millennium IT projects will fail through 'a scenario of death by attrition' the sheer scale of upgrades planned for 1999 will cause a logjam.

<u>Table 1.6 Computing: Monthly Reporting of Failed Projects 1998</u>

On the other hand, when IS projects fail in the private sector, there is no mechanism or incentive in place to automatically record and publish those failures, which in any event could prove damaging to investor confidence. Despite this, there have been some reports for IS project failures in the private sector. For example, the TAURUS project that aimed to reduce the flow of paper in the transaction of buying and selling shares was documented. It could be argued that the publication of failures within business would be detrimental to the image of the companies and morale of the staff involved, which in turn could reduce share prices. The high incidence of reported failed public sector projects, compared with reported private sector projects, does not therefore necessarily reflect a corresponding percentage of failed IS projects within the two different sectors.

1.2 Comparison of IS Projects with Other Disciplines

While IS related journals such as Computing report IS project failures, the national press publish what could be classed as significant or spectacular failures. These would include such as The London Ambulance Service (LAS), or the London Stock Exchange project (TAURUS), demonstrating that IS projects are not unique in failure. The national press have reported some high profile projects, other than IS that were said to have failed, Table 1.7 shows some of the examples.

The New London Library reported 10 years late and well over budget.
The first French nuclear-powered aircraft carrier, taking 14 years to complete at a cost of £4bn was too short for planes to land by a length of 12 feet.
Four months after a £100m Newbury Bypass road was opened with a new surface designed to reduce spray and vehicle noise, expected to last 10 years, the surface cracked with repairs estimated at millions of additional pounds.

Table 1.7 Examples of Project Failures None IS/IT

Research by Morris and Hough (1993) reported that as far back as 1975 the US Congress General Accounting Office reported that federally funded projects were 'overrunning on average 75% while the overrun on $1bn was over 140%'. By 1982 those costs had increased to an average overrun of 140% and for projects over $1bn the overrun was 189%. Table 1.8 contains a limited number of examples from the Morris and Hough (1993) study which indicates that other sectors in addition to IS, were experiencing some difficulty in achieving success.

It can be argued, using the secondary evidence presented above, that projects in general are prone to failure and that IS projects specifically have been identified as having higher than average failure rates. Failed Public Sector projects are reported because of the requirement of open government. However, there is no research to suggest that the failure rate of government projects is any different to those in private organisations.

Projects studied	Numbers	Overrun
World Bank	1,014	30-40% cost
US nuclear plants	42	190-3,900% cost
Oil projects	20	10-780% cost
US weapons	22	200-300% cost, 30-50% schedule

Table 1.8 **Costs of Project Failures None IS/IT** Source: Morris and Hough (1993)

While IS project failures are documented, there appears to be no equivalent reporting of successful projects. For example, copies of the report concerning the failed London Ambulance System are readily available (Williams 1993), while reports concerning project successes are not available.

A reason why failures are reported but success is ignored could be due to success being the expected outcome, while failure is not. It is also easier to identify and link factors with failure than to identify reasons or causes for success. Some factors may have been undertaken in the course of a successful project, but were either unknowingly nugatory or could not be linked directly to the success. Simply because a risk analysis was carried out prior to a successful project does not provide the evidence that the project would not have been successful had the risks not been identified.

The Standish Group research, for example, identified the chance of success being a factor of the average cost of projects, with higher cost projects having a lower chance of success. Their results are shown in Table 1.9.

Company	Average cost of projects	% Success
Large	$2,322,000	9%
Medium	$1,331,000	16%
Small	$434,000	28%

Table 1.9 **Success by Development Costs** Source: Gallagher (1995)

The total financial losses due to a failed IS project are however likely to be greater than those reported. When failure occurs, limited financial resources are wasted. That waste is usually calculated as the actual direct cost expended on the failed project. Other indirect costs would also have been incurred due to a failed IS project; for example the opportunity costs. Gallagher (1995) further reported from the Standish Group study that the '... costs of these failures and overruns is just the tip of the proverbial iceberg' that in total could be costing '... trillions of dollars'. These are the wasted finances and resources which have been caused as a by-product of failure.

1.3 Research Objectives

The wasted opportunities and consequential loss caused by the failure to implement successful IS projects are a real concern for all the stakeholders involved and provided the rationale for this research. The aim was to understand how the low success rate of IS projects could be improved. Since the factors of project management, rather than the IT, had been identified as the most likely reasons for failure by researchers such as Gallagher (1995) and Wateridge (1996), the research would focus into this area in more detail.

Consequently, an extensive literature review was conducted into, project management, management and information systems. An analysis of those findings are presented in Chapter 2. Following the initial literature review, the first research objective was:

- To identify factors and criteria in IS project management which, could lead to project success. *Following the analysis and evaluation of the results from the first objective and after a further literature review, with a focus on trust, the second research objective was:*
- To understand the likely impact that trust in project teams would have on the success of IS projects. *This led to the development of a Trust Audit.*

1.4 Research Approach

The details of the research methods and data populations for this work are presented in Chapter 3. However, it was felt important initially to identify the epistemology position of this research, by stating which part of reality it was believed the research was addressing.

Since the environment from where the data were collected focused on IS projects, it was considered reasonable to position this work within the accepted knowledge domain of IS research as defined initially by Mumford et al (1985). A more detailed description of the ontology (i.e. the things) within the IS domain that combine to become the epistemology of IS knowledge are discussed in Chapter 3.

The sequence of the research is presented in Figure 1.1.

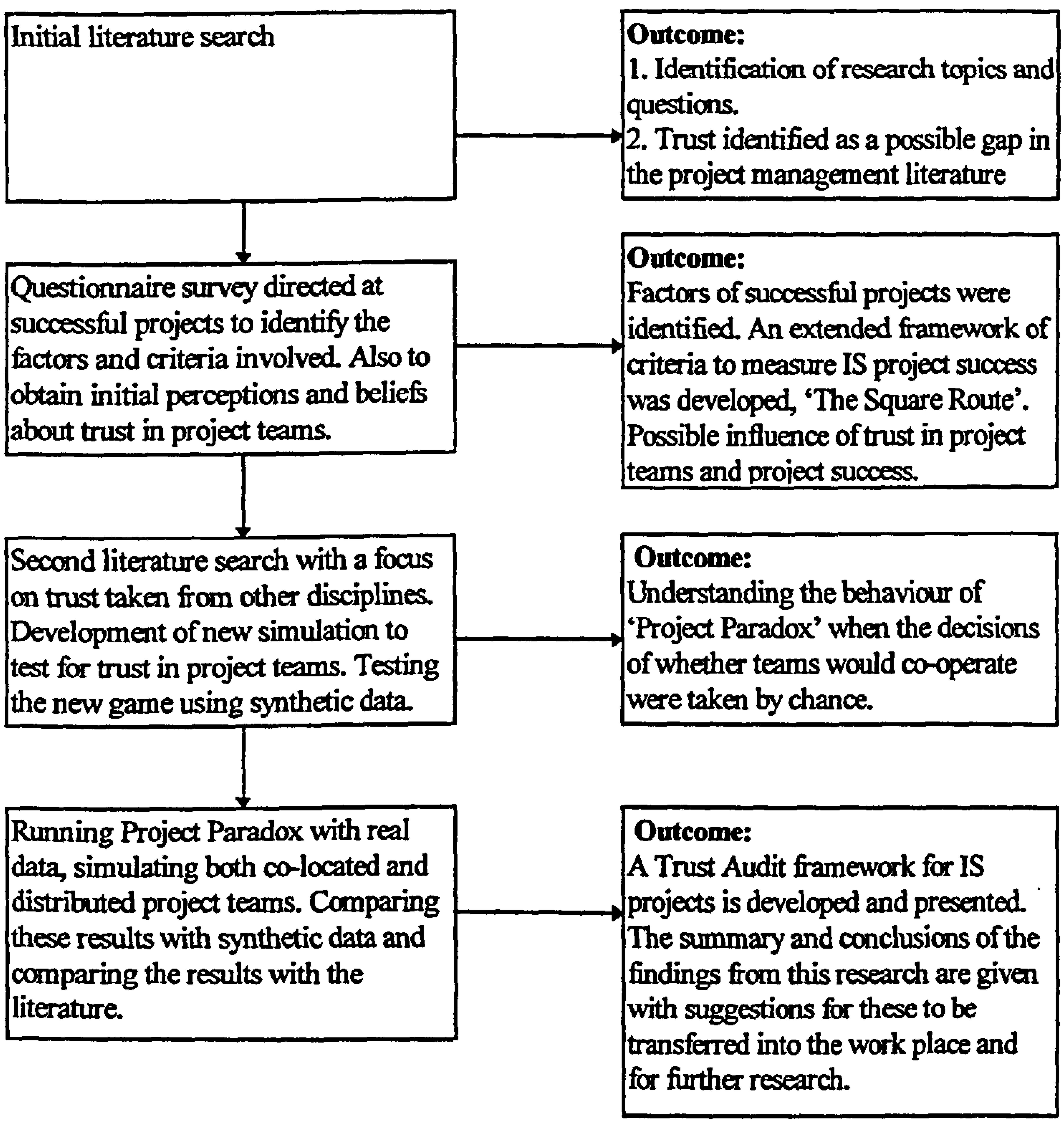


Figure 1.1 Structure used for this Research

1.5 Structure of the Remaining Chapters

The content of the remaining Chapters is as follows. Chapter 2 presents the analysis and discussion of the secondary literature. The topics discussed were IS, management and project management. The analysis and evaluation of IS and project management were not conducted to a point where the decomposition of each term became so detailed that the uniqueness of the meaning of IS project management became lost. Included in Chapter 2 are two outputs generated from this research. These interim finding/outputs were published in Atkinson (1997) and Atkinson (1999). The output from the literature search was used to select the domains for the questionnaire.

Chapter 3 describes the research methods used for this study and justification is given for their selection. These describe the development of the research questionnaire and the population within which the survey was conducted.

Chapter 4 contains the analysis of the responses from the questionnaire survey of stage 1. A significant finding from the questionnaire was centred on the subject of trust. The topic had not appeared in the project management literature but had been identified in other disciplines. The omission of trust from the debate in IS project management was considered a potential weakness, which provided the focus for stage 2 of this study.

Chapter 5 contains a review of the literature involving trust from other disciplines, and provides a discussion of the possible impact of trust upon project success. The evaluation of the trust literature identified that the type of trust involved in project teams was inextricably linked with the co-operative and collaborative intentions and behaviour of the team members. It was established that testing for such behaviour was possible and lead to the design, development and testing of a project game, called Project Paradox.

Chapter 6 provides a detailed discussion of how Project Paradox, the new research instrument, was developed. The behaviour of Project Paradox was observed when simulations were run using random data as input into various playing strategies. The outputs from these were later compared with the results obtained when teams took part in Project Paradox.

Chapter 7 presents the analysis and evaluation of the results obtained from running Project Paradox. The ramifications of trust for the success of IS projects were discussed.

In Chapter 8 a framework is presented to indicate how a trust audit could work in practice (including the use of the business game Project Paradox). Also discussed is how organisations could use the findings from this research to inform company policy directed towards increasing the success rate for IS projects through improved project management practices.

Chapter 9 provides the summary, evaluation and conclusions of the key findings together with recommendations for further research.

1.6 Summary

This Chapter has discussed the high failure rate of IS projects and identified some of the research already undertaken into this problem. Examples, giving the numbers and costs of continuing failures indicated the scale of the problem and provided the rationale for this research. The aim of the research was to investigate how the low success rate of IS projects could be improved; this resulted in 2 specific research objectives being stated. Finally a brief statement was made regarding the justification of the research approach while Figure 1.1 illustrated the structure used for this research.

Chapter 2

2.0 Literature review

2.1 Introduction

To support the two-stage research approach, the literature review is presented in Chapters 2 and 5. Chapter 2 underpins stage 1, the evaluation of which informed the design of the questionnaire. The literature review for stage 2 led to the design and administration of Project Paradox, which is discussed in Chapter 5.

This literature review for stage 1 covered three topics:

- information systems,
- management,
- project management.

This was done in order to scope and focus the remaining sections and indicate whether there were any possible gaps in the literature in respect of IS failures. The evaluation of the literature did reveal that project management had adopted several general management factors. However, the domain of trust, which was identified in the general management literature, had not been considered as a possible success factor for project management. That was the first indication that there existed a gap in the project management literature. Questions relating to trust were, therefore, included in the questionnaire for stage 1.

One aim of the literature search was to investigate the reasons for the low success rate in IS projects. The outcome of this research indicated that the failures may not be limited to the previously identified success factors being incorrectly undertaken, but also due to some additional factor(s) not yet identified (Atkinson 1997).

The project management literature search also included a review of how success and failure of IS projects were measured or judged. This resulted in a further research output, referred to as the 'Square Route', (Atkinson 1999) which is discussed in detail in Section 2.10.5. The 'Square Route' contained 3 additional sets of criteria against which the success of IS projects could be measured, in addition to a limited set of criteria, collectively referred to as the Iron Triangle: cost, quality and time. Data were collected using an open question via the questionnaire during stage 1 to identify the range of criteria the respondents use to measure success in order to map their responses against the criteria set out in the 'Square Route'. The following sections provide details of the three topics starting with IS.

2.2 Systems

Systems play a major part in IS structures. Thinking about systems and how organisation structures could be considered as systems was studied by (Beer 1985). That early work recommended '... dissolving rather than solving problems' by putting an organisation's procedures in cybernetic order. Beer (1985) believed that managing systems was managing complexity that could be measured by a '... loose portmanteau variable' he termed 'variety'.

Beer (1985) saw a relationship between 'management, operators and the environment'. That relationship required channels for the flow of information to be in place. Even when those information channels were in place, Beer (1985) suggested the axiom that the 'variety' of the environment would always be greater than the 'operators' that serve it, while in turn the 'operators' will exceed the 'management' which attempt to control or regulate them. The relevance for project management is that the profession will always be in catch up mode, never in full control. Some mistakes or failures are therefore to be expected, with the temporary nature of projects simply making the problem more volatile and difficult to achieve success.

2.2.1 Systems Structures

Systems within an organisation can be considered as structured, semi-structured or un-structured. The movement between these three levels can be considered in systems terms as a requirement to be both effective and efficient. In structured systems e.g. early pay-roll or stock control, the aim was to become more efficient. Efficiency was achieved by doing more with the same resources or doing the same with reduced resources. Early IS project strategies did not question whether this was the most effective system (i.e. correct).

The derived information available through the use of feedback loops from structured systems was used to achieve an increase in efficiency. This enabled semi-structured and unstructured systems to support 'what-if' type questions to be answered, thus helping management to make informed decisions where the logic was un-structured. That is to say, unlike a structured system where facts and figures are known in advance, un-structured systems enable people to use flair and intuition, where fuzzy logic does not allow the precision used in deduction from a given set of data or facts.

The IS projects which project management implement can be involved in one or more of the systems levels. The efficiencies achieved from the early structured projects are often now being re-considered in terms of helping organisations with increased effectiveness, doing the right things with improved decision making.

Checkland (1985) and Wilson (1984) also studied systems and introduced the idea of 'hard' and 'soft' systems. Checkland (1985) produced a topology for understanding systems and labelled them as:

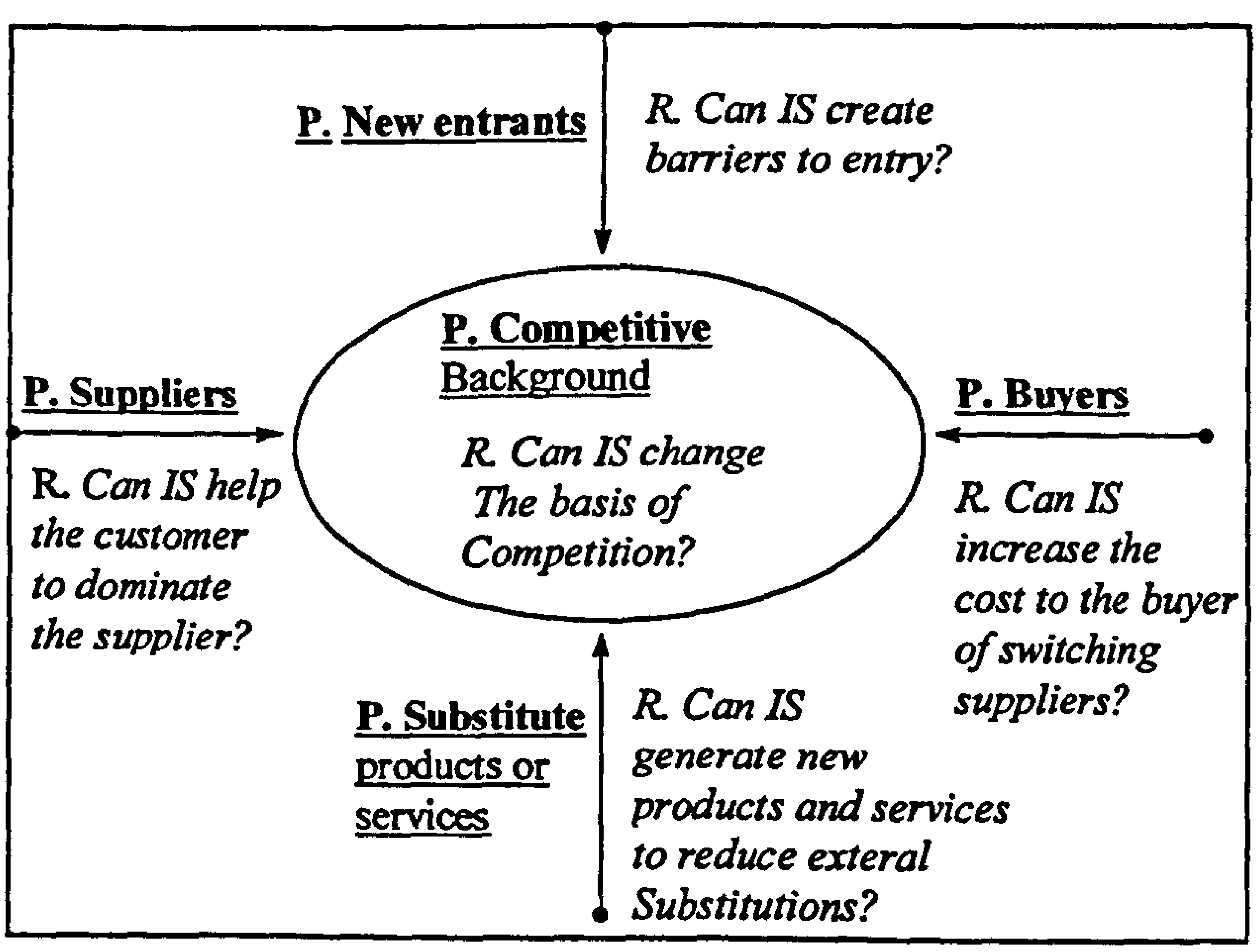
Design physical (e.g. boats),
Design abstract (e.g. mathematical models),
Natural (e.g. biological systems) and finally
Human activity (all aspects).

Checkland (1985) suggested the Human activity system required a different method of analysis and understanding to the other types of system. To help with that process the Soft Systems Methodology (SSM) was developed. IS projects include Human activity system and the SSM method is used by project, systems and design staff. When studying structured systems an analysis method called structured systems analysis and design methodology SSADM is used. One methodology for use by project managers is Projects in Controlled Environments (PRINCE), now at version 2 (Bentley 1998).

The systems thinking concepts have been developed into a method of understanding failure. Fortune and Peters (1995) used the systems thinking ideas when they created a systems approach to learning from failures, in contrast to other failure analysis techniques which they considered less accurate. For example Fortune and Peters (1995) described the official enquiry as a method from which lessons could be learned as '... very thorough but slow, cumbersome and expensive' and '... intends to concentrate on individual aspects of failure rather than considering it as a whole and investigating inter-relationships. It could, therefore, be reasonable to suggest that IS project management is a combination of design physical and human activity systems. The research questionnaire included questions about the use of both systems and project management methodologies used in successful projects to see if there were any indications that they were associated with project success.

2.2.2 Information Systems

A study by Porter (1985) described how business could be considered to be under attack from threats and produced a model called the 5 Force model to represent the idea. The forces were: 'New entrants' to the market place, 'Substitute products or services' which can replace existing products, 'Suppliers' who can manipulate prices and restrict the supply of products, 'Buyers' who can exert pressures through economy of scale purchasing and 'Rivalry' from similar positioned organisations. The 5 Force model was generic to any organisation. Robson (1997) tailored that 5 Force model to IS projects with the intention of identifying opportunities where Porter (1985) viewed only threats.



<u>Figure 2.1</u> <u>Robsons Adaptation of Porters 5 Force Model</u> Source: Robson (1997)

P = Porters original ideas ***R = Robson's adaptation to IS***

Parsons (1996) classified 6 different types of strategy an organisation could consider and how IS projects should be using them to obtain the possible benefits. These strategies were devised to enable the project manager to understand how organisations viewed the IS projects to be implemented that in turn would indicate the criteria against which the project would be judged. Those 6 different strategies are described below in Table 2.1.

Leading edge. IS are believed to be the driving force for the business placing a high risk on new and possibly untested ideas.
A free market. IS are viewed in an organisation as a profit centre which can withstand external competition, possible problem is the external competition may at some time prove a better business option with resulting in the IS dept being outsourced.
Monopoly. No external competition IS seen as part of an organisation, possible problem IS dept are single source and in a strong position to block new ideas
Necessary evil. IS are not considered important to the organisation. Resources and staff development not therefore seen as important.
Centrally planned. IS are included when organisational changes are planned and are seen as an integrative part of the system, not an unwanted overhead.
Scarce resource. IS are limited by funding without real reason an judged by cost/benefit criteria. Best benefits may not be allowed to surface due limited resources.

Table 2.1 **IS Strategies** Source: Parsons (1996)

The strategy developed for an organisation is one of the driving forces for the selection of the type of IS project required. If at the start of a project the most appropriate strategy is not selected, the chance of a successful project is already reduced.

It could be argued, that a project manager may be directed to implement an IS that is not the best strategic choice. Such an error at the strategic level could point the project in the wrong direction with stakeholders who are not fully committed. A contributory reason for some failed projects could be an incorrect strategic decision for the choice of systems and information requirements, and not a failure of the project management, or the resultant system. However, while the implementation of IS should be based upon an appropriate strategy, it may be ruined by poor project management. On the other hand, a poor strategy is very unlikely to be corrected by good project management.

For example, a strategy may indicate savings could be made by using an IS which would improve the efficiency within an organisation. Typically, removing a number of routine, mechanistic type work, associated with early pay-roll systems, would fit into this category.

If, on the other hand, a strategy indicates those in middle management need support for decision making, the IS required would need to be an effective not efficient system.

The author has demonstrated in Figure 2.2 how different strategic requirements could be mapped onto different types of IS. The three left most triangles were presented in Atkinson (1990) as an original diagram. Over the last ten years, new and updated IS types have also become available to managers. The two right most triangles of Figure 2.2 provide an updated illustration of how the types of IS can be mapped with an organisation process to provide more efficient or effectiveness.

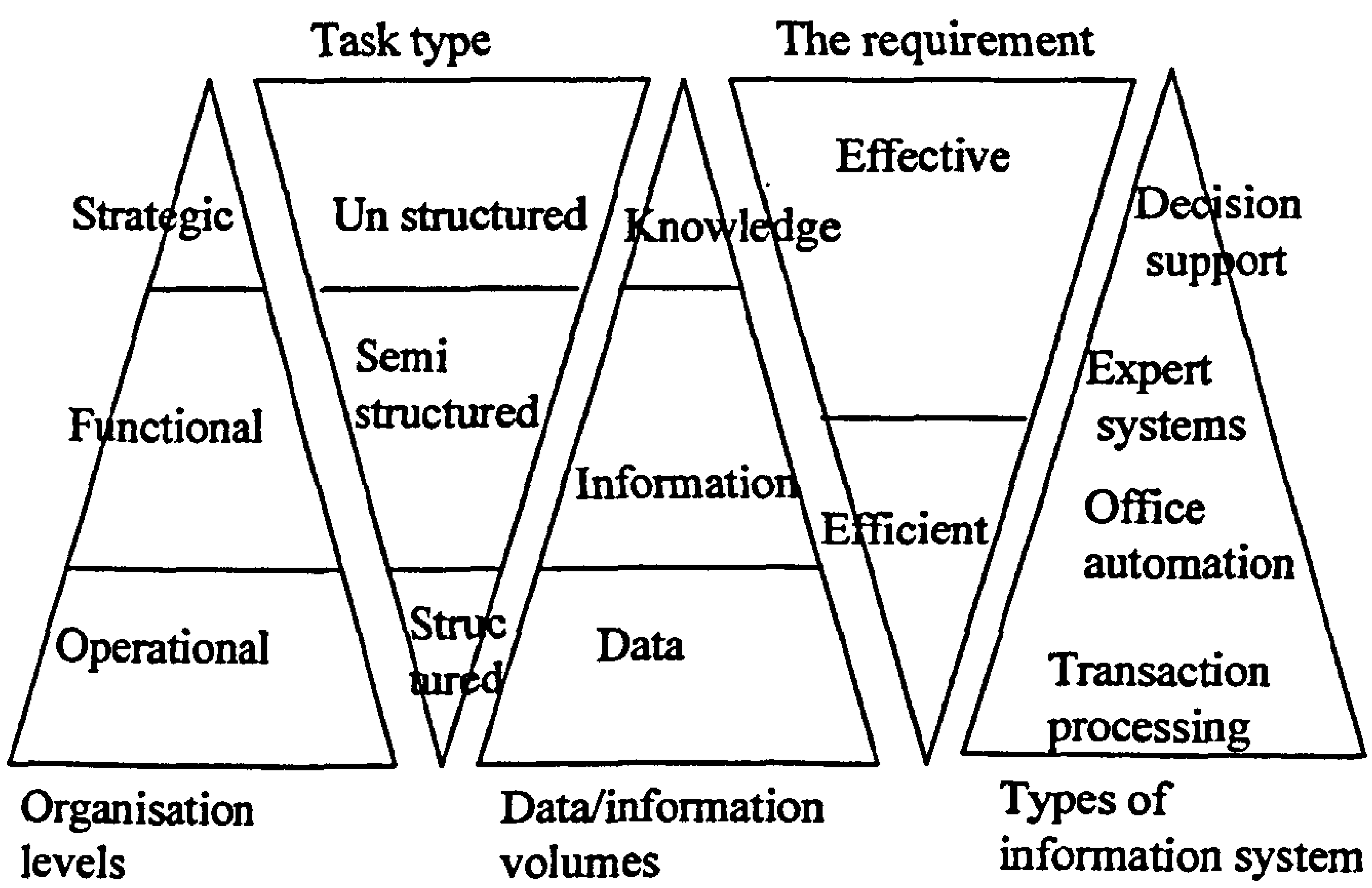


Figure 2.2 Information System Types and Applications Source: Atkinson 2000

The organisational requirements for different types of IS will change over time. The task for the IS project manager can be seen to be constantly changing, thus reducing the opportunity to learn from the mistakes of earlier projects. At the same time some bespoke systems are now being replaced with 'package' Commercial off the Shelf (COTS) type systems. The COTS type system offers a chance to reduce the time to implementation. At the same time, COTS change the existing problem/solution way of systems development to that of a solution/problem approach. This indicates how a strategy for an organisation's systems can be driven by existing COTS; thus, indicating how an IS can influence an organisation's operations in contrast to an IS simply supporting an existing operations.

Therefore, the variables that project managers are trying to control can be seen to be changing over time. From this, parallels can be made between the early axiom of Beer (1985) and some of the problems for project management, i.e. that the '... environment will be greater than the operators trying to serve it, which will be greater than the management attempting to control it', some IS project failures could be considered inevitable.

2.3 Project Management

Oisen (1971) suggests the term project management came into popularity after 1954 when a team was put together to 'manage a crash project for the U.S. Airforce's missile program'. At the American Project Management Institute Symposium in 1970, several attempts were made to describe project management and since then other authors have offered ideas to define project management. Oisen (1971) views were formed from the 1950's and may have been one of the earliest attempts to define project management.

> 'Project Management is the application of a collection of tools and techniques (such as the CPM and matrix organisation) to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints. Each task requires a particular mix of theses tools and techniques structured to fit the task environment and life cycle (from conception to completion) of the task'.

Notice the success criteria are intrinsically linked to the definition. Those limited criteria for measuring success included in the description used by Oisen (1971) continue to be used to describe project management today. The British Standard for Project Management BS6079 (1996) defines project management as:

> '... any management activity that introduces a new objective or causes change and has a definite start and finish time is a project'. This is achieved by ' ... the planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance'.

The UK Association for Project Management (APM) has produced a UK Body of Knowledge (BoK) (1995) which also provides a definition for project management as:

'The planning, organisation, monitoring and control of all aspects of a project and the motivation of all involved to achieve the project objectives safely and within agreed time, cost and performance criteria. The project manager is the single point of responsibility for achieving this'.

'There are many definitions of a project. The simplest form of a project is a discrete undertaking with defined objectives often including time, cost and quality (performance) goals. All projects evolve through a similar life-cycle sequence during which there should be recognised start and finish points. In addition the project objectives may be defined in a number of ways e.g. financial, social and economic, the importance being that goals are defined and the project finite'.

The UK APM BoK (1995) was divided into 4 main categories. These are Project management, Team, Tasks and General management. These 4 main categories were further subdivided into 40 specific topics requiring a knowledge or ability to carry out tasks. A copy of the topics included in the APM BoK (1995) is given in Appendix A. Several countries have developed their own BoK for project management, which seems to indicate that at least at an international level the factors which collectively are project management are not consistent. Wirth and Tryloff (1995) compared the contents of 6 project management BoK's from 6 different countries. The analysis identified a range of common and unique factors that the project management community for each different country.

Turner (1996) provided a consolidated matrix that helped to understand and moderate different attempts to describe project management. The matrix contained 68 functions, divided into 10 sections that he considered was '... an initial attempt at scoping an international project management BoK'.

Turner (2000) suggested that attempts to define project management during the 1990's, '... had proved to be a triumph of nationalism over globalization', and pointed to the Competence Baseline issued by the International Project Management Association as a further attempt to agree core elements. A review of the APM BoK undertaken by Morris and Dixon (2000) proposed 17 significant differences to be considered by those charged with producing a revised APM BoK (2000), the structure is given in (Appendix B). A revised APM BoK (2000) served to demonstrate that the profession of project management is evolving to reflect the new challenges and changes faced by the profession. A further example that Beer's (1995) axiom continues to apply to project management.

Other similar but different views of project management are offered in the British Standard 6079 (1996) and the British Computer Society Special Interest Group BCS PROMS-G. Lock (1992) suggested project management was '... a specialised branch of management' but which requires a '... clear grasp of proven and long-established principles of management and leadership'. Boddy and Buchanan (1992) on the other hand considered that project management was primarily to do with change.

Benjamin and Levinson (1993) suggested that one of the most important factors for a project manager is to have '... at several levels of detail the risks mapped out over time and a common frame of reference and vocabulary for discussing and managing change'.

Burke (1993) focused upon what could be considered traditional views of project management, planning and control while Reiss (1995) considered that a project was a human activity that achieves a clear objective against a time scale. To achieve this, while pointing out that a simple description is not possible, Reiss (1995) suggested that project management was a combination of management and planning and the management of change. Lock's (1992) view was that project management had evolved in order to plan, co-ordinate and control the complex and diverse activities of modern industrial and commercial projects. Burke (1993) considers project management to be a specialised management technique, to plan and control projects under a strong single point of responsibility. Meredith and Mantel (1989) and Stuckenbruck (1986) have also attempted to define project management, and that process continues.

Ward (2000) pointed out that 12 leading project management textbooks all provided different definitions suggesting his preferred, but not own definition was, 'Project Management is the interdisciplinary process of achieving a satisfactory end result'. The process of attempting to define project management can be seen to have been an on going debate during the second half of the twentieth century. During the same period three criteria for measuring success, namely cost quality and time have been linked to the definition. This may be a limiting factor if the perception is that project management is measured using only those criteria.

Many different descriptions for project management can be found. Three decades ago Oisen (1971) noted that '... there seemed to be as many different definitions as there were people defining the term' and since then many more definition have been suggested. There is possibly a paradox in even attempting to define project management. Can a subject, which deals with a '... unique, one-off set of complex task' as suggested as early as Oisen (1971) be defined? Project management could be described as an evolving phenomenon. While not ambiguous, it remains vague enough to prevent a single rigid definition. This could be a flexible attribute contributing to its enduring strength.

However, while several different descriptions for project management have been offered in the past 30 years, the generic criteria for measuring success, namely cost, quality and time remain the same. It was for these reasons that questions about how projects are measured for success and how project managers would prefer to measure project success were included in the questionnaire.

Having a standard would appear at the outset to be a requirement of project management. But the fact that there are several standards referring to the same topic indicates there is not *'a'* standard at all. While the UK APM have their BoK (2000) for project managers to use as a reference document, it is not a definitive list. In some respects, organisations magnify the difficulty as they compete to be seen as the 'standard', standard creator. Meanwhile work on an international Body of Knowledge to resolve this problem continues, with initiatives such as described earlier by Turner (2000).

To conclude the section about project management, a definition offered by the author is: project management involves the application of knowledge, skills and intuition to deliver an acceptable product or change.

2.4 Management

Drucker (1993) was one of the first writers about management and continues in his early belief that management involved five basic principles. These are presented in Table 2.2.

setting objectives
organising,
motivating and communicating
establishing measures of performance
and developing people.

Table 2.2 Five Basic Principles of Management Source: Drucker (1993)

Fayol (1997a) is credited with identifying 6 management activities and 14 principles of management Fayol (1997b); these are presented in Tables 2.3 and 2.4 respectively.

Forecasting
Planning
Organising
Commanding
Co-ordinating
Controlling

Table 2.3 Fayol's Managerial Activities Source: Fayol (1997a)

These 6 activities as defined by Fayol can be seen to be some of the core requirements for project management APM's BoK (1995). From this it can be seen that the early thoughts of what managers did could be classified as involving Structure and Organising tasks. Included also is the commanding activity, as identified by Fayol that involves the people side of management.

Division of work	Opportunity for initiative
Authority	Interest subordination
Discipline	Remuneration
Unity of command	Centralisation
Scalar principle	Order
Unity of direction	Equity of treatment
Esprit de Corps	Stability of turnover

Table 2.4 **Fayol's Management Principles** Source: Fayol (1997b)

Building on Fayol's ideas, many other management writers progressed the subject into different specialist areas, at times having some overlap. Crainer (1998) studied who he believed to be the top 50 writers about management; a summary of the writers and their contribution to management is given in Appendix C.

One of the factors considered by Crainer (1998) was to view management writers as so polarised that their views of the subject could be classified as either an art or a science. While in reality a balance of those two extremes would seem most likely, the split between the different management writers and their thinking about management over the last century can be seen to alternate over time between the two polarised views. It can be seen that over time the development of management did not build upon the existing view, but considered the topic from a polarised position.

For example, Buchanan & Huczynski (1997) reported how in 1911 Frederick Taylor worked on the ideas of Scientific Management in the Bethleham Steel Company. The next significant view of management was developed from the Hawthorne studies carried out between 1924-33 in the Western Electric Company. These experiments looked into the conditions of the working environment from a people perspective. Figure 2.3 demonstrates the chronological study of management as a science or an art.

Science	Art
1900	
Scientific management	
	Hawthorne studies
Operations research	
	Maslow's Hierarchy
	Theories X and Y
Strategic management	
	Service
Competitive forces	
	Quality
Systems theory	
	Empowerment
Reengineering	
	Competencies
2000	

Figure 2.3 Management as Art or Science Source: adapted from Crainer (1998)

The development of project management has benefited from the early work of management theory by adopting some of key topics such as planning, organising and controlling and introduced methods, standards, tools and techniques appropriate to project management. There have not been the polarised views within project management that it is either a science or an art as can be seen to have taken place in the development of general management.

Management over the last century has been the subject of several attempts to be understood and defined. With so many changes and often polarised views about the subject of management, it could be argued that the topic has suffered from adopting the latest ideas, rather than any significant attempt to develop previous knowledge. This in turn could reduce the topic of management to a temporary set of new ideas, which collectively has been termed 'fads'. Partridge and Perren (1994) advised caution in rushing to adopt new management techniques, citing management by objectives, work study, total quality management, and business process re-engineering as examples of management concepts and techniques not now in favour. Management can be seen not to have developed by building on some of the benefits of the earlier techniques. As new techniques emerge the current fad goes through a 'tarnishing stage' rendering the whole of the current technique undesirable. Wastell (1996) considered management fads a fetish for weak managers to use as a defence mechanism and to hide behind when problems occurred.

Tsoukas (1994) believed that the continual search for what would be considered 'real' management had resulted in the subject being reduced to a '... codification of work'. As more knowledge is known about what constitutes management, the codification would increase as it would do naturally when changes in the environment demanded new ideas to be used. Questions about the tools and techniques used on successful projects were therefore also included on the stage I questionnaire.

A key difference between management and project management is that project management is delimited by time, whereas general management is an on-going process. This key difference between management and project management provides the basis to distinguish between the two disciplines. A role of management is to make today the same as yesterday, while naturally accepting the need for continuous improvement. Project management on the other hand is about change. Information systems project managers bring about rapid change in organisations and change the way systems and people operate. Maylor (1999) illustrated the differences between management and project management by listing the factors against a common subject. Extending that original idea from Maylor (1999) has enabled Table 2.5 to be produced.

The terms are largely self explanatory and it is not possible within this Chapter to discuss, in detail, all the contents of Table 2.5. The following few examples will serve as an illustration. Change in a traditional management environment is usually a gradual process. The change brought about by the introduction of IS often requires the users and other stakeholders to make rapid changes in working patterns. The purpose of management is to do something 'because' that is what was expected and is based upon what has been done before. The purpose of project management on the other hand is to undertake some tasks 'in order to' move into a changed order of work or new processes. Project management unlike management has at the outset a finite and agreed time scale within which an agreed task would be achieved.

Generic Variables	Management	Project Management
Authority	Clear, reflects position	Ambiguous
Change	Gradual/continuous	Rapid/step/incremental
Control	Rules	Quality
Culture	Role and power	Task
Information	Established	New, unknown
Management Style	Authoritative	Participative group
Motivation	Extrinsic	Intrinsic
Purpose	'Because'	'In order to'
Roles	Clear	To be defined
Staff	Permanent	Temporary
Structure	Line, hierarchical, flat	Matrix, project
Task	Repetitive	Unique
Time scale	On-going	Limited, finite
Finances	Operational	Capital
Success criteria	Single or limited stakeholders	Multiple stakeholders
Success factors	Process (Doing things right)	Product (Getting things right)
Risks	Continuation almost assured	Cancelled if objectives not met
Estimating	Based on yesterday (known)	Based on tomorrow(unknown)
Skills	Specialised	Multidisciplinary
Schedule	Static, predictable	Dynamic, changing
Opportunity for success	Gradual improvements	Right first time

Table 2.5 Management vs. Project Management Source: Extended from original Maylor (1999)

2.5 The Project Manager

Lists and tables of factors are available from authors such as Dibble (1995), Bentley and Rafferty (1992) and Fried (1992) which act as a guide to project managers', but the rate of failure of IS projects remains high. Atkins (1980) suggested that the individual selected for the post of project manager was likely to influence the focus of the project. Atkins (1980) produced a list of the functions to be undertaken and the characteristics that IS project managers should possess. If the style of the project manager is likely to influence the focus of a project, it is important to understand what that focus would be.

Webster (1994) discussed and extended what is called the Herrmann Brain Dominance Profile, which can provide some ideas to aid understanding how the project manager is still likely to influence the focus of a project. That profile illustrates how the brain is divided into hemispheric left and right also into hemispheric top and bottom, Figure 2.4. Each of the quadrants or pairs has been identified as responsible for different purposes. For example, the left hemisphere has been demonstrated to be responsible for such as linear, analytical thought, while the right hemisphere has been linked with emotive or spatial attributes.

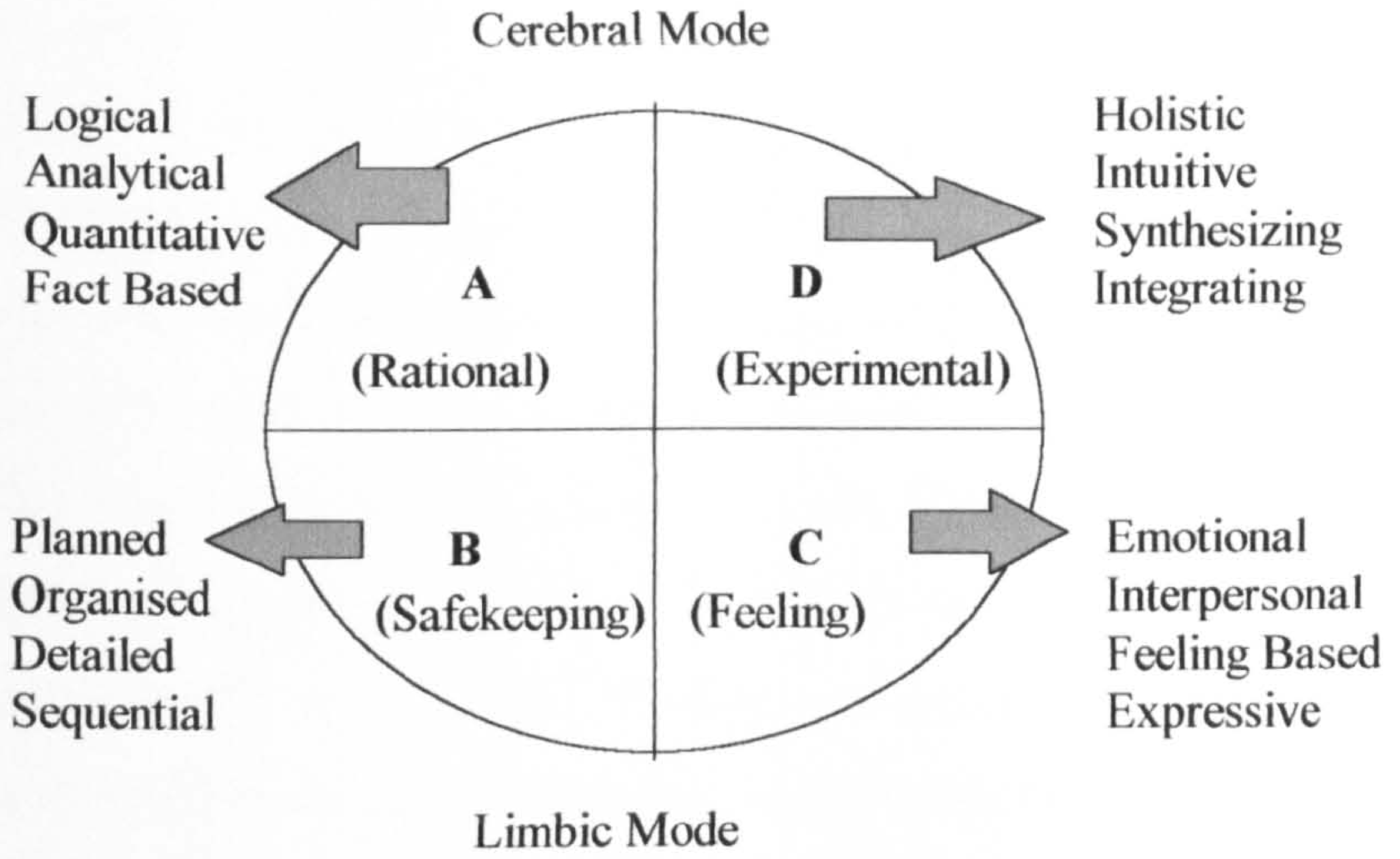


Figure 2.4 Brain Dominance Profile Source: Webster (1994)

Having identified that the four quadrants of the brain deal with different tasks, Webster (1994) has further catalogued into which quadrant some project management factors could be positioned, as illustrated in Figure 2.5.

Structure Work Breakdown Structure (WBS) Project Evaluation Review Technique (PERT) Critical Path Method (CPM) Bar charts Networks **A**	**Innovation** Seeking opportunities Problem solving Contingency planning **D**
B **Organising** Responsibilities Task assignment Staff hire/fire Expediting	**C** **Managing people** Mentoring Meetings Negotiating Training Counselling Coaching

Figure 2.5 Brain Dominance Profile and Project Management Process

Source: Webster (1994)

Project management can be seen to have links to all the 4 quadrants of the brain. This would sit comfortably with the view that project management is a holistic profession, requiring the person to have a balance of what could be termed attributes from both art and science. Figure 2.5 demonstrates how the different tasks and responsibilities of IS project management can be considered to map onto the 4 quadrants of the brain. For example, the top left quadrant of the brain is active with logical and analytical methods. This would fit with the tasks that benefit from those methods, such as work breakdown structure techniques or critical path networks. At the same time the lower right quadrant of the brain controls feeling and emotion. The lower right quadrant would be active for tasks used to manage people, the one that would deal with issues of trust. It would be reasonable, therefore, to suggest that a project manager should use (not necessarily equally) the four quadrants of the brain, in order to satisfy the eclectic collection of tasks needed for project management. Spinola (1997) discussed the results of a research study that indicated from over 500,000 submissions of the Herrmann Brain Dominance Profile the '… majority of the population have more than one dominance' as shown in Figure 2.6. The results further suggested that a project manager should ideally use all quadrants in order to '… maintain equilibrium in the team' but should '… at the least be double or triple dominant'. The findings from Webster (1994) indicate that while project managers do consider aspects from each quadrant, they concentrate their attention to the top left quadrant of the brain. That was the quadrant found to be active with tasks dealing with structure and logic, based upon facts, the quadrant which has been linked with networks, critical paths and planning. Figure 2.6 presents the dominance profile of a project manager.

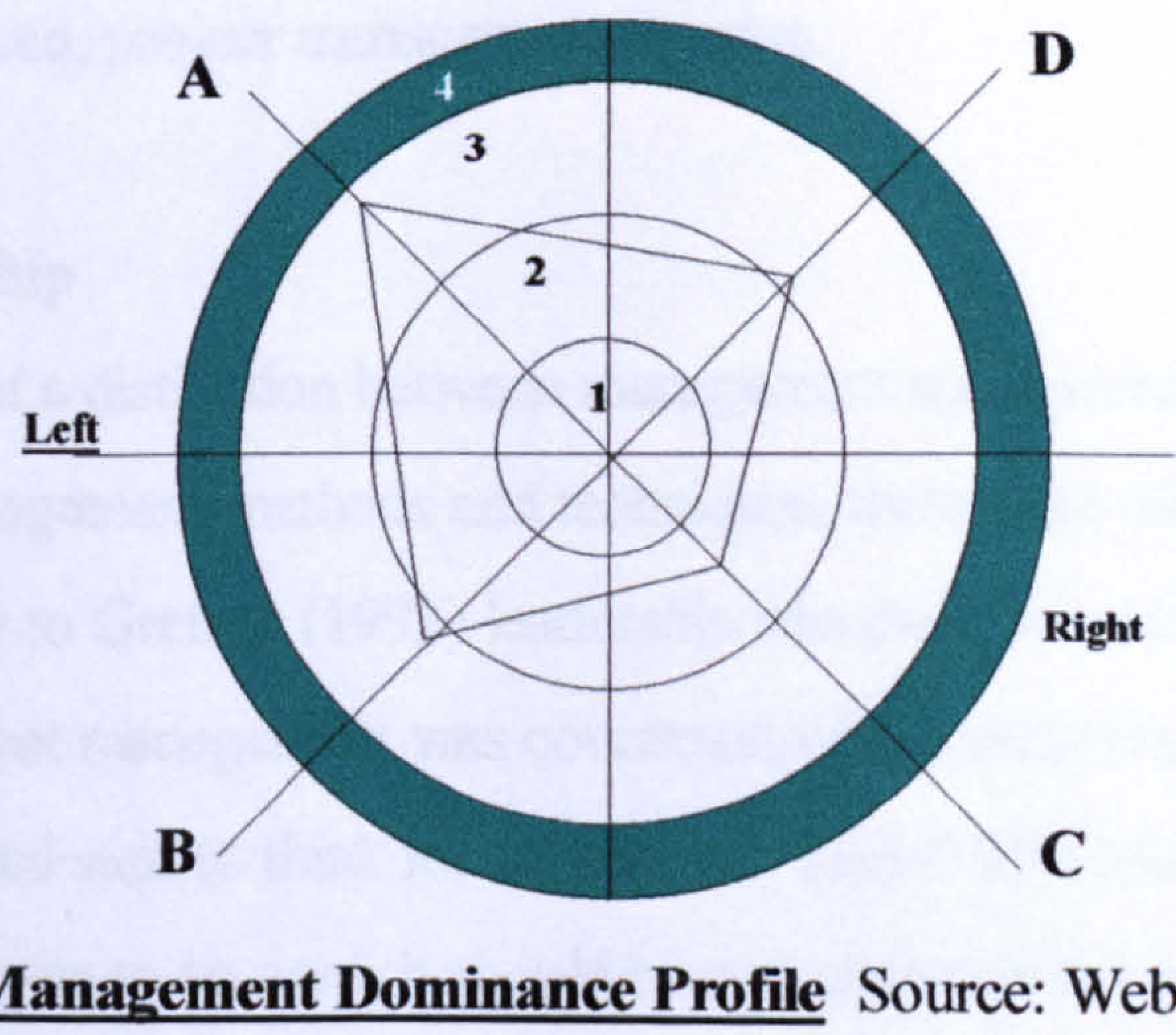


Figure 2.6 **Project Management Dominance Profile** Source: Webster (1994)

Left: Speech, Linear, Analytical, Rational. **Right:** Concepts, Emotive, Spatial Holistic.

The key to the sectors numbered 1 to 4 is as follows:

Sector 1 - Avoid using,

Sector 2 - Prepared to use,

Sector 3 - Prefer to use,

Sector 4 - Strong preference.

The results indicate project managers prefer to work in the quadrant A. Having a focus upon the Structure quadrant would indicate the project manager prefers to consider the fact based topics, using tools such as Project Evaluation Review Techniques. To a lesser extent, project managers do use quadrants B (Organising) and D (Innovation). What the research further indicates is that project managers are least likely to consider or spend time managing people. Webster (1994) has provided data to suggest that project managers are triple dominant, preferring quadrants A, B and D. The part of the brain which project managers appear to use most is the top left, which considers factors such as planning. If project managers do not at the same time consider the people issues, by using the right side of the brain, specifically the lower right quadrant of the brain, i.e. (quadrant C), the people issues of project management are perceived to be of only low importance. Most writers have indicated that the 'soft' issues are important to project success, yet the profile of project managers suggests that they are least likely to consider such issues, this is a concern. To study this further the questionnaire developed in this research included questions regarding which factors of project management the respondents believed to be important to IS project success. In Chapter 4 an evaluation of those results have been mapped onto the Herrmann brain dominance model to identify which quadrant of the brain, the respondents believed, project managers were using.

2.6 Leadership

Adair (1991) provided a distinction between management and leaders and identified that while there were management methods and techniques, there were different styles of leadership. According to Gretton (1995) leadership was more important than management, the difference being that management was concerned with control while leadership gave up control and empowered staff to think for themselves. Tam (1994) had earlier pointed out that if empowerment was to be used, it should be real, authentic not pseudo-empowerment. Schonberger (1994) did not believe leadership was correct for IS projects and argued that 'teamsmanship' was more important. Schonberger (1994) argued that if the composition of a team could be held together from project to project, this would achieve more than leadership styles. One possible style of leadership the project manager could adopt, would be the approach suggested by Machiavelli (2003). The fifteenth century civil servant, Machiavelli documented what he believed to be the style and attributes of successful leaders that differed from earlier treatises which suggested that '... man should gain his ends by communication and persuasion rather than by force or treachery'. Machiavelli (2003) spoke of the virtue of control and the prudence of risk assessment. However, the basis of Machiavellian leadership was based on aggression; the '... bold would succeed better than the hesitant', was one of Machiavelli's views from which he became known as '... the profit of force'.

Some modern corporations exhibit similar conditions to those described by Machiavelli. Project managers need to achieve a clear objective and performance related incentive schemes can produce aggressive behaviour when multi targets create conflicting requirements on staff. However, Graham (1996) found no link between having a project manager with a Machiavelllian style of leadership and successful projects. Neither did he find any support for the premise that successful project management would be linked to those believed to be exhibiting a so-called 'high Macs' rating. The attributes of those project managers who obtain a high Mach rating are that they manipulate people more, win more, are persuadable less and persuade others more.

The composition of management and project management has been discussed in previous sections to determine the synergy for the two subjects. Trust was found in the management and leadership literature as important. Trust however has not been identified as a key factor in any APM BoK, or the BS 6079 (1996), so it would be unlikely to be considered important by project managers. The questionnaire for stage 1 has included questions about how the importance of trust is viewed in relation to IS project success.

Hartman (2000) has also identified the importance of trust within project management, but those ideas were presented 4 years after the gap in the literature was identified for this research. Although the Hartman (2000) work was unable to influence the questionnaire for this research, a discussion of that literature of trust has been included in Chapter 5.

2.7 Reasons for Failure

Before a more detailed discussion of the literature of success and failure factors are presented, it is considered worthwhile at this point to indicate the generic reasons for failure. According to Flew (1976), the reasons for failure are twofold. Either something was done incorrectly, sometimes referred to as a sin of commission, or something that should have been done, was missed, referred to as the sin of omission.

Factors known to be critical to the success of a project, but were incorrectly implemented, would be an example of a sin of commission. Such as not having senior management support. The second reason for failure could be where a key success factor had yet to be found. In this case, a sin of omission had taken place within project management. This research posits that the failure to consider the likely influence of trust and by limiting the criteria of measuring success mainly to cost, quality and time, are two examples of a sin of omission within project management.

Handy (1996) provides a connection between the 2 sins (commission and omission) and the types of errors as defined and used in statistics. Handy (1996) argued that the sin of commission could be considered similar to a Type I error in statistics. This is when something is done incorrectly. At the same time, the sin of omission could be compared with a Type II error in statistics; when something has been missed or not done as well as it could have been. Handy (1996) pointed to an earlier example where the distinction between the sin of commission and the sin of omission had been understood, comparing these with Type I and Type II errors. The old prayer book (1662) from the Anglican Church, includes the words:

'... forgive us for the things we have done and ought not to have done', this is an example of a sin of commission, a Type I error.

'... and for the things we should have done but have not done', this example describing a sin of omission, a Type II error.

By making this link, Handy (1996) further argued that occurring within management would be both the sin on commission (Type I error) and the sin of omission (Type II error). The summary of this work will consider the findings within this framework.

Examples of sins of commission and omission can be found within project management. Quality control is used during the development of IS projects. If undertaken correctly, quality control would increase the chances of project success, but if administered incorrectly, the very control designed to help a project will become dysfunctional. Consider the implications , if more items than were needed for statistical significance were unnecessarily checked during the quality control function of a project. The development of that system would as a result be slowed down, possibly resulting in a late and/or over budget project. In other words, a Type I error had taken place. The team responsible for quality control had done something wrong, they were over zealous in their checking. A positive error had taken place, a sin of commission. The project was late as a direct result of too many quality control checks.

If, on the other hand, the same quality control system did not check a sufficient number of items, and some errors had been allowed through to systems implementation. In this case the quality control team had not undertaken the checking as well as they could have done. Something was missed, this time resulting in a Type II error, the sin of omission. The Ariane 5 project identified earlier in Table 1.4 dated 25th July indicated a case of a sin of omission, a Type II error. The testing by the quality team was not done as well as it could have been. In the case of the Ariane 5 project, existing software from a previous system was altered, unit testing was undertaken, but no new integrated tests were carried out. Quality control had been devolved from a central point to one where all the staff thought someone else was responsible for quality, resulting in the integrated systems tests being overlooked. Quality control must be administered correctly if it is to assist the development of a project. At the same time, all the factors that influence the success of IS projects should be considered as having two failure options, Type I and Type II. The stage 1 questionnaire required the respondents to indicate if any Type II errors had occurred on their projects.

Assuming, therefore, that the contents of the BS 6079 (1996), APM BoK (1995) and other lists of 'how to' and 'what is' project management are correct, the continuing failure of IS projects could be reduced to 2 possible reasons. Either known success factors have been administered incorrectly, i.e. (a sin of commission), or the lists of success factors are not yet complete, i.e. (a sin of omission).

In the proceeding sections the description of project management has been discussed together with standards such as the APM BoK (1995) and BS 6079 (1996). These catalogue the factors of project management. It has further been suggested that the project manager would influence those factors that s/he would prefer. The generic reasons for failure have also been discussed. However, what is missing from these list and tables is any sense of importance or ranking of the topics that would result with a successful project. These are known as critical success factors and are addressed next.

2.8 Success Factors

Factors that are considered to be important to achieving success have been produced by Posner (1987). Table 2.6 represents what were considered the skills for project management, which are not limited to IS.

1.	Communication Skills (84)	4.	Leadership Skills (68)
	Listening		Sets example
	Persuading		Energetic
2.	Organisational Skills (75)		Vision
	Planning		Delegates
	Goal setting		Positive
	Analysing	5.	Coping skills (59)
3.	Team building skills (72)		Flexibility
	Empathy		Creativity
	Motivation		Patience
	Esprit de Corps		Persistence
		6.	Technological Skills (46)
			Experience
			Project knowledge

Numbers in ( ) indicate relative % following absolute replies n = 1400

Table 2.6 Project Management Skills Source: Posner (1987)

What is interesting from this relatively early attempt to rank project management skills is that communication skills (an example of a so called soft skill) is considered to be 84%

critical while technological skills (so called hard skills) were ranked last with a value of 46% criticality. Yet the findings from the Webster (1994) study (discussed earlier in section 2.5) identified that the factors associated with left-brain dominance (so called hard skills) were the most used.

Project management involves managing different stages of a project. This was studied by Pinto (1988) who identified 10 critical success factors and 4 additional external project critical factors and linked them to specific project stages while also providing a rank of the criticality of those factors. Pinto (1988) tested these critical success factors during the following 4 phases of a project, namely the conceptual, planning, execution and termination phases. The results are given in Table 2.7.

Phase	Critical Success factors
Conceptual phase	Project mission, Client consultation (64%)
Planning	Project mission, Top management support, client acceptance, urgency (E) (65%)
Execution	Project mission, Characteristics of the project team leader (E), Trouble-shooting, project-schedule/plans Technical tasks and Client consultation (66%)
Termination	Technical tasks, Project mission, and Client consultation (60%)

Table 2.7 **Key Factors for Success** Source: Pinto (1988)

Percentages in brackets give the criticality of the factors with the likelihood of a successful IS project. For example, during the concept phase, the project mission and client consultation was believed to be 64% critical to the success of a project. The 'E' denotes an external factor. Geddes (1990) produced the following list of factors and their ranking that are presented in Table 2.8. The Table indicates the low importance of technical skills and knowledge but a need for clear objectives and a need to include the Users. The late 1980's produced a sudden interest in both defining and ranking both project management criteria and success factors. Belassi and Tukel (1996) compiled a list of critical success factors taken from the authors, Martin, Lock, Cleland and King, Pinto and Slevin, and Morris and

Hough. The significant result from Belassi and Tukel (1996) was to extended the knowledge of how the success factors would differ between industry and project type.

Belassi and Tukel (1996) identified that for Management Information Systems (MIS) projects the most critical factor was the project's project manager. This finding was supported by Cooke-Davies (2002). Having identified 12 'real' success factors, all unrelated to 'human factors', the conclusion made was that the 'people side of success factors is woven into their very fabric'. Cooke-Davies (2002) argued that the survey frame and questions had produced a bias excluding people factors from the results.

	Relative position	% importance
Clearly defined objectives	1	96
High user involvement	2	80
Executive quality of the Project Manager	3	73
Well defined Project management structure	4	69
High user commitment	5	69
Quality of project management team	6	57
Choice of project	7	57
Planning and control methods in project	8	57
Limited objectives	9	30
Well defined responsibilities	10	26
Good estimating methods	11	23
Technical quality of project manager	12	7

Table 2.8 **Success Factors of IS Projects** Source: Geddes (1990)

The Belassi and Tukel (1996) work has provided some differentiation of success factors by different factor groups. Ward (2000) reviewed the Belassi and Tukel (1996) paper and pointed out that there was 'almost no commonality'. From 61 issues identified, only 3 issues appeared in four lists with only one issue mentioned specifically on 5 occasions. Ward (2000) continues that '... even allowing for the different terminology', '... project controls could be said to have 10 mentions, but despite this did not appear in all the lists'. It could be argued that the information known about the subject of critical success factors could be likened to how Ward (2000) described creative designers as '... divergent thinkers, who explore and expand a problem, develop considerable knowledge of a subject but do not necessarily get any closer to a solution'. The solution required in this case, was an increase in the rate of successful projects. Ward (2000) further states that '... whilst the literature has identified the causes of project success and failure, it has not satisfactorily explained the *reasons* behind these causes to help us find new ways of dealing with the issues'.

A reason offered by Ward (2000) is the importance of alignment, adding that personal objectives will carry more weight and that importance can be tested using the Prisoner's Dilemma. The Prisoner's Dilemma is a game where the variables under test are co-operation and trust between the players. The Prisoner's Dilemma was adopted and adapted for stage 2 of this research and is explained in detail in Chapters 5 and 6.

Wateridge (1996) researched into critical success factors for IS projects. That research identified the following weightings, shown in Table 2.9 that the respondents believed to be linked to project success. In common with other studies, that was compiled using attitudinal surveys. The survey in this thesis also included behavioural questions in addition to some attitudinal questions. These behavioural questions were used to test whether the replies obtained from the attitudinal surveys were borne out in practice.

	weighted average weighted max =9
Manager/user attitudes towards systems development	7.1
Training in the systems approach for EPD staff	7.0
Operating and middle management involvement in planning	6.9
Technical expertise of EDP personnel	6.8
Operating and middle management involvement in analysis and design	6.5
User and management expertise in making their information need known	6.3
The use of data base management systems	6.0

Table 2.9 **Critical Success Factors for IS Projects** Source: Wateridge (1996)

An introduction to the Standish group results reported by Gallagher (1995) was presented in Chapter 1. That survey involved 365 respondents and represented 8,380 projects. The projects were divided into 3 types, these were:

- project success 16.2% (on-time on budget with all features as specified),
- challenged projects 52.7% (described as over time and budget which did not meet all the functions specified),
- impaired projects 31.1% (cancelled at some point during development).

Table 2.10 shows the link between success and the costs of projects.

	Large	Medium	Small
	$500m	$200m	$100-200m
Successful	9%	16.2%	28%
Challenged	61.5%	46.7%	50.4%
Impaired	29.5%	37.1%	21.6%
Cost overrun av.	178%	182%	214%
Time overrun	230%	202%	239%

Table 2.10 Project Success by Costs Source: Gallagher (1995)

Tables 2.11, 2.12 and 2.13 contain the different success factors that were associated to successful, partly successful and failed projects, described by Gallagher (1995) as successful, challenged and impaired projects.

1.	User involvement	15.9%
2.	Executive management support	13.9%
3.	Clear statement of requirements	13.0%
4.	Proper Planning	9.6%
5.	Realistic Expectations	8.2%
6.	Smaller project Milestones	7.7%
7.	Competent Staff	7.2%
8.	Ownership	5.3%
9.	Clear vision & objectives	2.9%
10.	Hard working, focused staff	2.4%
11.	Other	13.9%

Table 2.11 Factors of Successful Projects Source: Gallagher (1995)

1.	Lack of User input	12.8%
2.	Incomplete Requirements & specifications	12.3%
3.	Changing requirements & specifications	11.8%
4.	Lack of executive support	7.5%
5.	Technology incompetence	7.0%
6.	Lack of resources	6.4%
7.	Unrealistic expectations	5.9%
8.	Unclear objectives	5.3%
9.	Unclear time frames	4.3%
10.	New technology	3.7%
11.	other	23%

Table 2.12 Factors of Challenged Projects Source: Gallagher (1995)

1.	Incomplete requirements	13.1%
2.	Lack of User involvement	12.4%
3.	Lack of resources	10.6%
4.	Unrealistic expectations	9.9%
5.	Lack of executive support	9.3%
6.	Changing requirements and specifications	8.7%
7.	Lack of planning	8.1%
8.	Didn't need it any longer	7.5%
9.	Lack of IT management	6.2%
10.	Technology illiterate	4.3%
11.	Other	9.9%

Table 2.13 Factors of Impaired Projects Source: Gallagher (1995)

Comparing the results from Table 2.11 with the work from Webster's (1994) Project Management Dominance Profile, Wateridge (1996), Pinto (1988) and Geddes (1990) provide a useful insight into what are believed to be the factors for success, they include:

- having a clear user specification,
- supportive senior management,
- user involvement,
- planning.

Although the APM BoK (1995) and BS 6079 (1996) appear to have indicated what constitutes project management, the management of projects has a focus upon a different set of factors. Ward (1994) points to project managers needing more importantly to understand the dynamics of work resources and time. For example, Ward (1994) indicates the importance of understanding the Law of Marginal Utility and 'Brooks Law'. The law of Marginal Utility applies to systems development projects and states that while each new person makes a contribution, that new person makes less contribution until eventually either no or a negative contribution is made. 'Brooks Law' states that adding resources to a late software development project further delays the project. The formula to calculate 'Brooks Law' is that no more staff than the square root of the total amount of estimated man months is needed, i.e. for a 100 man month project, 10 staff would be required. 'Brooks Law' would suggest that, more than 10 staff on a 100 man month project would not result in reduction of time, and may result in an increase in time and associated costs. Questions were included in the questionnaire for this thesis to specifically test whether 'Brooks Law' applied in the successful IS projects surveyed. Details are given in Chapter 4.

Some projects are called 'runaway'. Those projects continue to fail despite early warnings, but project staff tend to press on against evidence that cancellation should be a valid option. The London Ambulance System (LAS) could be classified a runaway project. The final auditors' report for project LAS, (Williams 1993) indicated that serious problems had been encountered. For example, the supplier of the technology stated the equipment would not work where there were over-head power lines and high rise buildings. The LAS system was intended to operate in central London. This warning was ignored along with several others.

Keil et al (1994) investigated 'runaway' IS projects and identified three common factors:

- Self-justification theory (SJT),
- The concept of escalating commitment,
- Prospect theory.

SJT was described as '... individuals seeking to rationalise their previous behaviour against a perceived error in judgement'. The theory suggests that in the presence of negative feedback, individuals who have made a prior commitment to a project are, more willing to commit additional resources than those without any prior commitment.

Collins (1994) identified an example of Self Justification when he interviewed the Chief Executive of the London Stock Exchange who cancelled TAURUS, an IS project, which had exceeded both cost and time budget. This is example of a runaway project. Those involved in the earlier stages of TAURUS continued to support the project, despite poor progress. What TAURUS required was someone concerned for the project, but who was not too close that a decision to cancel would have indicated personal failure. The New Chief Executive of the London Stock Exchange was in such a position and he cancelled the TAURUS project after £150m expenditure. This indicates that an independent decision maker who can divorce important project decisions from self interest or preservation, would be a positive factor from which projects would be likely to benefit. One problem is that although success factors have been identified, the success rate of IS projects remains low, which indicates the lists produced may not be as complete as they could be. Success factors however provide only one view of a project. An added benefit to build a more complete picture of how to achieve IS project success is to consider the failure factors.

2.9 Failure Factors

Researchers such as Fortune & Peters (1995) and Avots (1969) have focused their work on why IS projects failed, rather than why they were successful. From Table 2.14 it is possible to map each of the failure factors identified by as sins of commission or sins of omission.

Basis for the project is not sound
Wrong man is appointed as project manager
Company management fails to provide enough support
Task definitions are inadequate
Management techniques are not appropriate
Project termination is not planned

Table 2.14 Reasons for Project Failure Source: Avots (1969)

Using the example, 'the wrong man was appointed as project manager'; this is a clear sin of commission. A project manager had been appointed, but the person was not right for the job. The final factor listed was 'project termination not being planned'; in this case there is a sin of omission. Cavell (1998) researched 200 project managers from The Times top 100 companies, asking what they believed were the reasons for the failure of IS projects. These are described as '... threats to the success of a project' and are given in Table 2.15

Bad Communications between relevant parties	55%
Lack of planning in scheduling resources and activities	37%
Milestones being met	36%
No quality control	31%
Costs getting out of hand	27%
Inadequate co-ordination of resources	24%
Poor overall management	23%
Mis-management of progress	17%
Supplier skills over-stretched	16%
Supplier under-resources	10%

Table 2.15 **Threats to Success** Source: Cavell (1998)

An interesting point from the Cavell (1998) results is that 31% considered that 'having no quality control' was a key failure factor. A lack of quality control as a failure factor was discussed earlier, in section 2.7, when the example of the failed Ariane 5 rocket project was described. Project managers need to be aware that some critical success factors are ignored during the life of their projects. Doing so transfers a critical success factor into a failure factor. Flowers (1996) considered failure rather than success factors for IS project management and compiled the following factors which he believed to be critical to failure as opposed to success.

The factors described as failure factors could be considered as the foundation upon which a project depends. That is to say, failure factors are the most critical of critical success factors that need to be in place for project success to be possible. However, ensuring that the failure factors are addressed, would not be enough to achieve success. For success to be achieved it would also need the success factors to be addressed correctly. The factors of success from the Standish report (Gallagher 1995) were presented in Table 2.11 while Table 2.13 contained the factors of failed projects that were termed, impaired projects.

Organisational context
Hostile culture
Poor reporting structures
Management of project
Over commitment
Political pressures
Conduct of the project
Initiation phase
Technology focused
Lure of leading edge
Complexity underestimated
Analysis & Design phase
Poor consultation
Design by committee
Technical fix to management problems
Poor procurement
Development phase
Staff turnover
Competency
Communication
Implementation phase
Receding deadlines
Inadequate testing
Inadequate user training

Table 2.16 Failure Factors Source: Flowers (1996)

When Table 2.11 is compared with Table 2.13 it can be seen that factors of failure are not limited to success factors being carried out incorrectly. There would be some factors that only exist within the success or failure sectors. However, in Table 2.11 it also indicates that 15.9% of success is considered to be linked to 'user involvement'. At the same time Table 2.13 also indicates that a 'lack of user involvement' is attributed to 12.4% of impaired (failed) projects. This places 'user involvement' as both a success and a failure factor. It is therefore important to consider both the success and the failure factors when planning IS projects as illustrated in Figure 2.7.

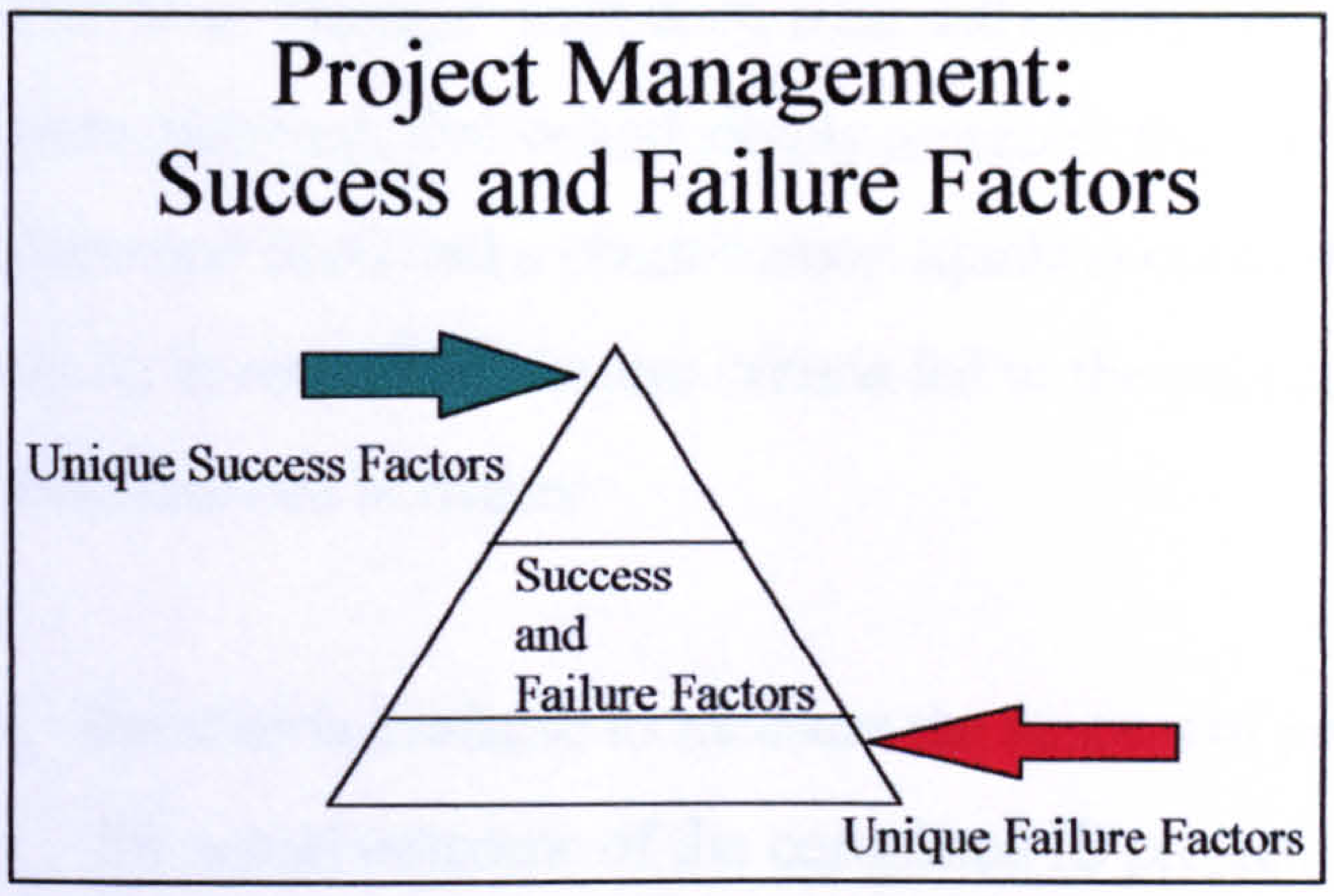


Figure 2.7 Success and Failure Factors

One success factor agreed by most researchers is having a clear statement of requirement. But to enable a clear statement of requirements to be of use, also requires the criteria against which that statement of requirement would be measured. These are known as the success criteria, which were previously referred to in this thesis as the 'Iron Triangle'. These and other possible criteria are discussed in the following paragraphs.

2.10 Success Criteria

White and Fortune (2002) reviewed how the success of projects could be measured and concluded that cost, quality and time were the most widely discussed. Turner (1999) commented that '... at best this is far too simplistic, and at worst it is positively detrimental to good project management'. These criteria are limited and do not address the wider spectrum of how additional criteria could be used to measure success.

Delone and McLean (1992) point out the importance of identifying the IS dependent variable before the factors can be studied. If the IS dependent variable is not known, Delone and McLean (1992) suggests researching for factors is no more than speculative. One argument could be that project management as a profession appears keen to adopt new factors to achieve success, such as methodologies, tools, knowledge and skills, yet continues to measure or judge using limited criteria of cost, quality and time. If the wrong criteria were used to measure success, or some criteria were omitted, the current reason for projects to be classified as having failed will simply be repeated in the future. The following section reviews the criteria frequently used to measure success, together with a proposal for the inclusion of additional criteria.

The 'Iron Triangle' uses cost, time and quality criteria to measure success. If these criteria were achieved, that would simply represent the chance of having matched 2 best guesses (time and cost) and a phenomenon (quality) correctly. Research undertaken as part of this study, in respect of success criteria led to the publication Atkinson (1999). That study differentiated between:

- the criteria available to measure the success of project management,
- the actual outcome of the completed IS project,
- the benefits to the organisation,
- the benefits to a wider stakeholder community.

From the outcome of the study was development of a new framework which was referred to as the 'Square Route' for considering how the success of IS projects could be measured.

To date, the criteria for IS project success has mainly focused upon the delivery stage using cost, time and quality, sometimes referred to as the 'Iron Triangle'. Recall that cost, time and quality were part of most descriptions of project management and have continued to be use to define the profession. The focus has been to judge whether the project was implemented right. Doing something right may result in a project that was implemented on time, within cost and to some quality parameters requested. The completed project however may not be used by the users, not liked by the customers and does not provide either improved effectiveness or efficiency for the organisation. It would be unreasonable to classify such a result as a success, without having other measures of success, indicating the need for additional criteria to gauge IS project success.

2.10.1 Emerging Success Criteria for Project Management

Bernstein (1996) reminded us it could be dangerous if the criteria that are used to measure success of a subjective topic depended exclusively upon the use of numbers. In order to understand if a project has been successful or not, the decisions are based upon objective criteria, such costs and time. Bernstein (1996) suggested '... the pendulum has swung too far from the early subjective decision making in search for numbers upon which decisions can be made'. The desire to be able to measure success using numbers has restricted the wider use of subjective criteria, such as '... the sponsors, users and project team should be happy', as identified by Wateridge (1995).

However, IS project management uses and relies on the use of factors that have no natural, numerical value. Subjective factors such as risks have no natural numerical value so they are assigned a notional numerical value. Since risk analysis and management is an accepted and integral part of the factors for IS project management, it would seem reasonable that the criteria used to measure success need not rely only on the need for real numbers.

There is however, a more worrying problem for IS project management because in business it appears that only that which gets measured gets done. Having criteria with a numerical value, even an unreal, man made number, makes the measurement simple, so that which is measured gets done. Criteria such as cost or time fall within this category. It is then reasonable to suggest that, that which does not get measured will not attract attention, and so by implication does not matter or may not be considered to even exist. The choice of success criteria for IS projects appears to have been limited to those factors that are measurable, not necessarily because they were important. Limiting the criteria to those that could be considered to be positivistic while ignoring or not considering those criteria that would be considered to a phenomenon can be seen to be an example of the sin of omission.

As stated earlier, Hartman (2000) has recently identified the importance of trust as a factor contributing to project management success. The subject of trust is subjective, making it difficult to measure. Consequently, to date, trust may not have been considered as an influencing factor for IS project management *because* it is not easily measured.

On the other hand, risks which are subjective but are believed likely to influence the chance of project success are often assigned a numerical value and are managed in a way assuming the epistemological position for the project, that those risks in some way represent 'reality'.

It is suggested that trust has been a forgotten or a missed factor within IS project management. One method of having trust elevated to a point where it is accepted as a success factor would be to include it as a risk factor. Webster (1994) found that project managers focused upon those functions of project management which map onto the left hemisphere of the brain as shown in Figure 2.6, at the expense of those functions of the right hemisphere, which includes trust. If trust was included as a formal risk, it would move the subject to the left hemisphere of the brain (logical), the side found to be more likely to be used by project managers.

It may be difficult to measure the exact level of trust of individuals as an output. It would, however, be possible to audit the level of trust as a process within a project team and include the result in a risk register to be managed like other risks. This suggestion is discussed further in Chapter 8. It is not unreasonable to suggest that the criteria used to consider IS project success may not be complete. Trust and additional criteria could be considered examples of a Type II error. That is to say, they may be omitted factors, because they are not currently measured. This is a concern with regard to trust. The management and leadership literature identified trust as a key factor to success but has been ignored by the profession of project management. Trust is a success criterion that to date has not been not measured in IS projects. Placing the topic of trust as a risk factor could contribute to overcoming that current Type II error.

2.10.2 The Delivery Criteria

Almost fifty years ago Oilsen (1971) included cost, quality and time as the success criteria into the description for project management. Wright (1997) reduced Oilsen's list by taking the view of a customer by suggesting only two parameters were important, time and budget. Many other writers Morris & Hough (1993), Wateridge (1995), deWitt (1988), McCoy (1987), Pinto & Slevin (1987), Saarinen (1990) and Ballantine et al (1996) all agreed that cost, quality and time should be used as success criteria, but not exclusively. Wateridge (1995) reported how criteria were ranked differently by project managers and users. Table 2.17 provides the results from his study.

Users		**Project managers**	
Meets users requirements	(96)	Meets users requirements	(82)
Happy users	(71)	Meets budget	(72)
Meets budget	(67)	Meets timescales	(69)
Figures in brackets indicate the frequency of mention as a % of a survey n = 100			

<u>**Table 2.17**</u> <u>**Success Criteria**</u> Source: Wateridge (1995)

While project managers focus upon their views of project success criteria, the users who may be asked to judge if the project was a success have been identified to have a different set of criteria. What emerged from the study carried out by Wateridge (1995) was the importance of clarifying the agreed project success criteria. If this is left to the various stakeholders, they will create their own criteria, based on self-interest not overall project or business objectives. One success factor that Wateridge (1995) found to be common to users, project managers, analyst and sponsors was '... value for the sponsor'.

Some industries prefer to measure the success and failure of their project management differently. The American nuclear industry decided that to reduce the chance of error in distinguishing between success and failure they adopted the concept of prudence. Hadzi-Pavlovic et al (1986) reported that by using prudence as a success criteria, a project that was implemented late and over budget could still be judged a success. The rationale for that focus was if the standard of conduct owed to others was provided by a project manager, the legal meaning of prudence was sound. That is to say, success is considered to have been achieved if the project manager had been seen to conduct the project in a reasonable, careful, sensible, cautious and wise manner; some of the requirements of being prudent. These are subjective criteria, without any real numerical value, but they are considered acceptable in life critical systems, thus demonstrating it is possible to judge and measure success and failure without the need for 'real' numbers.

On the other hand if a project manager was judged to some degree to have been negligent, the project performance of the project manager would be classed as imprudent with the result that the project was deemed to have failed. Deciding whether a project manager had acted in a prudent or imprudent way could also be included in the success criteria. In this example, it would be possible to suggest that IS projects could use some of the factors of prudence and imprudence as success and failure criteria in the same way the American nuclear industry decided to measure success.

Williams (1995) advised that using targets set at the start of a project should be considered as relative, not absolute. This view agrees with the ideas from Hadzi-Pavlovic et al (1986) who believed environmental and other changes from external project forces should also be included when success is to be judged.

It is interesting that we do not always rely upon the use of numbers to judge everything, even when 'real' numerical values are available. Colours have a numerical value measurable by the different electromagnetic wavelengths' each colour emits. However, we do not measure a wavelength to identify a colour unless there is a need to be objective. It should, therefore, be possible to decide whether an IS project has been a success, by including non numeric criteria, such as the concept of prudence, which uses factors such as careful or sensible as functions of project management. These have no real numerical values, but then neither do most factors of risk, yet they are included in a risk schedule.

2.10.3 Temporary Success Criteria

Temporary success criteria are considered during the delivery stage to gauge whether the project is going to plan. These temporary measurements can be considered to be measuring the progress to date, a type of measurement usually carried out as a method of control. For example Williams (1995) described how the use of short term measures would indicate if a the project is going off track by using the earned value method, where actual and budgeted costs are compared. However deWitt (1988) points out that when costs are used as a control, they measure progress, which is not the same as success.

Naturally some projects must have time and/or costs as the prime objective(s). A millennium project, for example, had to be on time. Projects measured against cost, quality and time are measuring the delivery stage, i.e. 'doing something right'. Meyer (1994) described these as 'results measurement', when the focus is upon the task of project management doing it right. Table 2.18 shows Meyer's (1994) 4 guiding principles.

1	The overarching purpose of a measurement system should be to help the team, rather than top managers, gauge its progress.
2	A truly empowered team must play the lead role in designing its own measurement system.
3	Because the team is responsible for a value-delivery process that cuts across several functions, ...it must create measures to track that process.
4	A team should adopt only a handful of measures (no more than 15), the most common results measures are cost and schedule.

Table 2.18 Results Measures Source: Meyer (1994)

For projects involving life critical systems, quality would be the overriding criterion with a focus to 'getting something right'. Time and costs become secondary criteria while the resultant product is the focus. Alter (1996) described process and organisational goals as two different measures of success. This takes the criteria away from measuring 'was it done right', to, 'did they get it right', a measure only possible for post implementation. However, projects are usually understood to have finished when the delivery of the system is complete.

The criteria used in the measurement of whether the delivery stage was a success does not include many elements of the resultant IS, or business benefits, as these can only be judged sometime post delivery. The criterion of time seems to overarch other criteria, from being included in the decision of whether an IS project was a success. Providing that time is not critical, the criteria used to judge delivery are only one set against which success could be measured.

When the process of IS project management is being measured i.e. 'doing something right', the criteria are measuring efficiency. However, when the success of the resultant IS project or organisation benefits are being measured, the criterion changes to that of assessing 'getting something right', meeting goals and measuring effectiveness. So what are these criteria that are judged post implementation or post delivery? The following sections provide answers to this question.

2.10.4 Post Delivery Criteria

First, who should decide the criteria post delivery? Stuckenbruck (1986) considered the 4 most important stakeholders who could decide. These were:

- the project manager,
- top management,
- customer-client,
- the team members.

Two other possible criteria available to measure the success of the project are the resultant IS (the product) and the benefits to the many stakeholders involved, such as the users, customers or the project staff. DeLone and McLean (1992) identified 6 post implementation systems criteria to measure the success of a system, which are presented in Table 2.19.

1	System quality
2	Information quality
3	Information Use
4	Users satisfaction
5	Individual impact
6	Organisational impact

Table 2.19 **Systems Measures** Source: DeLone and McLean (1992)

Ballentine et al (1996) reviewed the attempts of other researchers to populate the Delone and McLean model and put forward some new ideas or approaches of searching for a criteria as a dependent variable.

2.10.5 Post Project Delivery Benefits

deWitt (1988) argued project management and organisational success criteria were different and questioned even the purpose of attempting to measure project management and organisational success and link between the two. deWitt (1988) stated that they required separate measurement criteria. However, if project reviews were conducted, deWitt (1988) further suggested the results should not be to determine success and failure, but should be used to investigate '... what went right, what went wrong and why'.

Project management and organisational success could be measured separately. Shenhar et al (1997) produced the results from 127 projects and decided upon a multidimensional universal framework for considering success. Only one stage was in the delivery phase that he decided was measuring project efficiency. The three other criteria suggested were all in the post delivery phase. They were the impact on customer, theses are measurable within a couple of weeks after the implementation, business success, that are measurable after one to two years and preparing for the future measurable after about four to five years. Shenhar et al (1997) suggested project managers needed to '... see the big picture ... be aware of the results expected ... and look for long term benefits'.

Measured results of project management seem to be needed as soon as possible. This limits longer term benefits from been included in the success criteria. Project managers are expected to deliver results quickly and those results are measured as soon as possible. A feature of Rapid Application Development (RAD) (Avison and Fitzgerald 1995) is that the results are delivered quickly and a more pragmatic view may be taken of how success can be measured. This is a benefit of the RAD method, because time is considered to be 'boxed' i.e. the dates by when products are to be complete are set and are not extendible. The results (products) from a 'boxed' time-scale may result in what are termed 'dirty' i.e. they are not exactly as specified, but this is accepted as a success.

Customers and users are stakeholders of IS projects and the criteria they consider as important for success should also be included in assessing a project. Deane et al (1997), looked at aligning project outcomes with customer needs, and viewed these as potential gaps which would exist if the performance was not correct giving an '... ineffective project result'. The five possible levels of project performance gaps are given in Table 2.20.

Actual project outcome needed by the customer
Gap1
Desired Project outcome as described by the customer
Gap2
Desired project outcome as perceived by the project team
Gap3
Specific project plan developed by the project team
Gap4
Actual project outcome delivered to the customer
Gap5
Project outcome as perceived by the customer

Table 2.20 Criteria Performance Gaps Source: Deane et al (1997)

Mallak et al (1991) pointed out that there might be times when one group could be multi stakeholders. For example, an IS project for the Government. With these projects the Government are the customers of the product, they also supply the capital and are the eventual users. Table 2.21 gives the list of possible stakeholders on an IS project.

1,	Workers involved with the project,
2.	Corporate division/governmental agency,
3.	Parent corporation/government,
4.	Customers,
5.	Capital suppliers,
6.	Subcontractors (consultants, contributors to the project),
7.	Users of the project,
8.	Authorities and regulatory agencies,
9.	The public are represented by the media, (special interest groups),
10.	Non human, scientific environment and the natural environment.

Table 2.21 Stakeholders Post Implementation Source: Mallak et al (1991)

Earlier in this Chapter Morris & Hough (1993), Wateridge (1995), deWitt (1988), McCoy (1987), Pinto & Slevin (1987), Saarinen (1990) and Ballantine et al (1996) included cost, quality and time, sometimes known as the 'Iron Triangle', as necessary criteria against which the success of the project management process of an IS project could be judged. At the same time, these writers included additional criteria that could be used post implementation, to enable a more complete assessment of whether an IS project was deemed successful.

Considering all the points mentioned in this section, in addition to the 'Iron Triangle' it can be argued that it is possible to position the additional criteria into three new categories, these are:

- the technical strength of the resultant IS (post implementation),
- the benefits to the resultant organisation (direct benefits),
- the benefits to a wider stakeholder community (indirect benefits).

These 4 categories of criteria were represented as the 'Square Route', to enable project management to judge the level of success of an IS project, as presented in Figure 2.8.

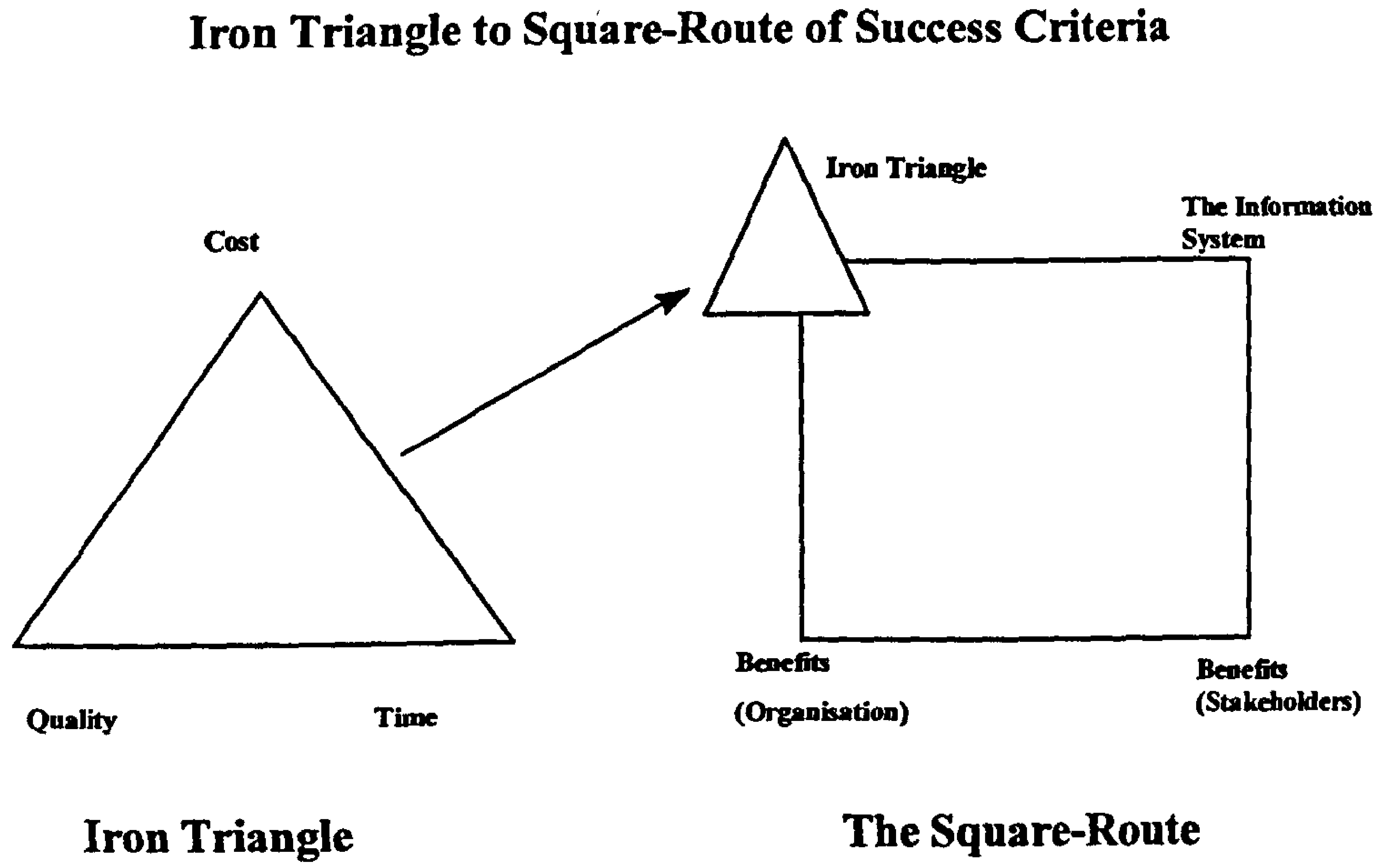


Figure 2.8 **The 'Square Route' of Success Criteria** Source: Atkinson (1999)

A mapping of some of the criteria is offered in Table 2.22

Iron Triangle	The IS	Benefits (Organisation)	Benefits (Stakeholder community)
Cost	Maintainability	Improved Efficiency	Satisfied Users
Quality	Reliability	Improved Effectiveness	Social and
Time	Validity	Increased Profits	Environmental impact
	Information-	Strategic goals	Personal development
	quality	Organisational-	Professional learning,
	Use	Learning	Contractors profits
		Reduced waste	Capital suppliers
			Content project teams
			Economic impact to surrounding
			community

Table 2.22 **Square Route' to Understanding Success Criteria** Source: Atkinson (1999)

Table 2.22 was not intended to offer an exhaustive list. The 'Square Route' is intended to indicate that there are 3 other types of success criteria and provides examples of what they could contain, some also indicted by other authors. For example one factor leading to a successful project may include the degree to which team members trust each other. The

project may fail in one or more of the 'Iron Triangle' criteria, but the existence of trust would be an additional measure of a benefit to the stakeholder community.
Exchanging one set of success criteria for another is not a suggested option. What is important is that there are differences between the criteria for measuring project management and the resultant IS, that are both different from the benefits the project should deliver. Success for project management is usually measured against the criteria of cost, quality and time. These criteria focus upon the delivery stage of a project, 'getting it right'. The 'Square Route' provides a consolidated view of additional criteria.

2.11 Summary

At the start of this Chapter, three domains were identified to create the boundary for the literature search. First was a review of the options that different types of IS projects create for those charged with their strategic selection for both public and private sector organisations. This was illustrated in Figure 2.2. By drawing parallels between the axiom presented by Beer (1985) and the IS project environment, it was considered that some failures of IS projects could be considered inevitable.

The second section reviewed the project management and management literature highlighting that many factors for management had been adopted by project management, with one notable exception. The subject of trust had been found in the management and leadership literature but was identified as a gap in the project management literature, including the APM BoK (1995) and BS 6079 (1996). It was argued that if it was established that trust was a success factor of IS projects, this could be considered to be a 'sin of omission' for project management. It was further suggested that the profile of trust would be raised if it was measured. This could be achieved if trust was included as an integral part of a risk register, via the use of a project trust audit.

Finally, the factors and criteria used in IS project management were reviewed. The success factors identified by other researchers were considered, but despite this it was not possible to offer any direct cause for the low failure rate of IS projects. However, factors linked to failure as opposed to success factors were argued as being the most critical of critical success factors. The elimination of those failure factors would be required to ensure that success factors would have the best chance of achieving success.

This was followed by a discussion about the criteria used to measure the success of IS projects. Cost, quality and time, sometimes collectively known as the 'Iron Triangle', were argued to be limited as they were only linked to the project management function. A new method of considering additional success criteria was presented in the 'Square Route', illustrated in Figure 2.8 and expanded in Table 2.22. It was suggested that the existing limited criteria used to measure the success of IS projects was a further example of a 'sin of omission' within project management. That is to say it was not 'wrong' to use limited criteria to judge success, but that they were not as complete as they could be.

Following this literature review, it was decided to focus on; success factors, criteria, the use made of COTS, trust, project duration, staff numbers, project costs, tools and techniques, in order to research into whether the low success rate of IS projects could be improved. The following Chapter provides a discussion of research methodologies, together with the reason for selecting the research approach and research methods used to conduct this study.

Chapter 3

3.0 Research Approach

3.1 Introduction

This Chapter describes and justifies the research approach and the methods used in this study.

In Chapter 1 a brief statement positioned this research within the epistemological domain of IS project management. Research methods appropriate to this are discussed in the generic research literature for business and management from Saunders et al (1997), Easterby-Smith et al (1994), Raimond (1993) and Hussey and Hussey (1997). More importantly, IS projects provided the data population from where the data was collected. This indicated that research approaches and methods specifically intended for IS should be considered for this research. These were found in the literature from the International Federation of Information Processing (IFIP) Working Group 8.2. A colloquium held at the Manchester Business School in 1984 by Mumford (1985) considered new approaches and research methods into IS that became a defining work for those involved in such research. That work has since been extended by Galliers (1992) and further (IFIP) WG 8.2 meetings such as Lee et al (1997) and informed the approach and methods used for this research as discussed next.

A two stage research approach was devised integrating complementary research methods. Stage one was conducted by the administration of questionnaires. The questions were developed from the detailed secondary literature research presented in Chapter 2. This resulted in a focus on the influence which: success factors: criteria, the use made of COTS, trust, project duration, staff numbers, project costs, tools and techniques have on the success rate of IS projects.

The rationale for adopting this research approach was as follows. The subject issue of this research as stated in Chapter 1 was 'how the low success rate of IS projects could be improved'. Researching reasons for success and failure of IS projects would naturally need to involve people in organisational settings. In deciding upon a suitable research method, Antill (1985) considered IS as a set of hybrid activities that Mumford (1985) and Hirschheim (1985) believed should be researched using a range of research methods. Galliers (1992) positioned IS as a 'social system' and a 'multi-disciplinary endeavour' with contributions from several sources including behavioural science, maths, engineering, natural science and linguistics. Galliers (1992) believed for such a broad subject domain, no single research method was possible, as stated by the post positivism methodological pluralism view.

The topic for this research could be argued to belong in part to the phenomenological paradigm. At the same time there would be some discrete quantifiable data that neither the researcher nor the respondents were able to influence, indicating the topic could also be researched within the positivistic paradigm. Consequently, it was decided to use a two stage research methodology, referred to as a triangulation of methods by Gallivan (1997), which had a benefit of supporting the validity of the data. The benefits of using multi method approaches are as follows. Saunders et al (1997) describe how '... different methods can be used for different purposes in a study' and that '... although questionnaires may be used as the only data collection method, it is often better to link them with other methods in a mixed method approach'. Multi methods have the advantage that they allow the triangulation of the results to take place. Saunders et al (1997) argues this to be of great benefit as, '... the results will be affected by the method used and .... since different methods have different effects, it makes sense to use different methods to cancel out the method effect'. This would lead to greater confidence being placed in the conclusions.

Using triangulation it is possible to have either within-method or mixed methods (Gallivan 1997). Within-method uses two measurements using the same method within the same research paradigm. The alternative is a mixed methods triangulation where two different research methods from either a single or both paradigms (positivistic and phenomenological) would be selected and the results from both methods analysed and compared in the research findings. Following a comprehensive literature review and the setting of the research aims and objectives, the two stage, mixed method, sequential approach was designed; the exact method to be used for the second stage was not known until the data collected from stage 1 was analysed.

Questionnaires are usually associated with the positivistic paradigm. Linking suitable research methods to paradigms was achieved by comparing the views of Raimond (1993), Easterby-Smith et al (1994), Gill and Johnson (1991), Saunders et al (1997) and Hussey and Hussey (1997). A summary of the key points is presented in Table 3.1.

Positivism	**Phenomenology**
Cross-section studies Experiments Longitudinal studies Surveys (large)	Action research (applied) Case studies Ethnographic (of people) Grounded theory Participative enquiry (with people) Surveys (small)

Table 3.1 Types of Research Methods

These authors all discussed the two paradigms and the associated methods most likely to provide reliable and valid results, endorsing the mixed method research adopted for this study. Research methods are not mutually exclusive to either paradigm, it depends upon their use, as can be seen in Table 3.1. One difference is that large surveys would usually be associated with the positivistic paradigm while small surveys are undertaken and the results considered using the interpretative method.

The questionnaire used for stage 1 was undertaken within the phenomenology paradigm, using what could be considered a small survey. Why is that the most appropriate method for this study? One reason is the inability to identify the complete data population for IS projects on a global, or even on a UK basis. The Association for Project Management have approximately 13,000 members but this is only a fraction of the population considered to be linked to IS projects and project management. It would therefore be impossible to suggest that a true random data collection could ever take place within the subject framework of IS projects, since the boundary is unknown. Other researchers such as Wateridge (1996), Pinto (1988) and the large survey conducted by the Standish Group reported in Gallagher (1995) could only use a snapshot of a limited set of data. It is suggested that understanding how the success rate for IS projects can be improved, would be achieved by consolidating all the research findings, with each individual study providing a set of unique or supportive findings from an unrepeatable data boundary. Hussey and Hussey (1997) argued that the actual number of questionnaires used is not important, what they consider important is whether the results provide any useful indications. The study by Peters and Waterman (1982) used 64 companies in the USA as their data source, yet their results were generalised to represent excellence across USA business.

Easterby-Smith et al (1994) argued a researcher should understand what came first, '... data or theory'. The first stage of this research, was to start from data relating to successful IS projects leading to a theory which could studied in greater detail in stage 2.

Having decided upon the research approach and method for stage 1, the next consideration was, how were the questions for the questionnaire selected? Gill & Johnson (1991) suggested '... prior consideration of the relevant theory and literature may be vital in determining what kinds of questions need to be asked'. This was achieved by undertaking the literature review and the interpretative decision by the author in selecting which factors were believed to be important. Within a traditional scientific study the researcher is required to be external to the research, (value free), thus unable to influence the results. Within phenomenology it is accepted that it is difficult to consider that the history the researcher brings to the work will not influence a study, thus changing the status to value laden. Garcia and Quek (1997) observed, '... it is a myth that the researcher can claim value neutrality in social research'. However, providing the bias that may be introduced by the researcher are declared, they can be taken into consideration during the evaluation of the results stage. This is seen as a strength by Garcia and Quek (1997) who pointed out that '... using qualitative methods in the research process is a reflective activity, constantly informing the researcher's actions' which in turn '... permits deeper understanding'. Furthermore, Galliers (1992) reminds us that epistemology refers to our theory of knowledge, in particular how we argue what is valid knowledge and how it can be obtained. Naturally within this context, the selection of the question topics were influenced or biased by what the author believed to be of importance. Galliers (1992) also points out that the process of obtaining valid knowledge is the transformation from what we think to be true (doxa), to what we know to be true (episteme), which is a matter of societal (or group) acceptance. The subjective influence and possible value laden bias which the writer brings to the selection of the topics for inclusion in the questionnaire for stage 1 provides further support that the approach was more appropriate to be considered under the phenomenology paradigm.

The second stage of the research built on a significant finding from stage 1, which indicated the likely importance of trust to IS project success. The next problem was the selection of the most appropriate research paradigm and method for use in stage 2. It was decided to start from the theory developed and argued in stage one, leading to new data. Stage two of the research was conducted by the design and administration of a project management game, which had a focus on trust in project teams. Using the argument of Galliers (1992), the method used for stage 2 could have been considered under either the scientific or interpretative approaches as indicated in Table 3.2.

Scientific	Interpretivist
Laboratory experiments	Subjective/argumentative
Field experiments	Reviews
Surveys	Action research
Case studies	Descriptive/interpretive
Theorem proof	
Forecasting	Futures research
Simulation	Role/game playing

Table 3.2 Information Systems Research Approaches Source: Galliers (1992)

It was possible to set and test a hypothesis for stage 2 using Project Paradox to collect the data. However, due to the interpretative nature of the experiment it was decided to consider stage 2 of this research also within the phenomenology paradigm. Combining the phenomenology of stage 1 with that of stage 2, resulted in an overall mixed method research approach. It is possible to conduct these independently or sequentially (Gallivan 1997). This research used the sequential method, building stage 2 upon the results from stage 1. The benefit of using a sequential triangulation of methods is that two sets of results are available for analysis in addition to the combination of results. A potential problem with this approach is that the results from two different methods may not produce a synergy of findings. This would not be wrong, but if it occurred would not permit a strong conclusion to be drawn until the research was repeated, perhaps several times to ensure reliability.

3.2 Stage 1 - The Questionnaire

The design of the questionnaire and the wording of the questions used in stage 1 for this research were selected following the literature review, these domains were IS, management and project management.

The design of the questionnaire included a pilot study. The questionnaire was designed and structured into three sections. Section one contained questions about the number of successful and failed projects that the respondents have been involved with. These were closed questions which were designed to determine on balance, whether the respondents had been involved more with successful or failed IS projects. These questions were designed to collect discrete quantifiable data. The purpose of section one was to enable a comparison to be made between the results from this survey and the results from other researchers such as the Gallagher (1995) report, presented in Chapter 1 that indicated very low success rates.

Section two of the questionnaire was designed to collect information about one specific successful project in which each respondent had been involved. This section was based upon a range of question types in order to obtain a triangulation of data. For example, section two contained some questions to generate discrete quantifiable data. Data such as the duration of the project and the number of staff involved. This was specifically included in order to test whether 'Brooks Law' concerning the number of staff and the duration of a project was repeatable and applied in practice. Section two also contained some behavioural questions. These types of questions were used to identify the experiences the respondents had in projects.

Wateridge (1996) studied the success and failure of IS projects using attitudinal surveys, thereby building up a picture of what people thought were the reasons for success. Peters and Waterman (1982) on the other hand used behavioural questions in their study of successful companies. The questionnaire designed for this research used a combination of attitudinal and behavioural questions to understand what the respondents thought to be success factors while at the same time obtaining factual data about what was taking place.

As stated above, the selection of the factors used in the questionnaire for section two of the questionnaire was carried out after the evaluation of the literature as discussed in detail in Chapter 2. Naturally, not all factors identified in the literature search could be included in this questionnaire. Those selected were based on the subjective view of the researcher who considered them worthy of further investigation.

The final section of the questionnaires asked respondents to consider specific issues relating to trust. The topic of trust had emerged as a gap in the literature, following the literature review. The questions in section three were a categorical, descriptive type question, which were further sub divided into 2 types. The first type was an attitudinal question where the respondents were asked if they *felt* that trust had been broken in project teams. The second was a *belief* question where the respondents were asked did they *believed* project controls could replace trust. The replies to these questions informed the second stage of the research, which underpinned the design of the new game, called Project Paradox.

The questions for stage 1 were developed using questionnaire design criteria as described by Oppenheim (1966), Hussey and Hussey (1997) and Saunders et al (1997). Both qualitative and quantitative questions were to be used in the survey. The pilot run identified changes that were required to the questionnaire, such as some re-wording and providing additional space on a form. Data were collected using a non-probability method, the sample was chosen by employing the subjective view of the researcher. The analysis and evaluation of the replies to the questionnaire are presented in Chapter 4.

3.3 Survey Administration

In the third year of their studies at the Business School in Bournemouth University, the students undertake a placement year in industry. Those students who had a placement within an organisation involved with IS projects were provided with a questionnaire to administer to project management staff. A formal briefing meeting was held with the students where the aim of the research was explained and when any questions from the students were answered. Through this approach the study adhered to the self administered group distribution and collection method as recommended by Hussey and Hussey (1997), benefits of which included low costs and a high return rate.

Utilising groups to administer questionnaires have been validated by other researchers as a reliable method of data collection. Oppenheim (1966) also suggests what he called '... group administered questionnaires' as a reliable method of data gathering. The mechanism of using students to administer the questionnaire increased the chance of delivery to the respondents and ensured an increase in control and reliability over the delivery channel.

Hussey and Hussey (1997) suggest phenomenology seeks to understand human behaviour and this is not achieved by large surveys. The results of large surveys are easier to generalise, but only through the analysis of small qualitative samples are the results more likely to be specific and indicate profound insights into complex problems. Such phenomena are especially relevant in the field of business and IS projects.

Hussey and Hussey (1997) further suggested a requirement for a survey is that the researcher '... needs a prior understanding of the attributes of the target population'. To meet this criterion the population from which this study was conducted was known, because they were all involved in IS projects and employed students from the Business School at Bournemouth University or had experience known to the researcher. The attributes of the target population were therefore known and the target population filtered before the survey took place.

While the names of the organisations were known, the survey was conducted in a way to enable then to remain anonymous, if they so wished. A record was maintained to identify the students, (not the respondents), who had not obtained a completed questionnaire. No comments or remarks made are attributed to any individual or organisation. Ten of the organisations selected were prepared to contribute by completing the questionnaire, while requesting anonymity. The majority of organisations were willing to be listed as contributors of this research. Appendix D lists the organisations who contributed data and did not wish to remain anonymous. The surveys were carried out between 1996 and 1998. The questionnaire was delivered to 70 respondents. From this 5 replies were not usable. Following the analysis of the valid replies it was decided to administer the survey a second time. Survey 1 had produced some interesting results about the topics selected, but the specific topic of trust had indicated such a significant response that it was considered worth capturing additional responses from other respondents. The questions for the second survey covered the same topics as survey 1, but to improve the presentation of the questionnaire some of the questions were re-worded. During the analysis stage it was decided that when the wording of the questions was not the same in surveys 1 and 2 the analysis should be conducted separately. The second survey had 20 replies, representing a 100% response rate. On reflection, it may have been better to have used exactly the same questionnaire for a second survey that was used in the first, although this is not an imperative. However, the second administration of the questionnaire provided information to strengthen the findings from the first. Copies of the questionnaires for surveys 1 and 2 can be found in Appendices E and F respectively.

3.4 Replies to the Surveys

In total 85 valid replies were received for analysis. For a survey which seeks to understand the reasons behind a phenomenon, namely a low success rate for IS projects, Oppenheim (1966) suggests that '... a samples accuracy is more important than its size'. To ensure non-respondents did not introduce bias into the data each student who was not able to return a completed questionnaire was interviewed. Some students were not able to submit a uniquely completed questionnaire because more than one student was working in the same organisation for the same manager (questionnaire respondent). These duplicated replies were therefore excluded to prevent bias in the data. The students had a finite time to obtain the completed questionnaire. This was done to create a focused time-scale for the students and keep the research moving. Follow up letters were sent to students who had not returned a completed questionnaire from their manager, i.e. for non-respondents. A random selection of respondents were phoned to ensure that they and not the student had completed the questionnaire. Respondents who did complete the questionnaire could be considered to belong to a group who shared common features. Those features would include respondents who were interested in the subject, held an opinion they wished to pass on, believed they could answer the questions and/or had time to answer the questions.

3.5 Stage 2 - Testing for Co-operation and Trust

The second stage of the research involved the design, testing, and administration of a new business game called Project Paradox. The overall purpose of this was to test whether staff in a simulated IS project environment would have a propensity to work together in a co-operative collaborative manner to achieve a successful project. The hypothesis was set to test whether staff would exhibit a propensity to co-operate and collaborate to achieve a successful IS project greater than if the decisions to co-operate were taken at random. Therefore, the approach for the second stage started from theory and lead to data as discussed by Easterby-Smith et al (1994). As discussed earlier in this Chapter, the second stage utilised the interpretative paradigm within the approaches discussed by Galliers (1992), illustrated in Table 3.2. Saunders et al (1997) described a deductive approach method, and identified the 5 sequential phases that need to be in place. These phases are presented below, together with a description (given in italics), of how this research adhered to those requirements:

1. Phase 1, deducing a hypothesis (a testable proposition about a relationship between two or more events or concepts). *This was achieved by identifying a gap in the literature and from the results of the stage 1 questionnaire relating to trust.*

2. The second phase required the hypothesis in operational terms, which proposed a relationship between two specific terms. *A hypothesis was developed to test whether project teams would exhibit a propensity to co-operate to achieve a successful project greater than if the decisions to co-operate were made at random.*

3. The third phase required the testing of that operational hypothesis. *This was achieved by developing a research instrument to test the hypothesis given in phase 2 above. The development of that instrument (Project Paradox) was undertaken by the design of an IS case study over the period of a year where post graduate and undergraduate students were used to pilot the game to ensure the rubric was understandable. Changes were made to the case study based on feedback from the students and through observation when the simulated business scenarios were being run. The finalised instrument was populated with 2100 randomly generated data items. This resulted in understanding the behaviour of Project Paradox when decisions about whether to co-operate or not were taken simply at random. The output from the simulation provided data, against which the results of Scenarios 1 and 2 could be compared and contrasted. Scenario 1 involved running Project Paradox 14 times over the next year with students who had experience of IS projects. In addition to capturing the specific data from Project Paradox, during*

the running of Scenario 1, comments and statements were also recorded from students that indicated why they had used their chosen strategy to make the decisions about whether to co-operate.

4. The next phase required the examination of the outcome of the experiment. Such a mechanism would either tend to confirm the theory or indicate the need for its modification. *The results from the runs from scenario 1 were analysed and conclusions could be drawn. Changes were made to the environment of Project Paradox and a further 14 runs called Scenario 2 were undertaken as described next.*

5. The 5th and final phase required (if necessary) the theory to be modified in light of the findings. Scenario 2 was carried out in an attempt to verify the revised theory by repeating the cycle. *This final phase was done by administering the Project Paradox an additional 14 times. Scenario 2 of Project Paradox took a further year to administer in order that the same profile of those taking part in the game were the same as those in Scenario 1.*

A game was used because it has often been argued to be a reliable method to collect data. Business games and simulations provide an environment where the behaviour of those taking part can be recorded. Petraneli (1994) has designed business games over a 25 year period and produced a set of 17 principles for their design and running. A major point from Petraneli (1994) was that simulations '... dramatically conveyed major messages' and that '... if you want people to open up, play a simulation'. Rather than simulations being a false representation of the real world, Petraneli (1994) believed they encourage people to behave in an open manner thus reflecting reality.

This game was designed to investigate whether those in an IS project environment would exhibit a trusting style of working. Should the players have known the real objective, that is to say, if they knew what was being measured, they may have behaved in a way they thought they were expected to, introducing bias into the data. To overcome this possible bias the game was designed as a placebo, which is discussed later in this Chapter.

Wolfe (1985) suggested that each simulation would have a number of effective elements which the design, administration, player characteristics and administrators' characteristics would need to ensure were present, one of these is the 'starting position'. To comply with this, the team formation stage of Project Paradox was achieved by having the researcher select the members of the teams at random from student seminar groups. Teams were therefore comprised of players who may or may not have previously been known to, or worked with each other. This method of team selection was carried out to reflect the way IS project teams are normally formed. IS project teams often have consultants working alongside in-house team members. At the same time some team members may have previously worked together and could have formed some views about each other, either good or bad.

Gill and Johnson (1991) pointed out that when an experiment is undertaken that includes individuals, it is important to consider elements termed the experimental 'artefacts'. These are artificial variables introduced by the very design of an experimental method of research. In the same way that the stage 1 questionnaire survey had to be designed to enhance the validity of the data, the design of Project Paradox had to take into account what is termed the ecological validity. That is to say, was it likely Project Paradox would produce the same result if it was undertaken outside the research experiment type environment. This has been achieved by running Project Paradox, on invitation, within major organisations. The purpose of this was two fold. Firstly, the organisations wanted their project managers to experience the issues of trust and co-operation that Project Paradox achieved. Secondly the data received from the organisations provided the validity of Project Paradox in the work setting.

Reducing the experimental artefacts was further achieved by designing Project Paradox as a placebo game. The players were not aware of the real purpose until it was completed. The players believed they were taking part in a game, simply as a learning vehicle, related to the decision making of project teams within an IS project environment. The rubric for the game was given to players to study, with questions and clarification taking place before the first team decisions took place. Players had to decide whether to co-operate in a given project scenario as shown in Appendix G. The underpinning for the decision was whether they trusted the other teams. This however, raised the ethics of using people in an experiment within a placebo role. In this study the players were informed about the real purpose of the game after it had been completed, but before they dispersed. By doing this, a discussion within the learning environment was facilitated although the players would not be aware of the underling purpose while the game was in progress. However, the discussion following a run of Project Paradox enabled an open debate about what had taken place during the running of the game and reasons for the decisions that had been taken. The argument about the ethics using placebo studies is relevant when those taking part are never informed of the real objectives and when those taking part may be at some personal risk. Players of Project Paradox were eventually informed of the real purpose, they were under no personal risk and the benefit was that a learning environment had been created. Interim findings from Project Paradox were presented at a refereed conference Atkinson (2000). The type of trust that the players of Project Paradox were considering is called calculus, the lowest form of trust. A detailed explanation of the different types and levels of trust is given in Chapter 5.

Each run of Project Paradox took approximately an hour. Each complete run comprised of 7 collective decisions to be made by the members of each of 3 teams, hence 21 decisions in all. The design of Project Paradox incorporated elements of the well established project management structure, Projects in Controlled Environments (PRINCE 2) by having Business, Technical and User assurance teams. The teams were given time to read the rubric and decide their strategy of co-operation and decision making, while knowing what the consequences of their decisions could be. The decisions of the members of the teams to either co-operate or not co-operate that were recorded during the running of Project Paradox were relayed back to all team members at the end of each decision. This enabled team members to have the history of the decision making from the other team members before they made their subsequent decisions.

A more detailed description of the development and testing of the Project Paradox and the results obtained using random data and data from teams of players, can be found in Chapters 6 and 7 respectively.

3.6 Limitations to the Research Methods.

The research approach for Stage 1 was via the use of a questionnaire. It was discussed how the researcher would be value laden and influence such as the questions used. The question topics selected were a direct result of the analysis of the literature review and were stated in the summary of Chapter 2. For stage 2 it was decided to use a deductive method. This was achieved by utilising a game to test a hypothesis. However, it is not always possible to use deductive logic as a method of reasoning even within this method. Although a correlation may be found, there may still be no linkage between the research variables. When it is not possible to use deductive logic, the argument has to be made intuitively using inductive logic. Inductive logic uses the soundness of inference for which evidence is not conclusive, such as would be available using a positivistic approach, but on the balance of probability. For example, it would be unreasonable, (although not tested), to suggest that the project manager was the cause of every failed IS project. Although a perfect correlation would be found between having a failed IS project and the project having a project manager, this still represents a weak linkage or inference to suggest that the project manager 'caused' the failure.

When inductive logic is used to argue a point, bias can be introduced by the possible presence of fallacies. Below are some examples of fallacies, which can exist within inductive logic. These were taken into consideration during the analysis of the results. Typically, the fallacies that could exist within inductive logic research are as follows:

- a fallacy of 'division' and 'composition', where the attributes of an individual cannot be generalised to the population,
- the fallacy of 'non-sequitur' where a story line does not follow in either chronological or logical sequence,
- a 'statistical fallacy' where non significant results are used without any other supporting material to argue a case,
- The fallacy of 'post hoc ergo proctor hoc', simply because that occurred after this, therefore that must have occurred on account of this.

During the analysis and evaluation of the results these possible fallacious arguments were taken into consideration as a source of possible bias.

3.7 Summary

The argument and rationale for using a 2 stage approach with a sequential triangulation of mixed methods for this research has been presented. The method of data collection used for each of the 2 stages maintained the validity of the data. Data triangulation on the other hand supported the data verification that in turn provided the reliability of the results.

Both stage 1 and 2 were conducted within the phenomenological and interpretative approach. The method used to administer the survey questionnaire for stage 1 and the data population was also identified. Project Paradox, was developed and run for stage 2 to test whether IS project teams would have a propensity to co-operate, through trust, to achieve a successful IS project. The validity of Project Paradox was discussed showing how the 5 sequential phases for a deductive method were followed. Additional validity of stage 2 was further achieved when the possible experimental artefacts were reduced by designing Project Paradox as a placebo scenario.

Chapter 4

4.0 Analysis of the Questionnaire

4.1 Introduction

The results from stage 1 are presented as descriptive statistics and include an analysis and discussion of what the results indicate and how they relate to the secondary literature reported in Chapter 2. Survey 1 had 70 replies, with 5 spoiled forms. Survey 2 had 20 replies, all valid.

If a reply to a question in the questionnaire could not be included, this did not result in the entire questionnaire having to be rejected. Where individual questions were rejected, the analysis took this into account when the results were produced and the presentation of the results indicates the number of respondents.

The following sections discuss the questions in the questionnaire, together with the analysis of the responses. For each question, relevant academic, commercial and management issues are raised which are followed by the analysis of the responses.

As discussed in Chapters 1 and 2, researchers such as the Gallagher (1995) report that the majority of IS projects resulted in failure. Questions one and two were included in the questionnaire to verify whether the respondents had on balance been involved with more successful or failed information systems projects.

4.2 Success and Failure Rates

The replies to questions one and two show the respondents had been involved in 702 successful projects and 135 unsuccessful projects over a 5 year period. These were closed questions. The results from questions 1 and 2 indicate a success rate of 83.8% for the 837 IS projects, success in terms of this research being stated on the questionnaires. This result would appear to contradict the results concerning the rate of project success published in the literature while accepting the criteria to measure success may be different. However, from a more recent survey by White and Fortune (2002) a success rate of 41% from a frame of 236 was reported which agrees more with these results. The results of questions one and two are presented in Figure 4.1.

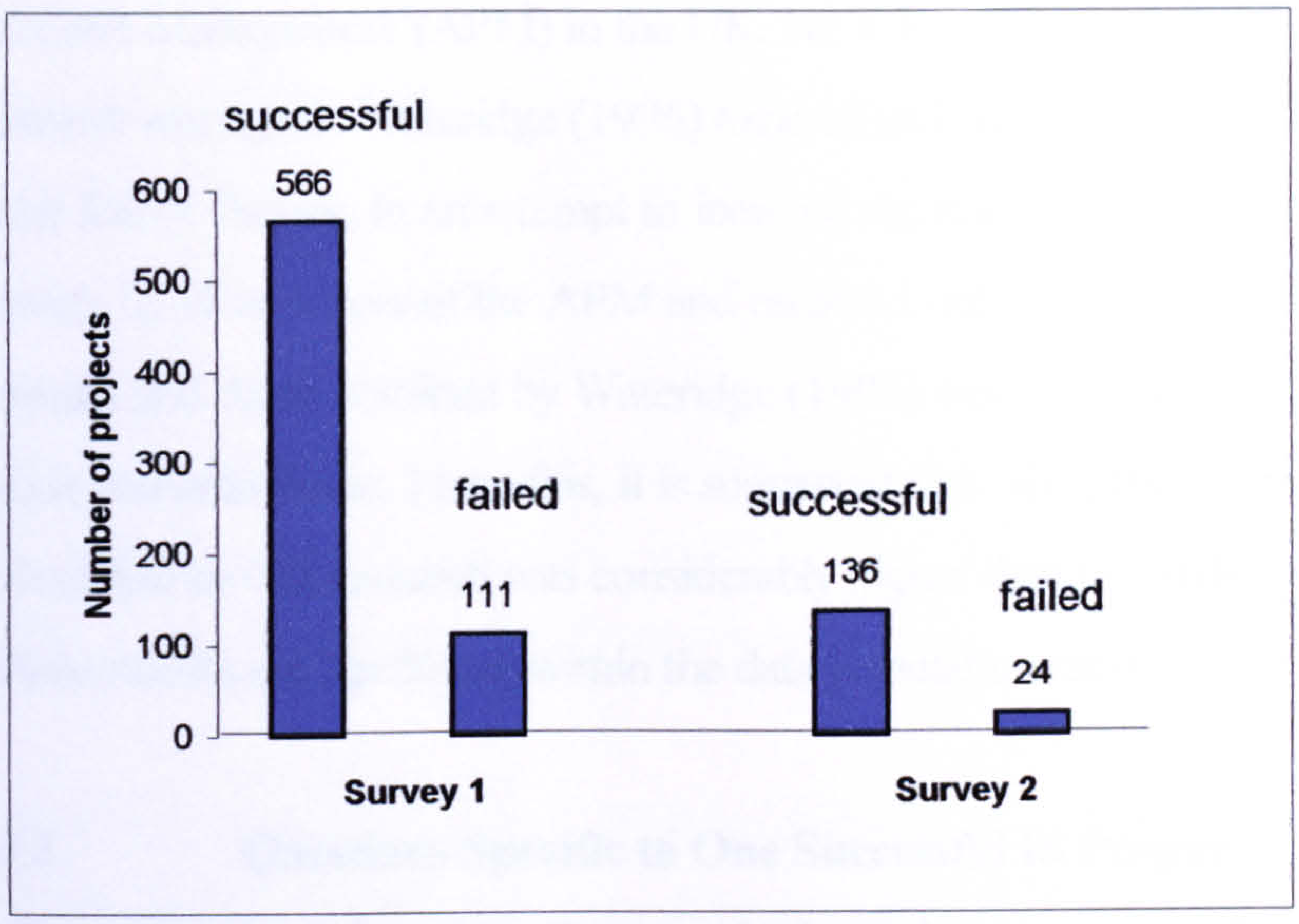


Figure 4.1 Success Rate of Projects for Respondents

The high success rate indicates this data population could be different from other surveys, yet the survey data was not stratified, nor were the respondents a self selecting group.

The Gallagher (1995) statistics, taken from American projects, suggests the failure rate to be as high as 54%. The Gallagher results were based on 175000 projects, while this study researched 837 IS projects. Adding to the picture of the high failure rate of IS projects was the tertiary data obtained from the Computing Journal, presented in Tables 1.1, 1.2 and 1.3 in Chapter 1. It is worth noting however that only failed projects were reported. There must have been successful IS projects too during the same period, but these were not reported. A reason for reporting failures only, could be that project success is the expected outcome. The examples of failed projects, presented in Tables 1.1, 1.2 and 1.3 respectively could therefore be considered as exception reporting.

The results from question 1 and 2 are a general descriptive statistic from 837 IS projects that indicated a success rate of 83.8% experienced by those respondents. This result is significant in that it challenges the literature that suggests a high rate of IS project failures. Attempting to indicate the true success rate of IS projects will always be difficult. In order to generalise the results of any research that attempts to identify the rate of project success, it would need the data to be obtained from a random sample of the complete population of those involved with IS projects. There are over 13,000 members of the Association for Project Management (APM) in the UK, but it is estimated that there are more than 50,000 project managers. Wateridge (1996) experienced difficulty in obtaining data about success and failure factors. In an attempt to increase the number of replies to his questionnaire, he wrote to all members of the APM and received only 13 replies. But the Gallagher (1995) results and those obtained by Wateridge (1996) were significant within the boundary of their research frame. From this, it is suggested that while the rate of project success identified by this research was considerably higher than that indicated from other studies, these results are significant within the data population used.

4.3 Questions Specific to One Successful IS Project

The respondents for survey 1 were asked to select one successful project on which they had worked, and provide some additional in-depth information. The replies to these questions can therefore be used to build up a picture of some of the functions and factors taking place in successful projects.

4.3.1 Support Tools

The aim of three questions in section two of the questionnaire was to identify the usage of; a project management methodology, a systems development methodology and computer assisted software engineering (CASE) tools. All the 65 respondents replied to the question referring to the use of project management methodologies, two replies were not completed for the questions relating to systems development and three did not answer the CASE question. The responses are presented in Figure 4.2 as percentages.

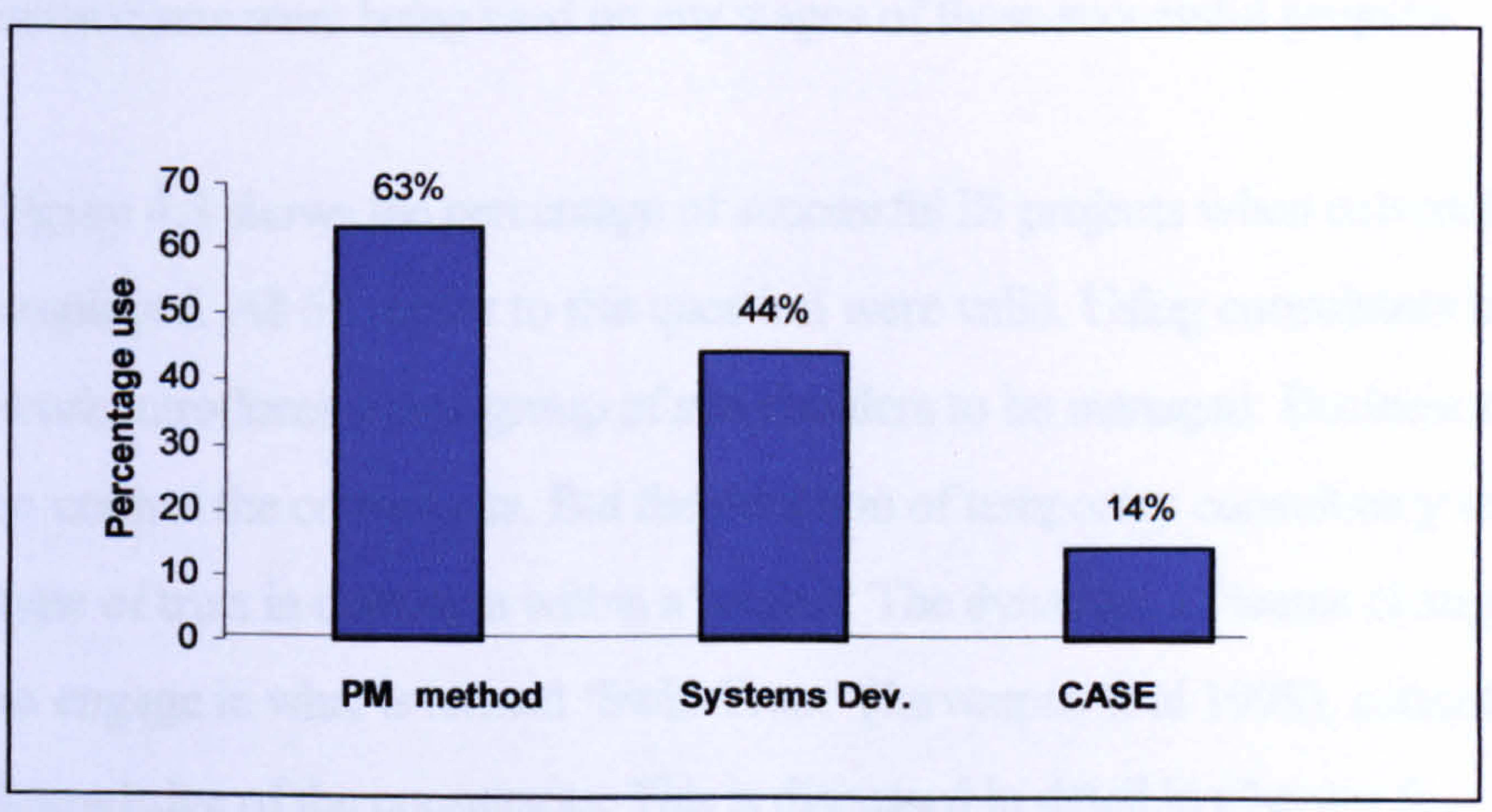


Figure 4.2 Project Management Support Tools

Although the majority (63%) of the projects had been managed using a formal project management methodology, clearly the success of IS projects is not dependent upon its use. But it was surprising that a project management methodology was not used on more projects. To validate this response, on return from their placement year, the students confirmed that not all the organisations were using any formal project management methodology. The reason why only 44% of the successful projects had followed a systems design methodology is understandable, since many projects were using package solutions, (COTS) rather than in-house development, see section 4.5. What is interesting however, is the comparatively small number 14% of projects which used a software tool to support the project, particularly since these were IS projects.

The APM BoK (revised 2000) indicates the benefits of using a project management methodology and systems design methodology, however, using a CASE tool is not specifically advised. At the same time caution has been given not to allow the technology to become the focus of a project in place of the stated business aim and objectives. While CASE tools can provide support for IS projects, success has been shown to be possible without their use.

4.4 Project Staff

Focusing upon core work is becoming a more favoured strategy within business, commerce and industry. The benefits of such a strategy include using the expertise of consultants for specialist tasks in support of a project without having to make provision for their continued employment. A question was included in the questionnaire to determine the extent to which consultants were being used on any stages of these successful projects

Figure 4.3 shows the percentage of successful IS projects when external consultants were employed. All 65 replies to this question were valid. Using consultants to support project work introduces a new group of stakeholders to be managed. Business contracts are used to control the consultants. But the selection of temporary consultancy teams changes the type of trust in operation within a project. The dynamics of teams change when they have to engage in what is termed 'Swift Trust' (Jarvenpaa et al 1998), caused in part by limited knowledge of the consultants. This is discussed in detail in Chapter 5.

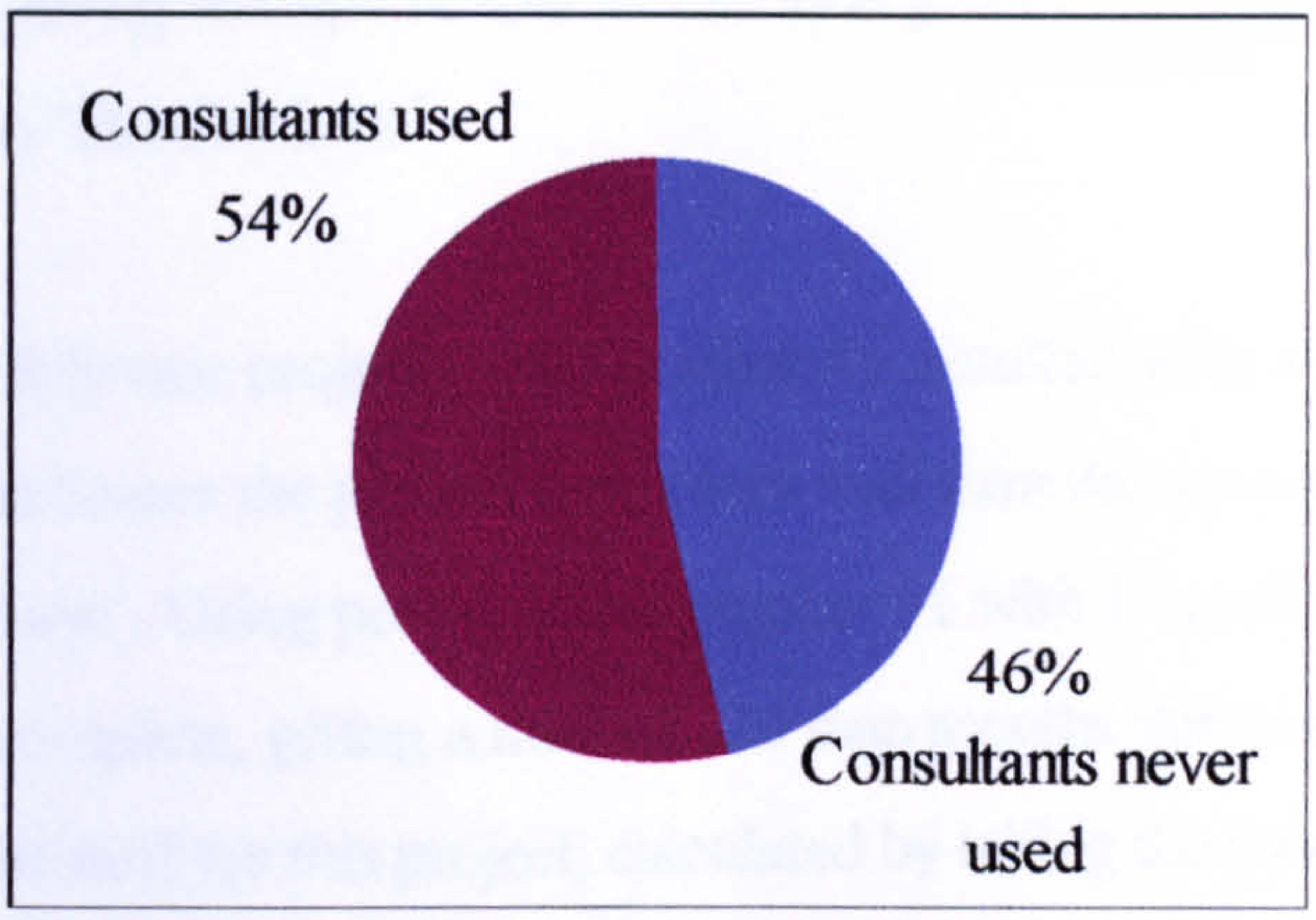


Figure 4.3 Use made of Consultants

The results show that 46% of the projects used only in-house staff while 54% made use of consultants during one or more of the stages. Further analysis indicated that it was during the inception stage of these projects when consultants were used most; this was discussed in Chapter 2 as arguably the most important stage when the strategy and direction is formed.

From those 46% (30 projects) which used only in-house staff, 22 were able to confirm both the number of staff involved and the duration of the projects. The combination of those two replies made it possible to analyse the number of staff and the total number of man months.

4.4.1 Testing 'Brooks Law'

In Chapter 2 it was suggested that estimating the optimum number of staff for an IS project could be achieved by using 'Brooks Law'. This states that the optimum number of staff required can be calculated by taking the square root of the estimated total of man months. An analysis was undertaken of the actual number of staff used in the successful projects with the optimum number of staff according to 'Brooks Law' as shown in Table 4.1. From the 22 successful projects, 21 had used less than, or equal to, the optimum number of staff according to 'Brooks Law'.

The results in Table 4.1 indicate 3 projects with a balance of zero in column F used the optimum number of staff to complete the project. As shown in Table 4.1 project serial number 61 used 6 staff for a period of 6 months resulting in a total of 36 man months.

Taking the square root of this total gives a result of 6 staff, the optimum number according to 'Brooks Law'.

Only one project, serial number 51, resulted with a positive balance in column F. That indicates the project used more staff than the optimum when calculated using 'Brooks Law'. Using project serial number 51 with 12 staff as an example, this took 10 months to complete, giving a total of 120 man months duration for the project. The optimum number of staff for this project, calculated by taking the square root of 120 would be 10.9. This suggests 1.1 more staff were used when compared to the optimum number. However, this same result could have been possible, not only because there were more staff than the optimum number, but because the project may have been completed earlier than the project plan indicated.

Optimum number of staff

A	B	C	D	E	F
Serial no.	Number of staff used	Duration	Max man months B X C	Optimum √(B X C)	Balance B - E
4	3	3	9	3	0
11	3	12	36	6	-3
12	6	12	72	8.4	-2.4
18	25	36	900	30	-5
24	5	6	30	5.4	-0.4
26	2	9	18	4.2	-2.2
30	5	6	30	5.4	-0.4
31	5	5	25	5	0
32	5	15	75	8.6	-3.6
39	15	26	390	19.7	-4.7
42	4	24	96	9.7	-5.7
45	3	7	21	4.5	-1.5
48	8	12	96	9.7	-1.5
49	8	24	208	14.4	-6.4
50	5	6	30	5.4	-0.4
51	12	10	120	10.9	1.1
53	10	15	150	12.2	-2.2
56	5	12	60	7.7	-2.7
58	2	15	30	5.4	-3.4
59	10	12	120	10.9	-0.9
61	6	6	36	6	0
62	2	8	16	4	-2

Table 4.1 Optimum Number of Staff

The projects used for this survey were deemed to have been successful. A successful project needed to be completed on, or before, the target time. If that same project had been planned to take 12 staff for 12 months the optimum number of staff would have been used. It is, therefore, possible for project serial number 51 to have a positive balance in column F, either because more staff than the optimum were employed, or because the project was completed ahead of schedule.

This leaves the remaining projects all which have a negative balance in column F. This is suggesting that using more than the optimum number of staff is not a pre-requisite to achieve project success. In these cases, 21 from 22 successful projects used less staff resources than the optimum number, as calculated using 'Brooks Law'.

Consider the project serial number 18, that employed 25 staff for 36 months, using 900 man months in total. The optimum number of staff was 30, giving a balance of 5 additional staff. If, however, the project had used 25 staff but was planned to take 24 months, this would require a total of 600 man months. The square root of this new figure (600) would be 24.5 indicating an optimum number of staff required. Although it is possible for this scenario to have taken place, it would require the project to have been planned for 24 months but to have been late by 50% giving a final project duration of 36 months. This scenario is both possible and in one way probable. Project estimating is a factor that was described in Chapter 1 and Gallagher (1995) indicated in their research that 53% of the projects were late by an average of 222%. But the results in Table 4.1 are taken from successful projects and using even the basic criteria to measure success, it would have required those projects to have been implemented on or before the time estimate, not later.

Using the data relating to projects where only in-house staff were involved, it has been possible to demonstrate that 'Brooks Law' is a reliable indicator when planning project staff resources. It can also be argued to have remained valid over time, despite the changes in IS project development methodologies. When Brooks suggested his Law, systems development projects were usually conducted in-house using low level programming languages. IS projects now use high level languages and often use Commercial Off The Shelf package (COTS) to replace in house systems development. Despite the changes in the development methods, a result from this research found that 'Brooks Law' remains valid and can be used as a guide to calculating the optimum number of staff to employ on IS projects.

4.5 Commercial Off The Shelf Solutions (COTS)

In Chapter 2, Commercial Off The Shelf (COTS) was described as a relatively new systems development method. An alternative to COTS is to develop a system that is bespoke to the Users requirements. Both these systems development methods require the eventual users to adhere to specific strategies. If the Users will accept no less than their requirements, a bespoke system will need to be developed, following an analysis and design phase. These can be considered as problem/solution type projects, where the solution is developed to map onto the specific User's requirements or problems.

If, on the other hand, the User's are prepared to consider changing some of their working practices, the development of the IS could be achieved by selecting and adapting an existing COTS package. Some of these COTS have relatively basic functionality and can be implemented without any changes, again providing the Users are prepared to change some of their operating procedures. Industry best practice for using COTS suggests that changes to COTS of more than 40% is not advised and indicates a bespoke system should be used.

The respondents were asked to what extent their project solution was based on bespoke or COTS. The two extreme answers were for the project development to have been fully bespoke or fully COTS, with three options in between, as presented in Figure 4.4.

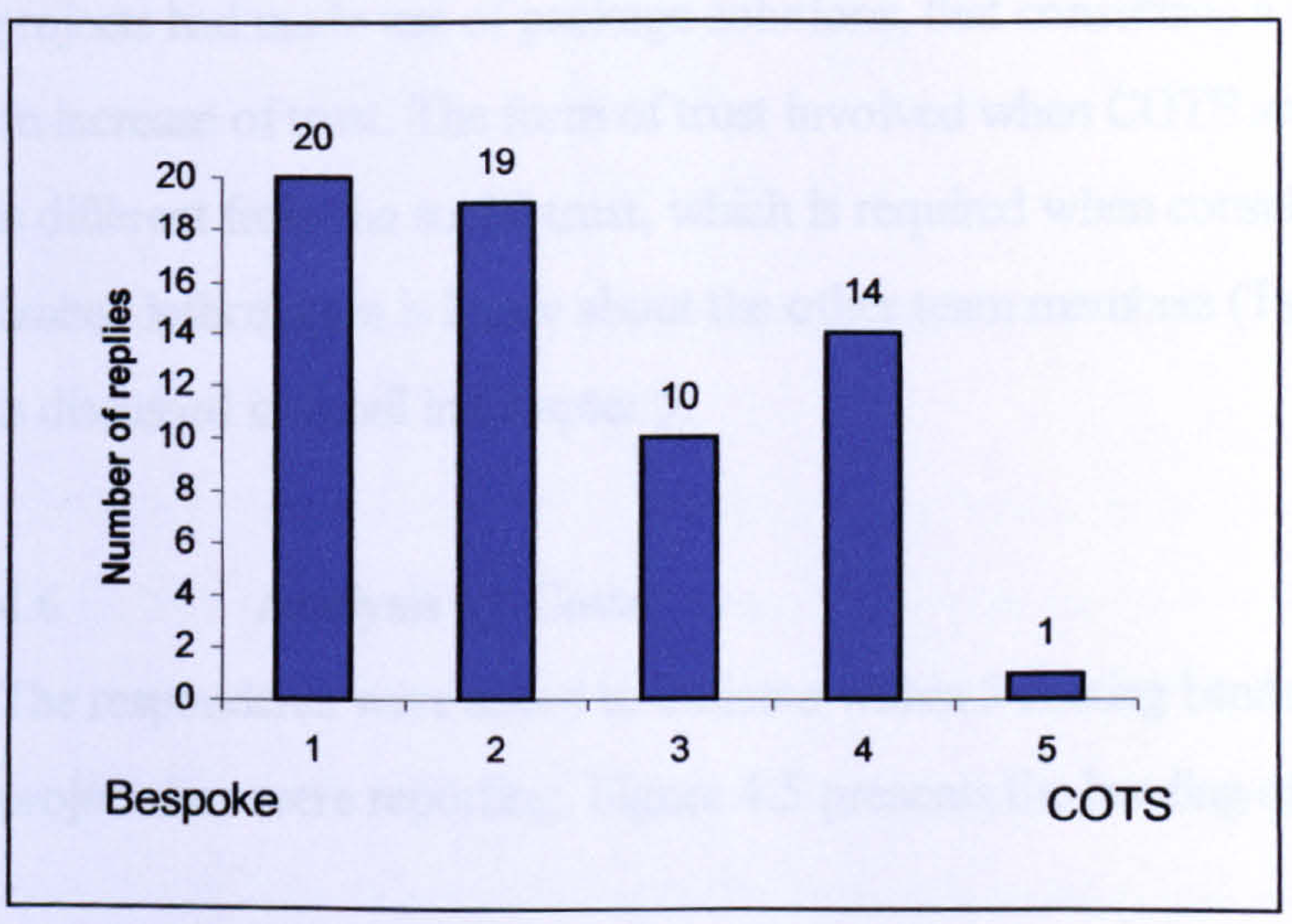


Figure 4.4 Bespoke vs. Commercial Off The Shelf (COTS)

The modal value indicates a bespoke systems development with 31% of the replies (20). However, 69% (the total of columns 2, 3, 4 & 5) of the successful projects used packages to some extent. It can be seen that only 1 of the successful projects utilised a pure solution/problem type strategy for the systems development. In Chapter 2 the strategy for selecting packages or bespoke required several variables to be taken into consideration as presented in Figure 2.2. A reason for the extent of the use of COTS packages can be the benefit of ready made system, often with reference sites, to provide confidence if the COTS functionality and reliability. Organisations usually benefit from an early implementation of an IS with profits or savings becoming available earlier than when the development was achieved using bespoke systems.

The implication for project management from these results is that there is a shift in the skills required. The increasing use of packages requires a change of skills for project management, in package selection as well as legal and contractual expertise. If a competitor organisation uses the same COTS package, the differentiation in the organisation must be found from somewhere else other than from the package. This is an operational problem. The issues for the project manager when packages are utilised are to ensure that they will deliver against the specification. In some ways, as explained this is possible with access to reference sites. The project manager must, however, enter into a contractual agreement partially from a position of trust and belief that the package will match the claims made for it. Moving from bespoke towards package development requires greater trust, as control of the development team has been lost. The results from this research indicated that 69% of IS projects had made use of package solutions, that constitutes a similar percentage shift for an increase of trust. The form of trust involved when COTS are used is technical trust. This is different from the social trust, which is required when consultants join a team and only limited information is know about the other team members (Tyler and Kramer 1996). This is discussed in detail in Chapter 5.

4.6 Analysis by Costs

The respondents were asked to indicate within 5 costing bands, the cost of the successful project they were reporting. Figure 4.5 presents the banding of the 65 successful projects.

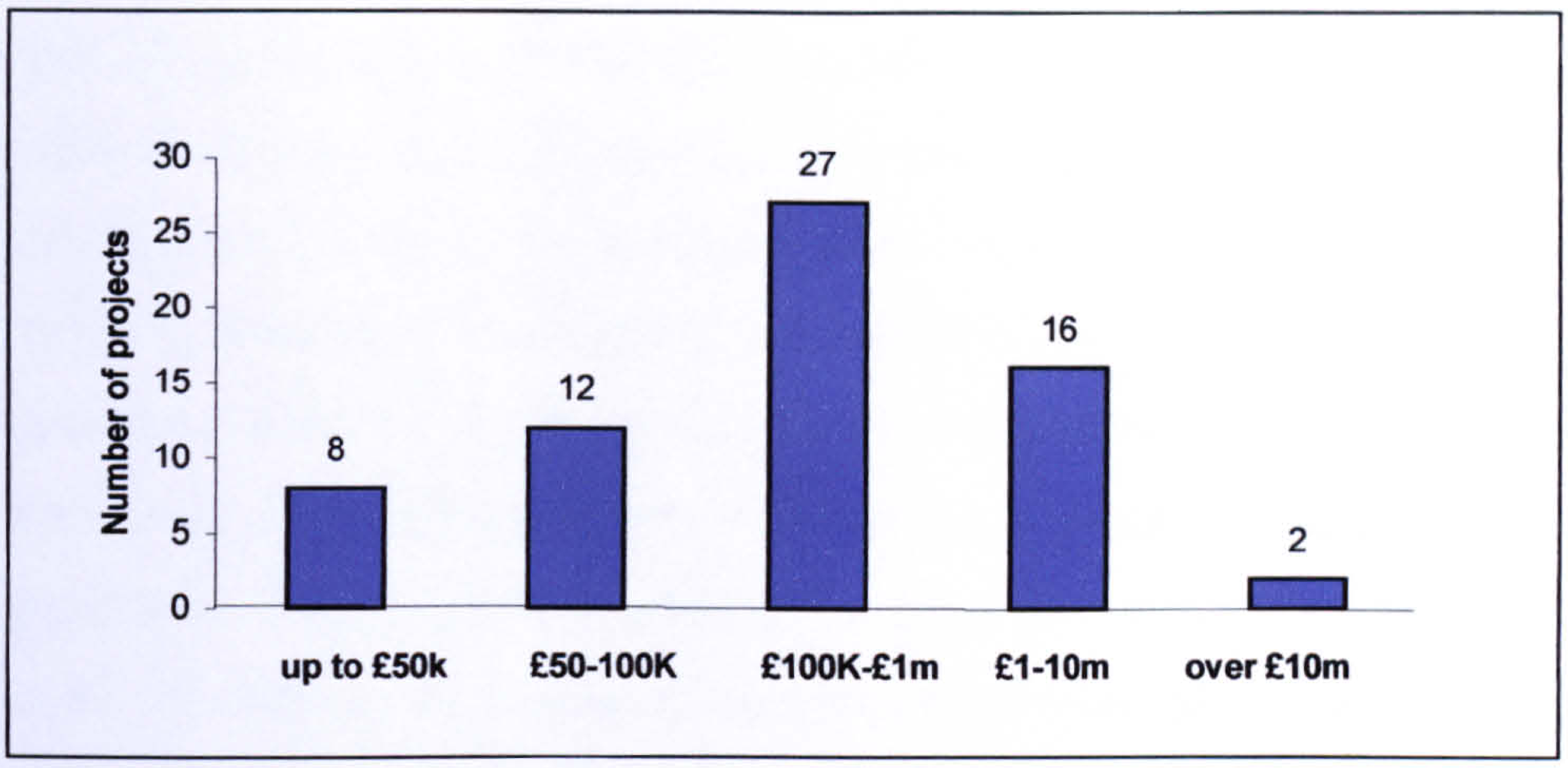


Figure 4.5 **Project Numbers by Cost**

In Figure 4.6 the actual number of projects that used a project management methodology (shown in blue) are compared with the total number of projects within the 5 cost bands (shown in purple). Figures 4.7, 4.8 and 4.9 provide the comparison between the total number of projects and those that used a systems methodology, CASE tools and consultants respectively. In all cost categories most projects were managed using project management software, while the results for the CASE tools indicate the opposite trend.

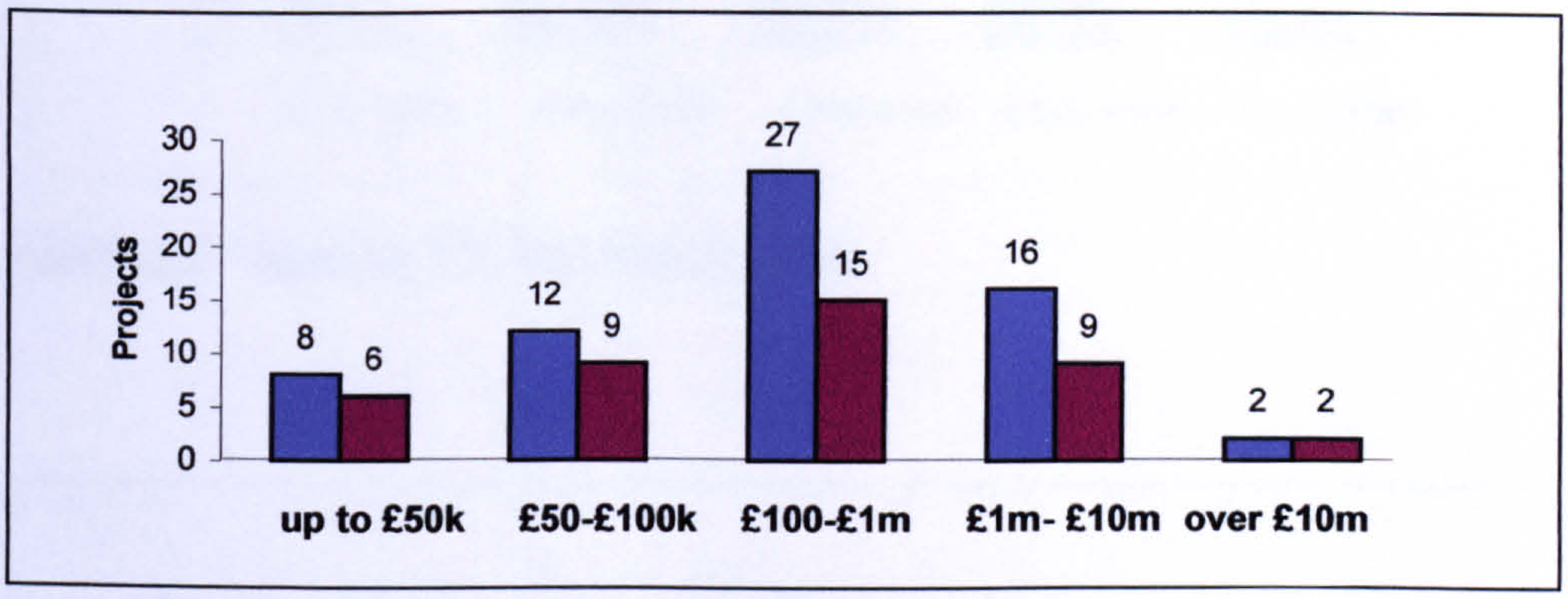


Figure 4.6 **Project Management Methodology by Cost**

The use of consultants can be seen to increase when the cost of the projects increase. However, within the £50k band, consultants were used on 37% of the projects. The use of consultants increases to 41% for the £50 -100K, rising finally to 62% for both the £100k -1m and £1-10m. This has an impact on projects due to the additional temporary or transient nature of the project groups. In turn it requires additional trust building because in-house staff may have limited information of the consultants other than possibly through their CV's. Consultants would conceivably have even less information about the in-house staff. In these cases the CV has had to be used as a control to replace the trust that usually builds as team members work together. One additional observation is that Gallagher (1995) identified a link between having a higher success rate and lower project costs. But even the 'small' projects within that research were over $200m which is much higher expenditure than those within this research frame. However, a correlation between IS project success and the use of consultants can be seen to exist, but it would be a fallacy of post hoc ergo proctor hoc to suggest there is a link or that either factor caused the observed change in the other. Nevertheless, it would be worth researching further into the use of consultants and project success, since this research has indicated consultants are used on more costly projects, but the Standish results reported by Gallagher (1995) identified IS project failures increased with a corresponding increase in project costs.

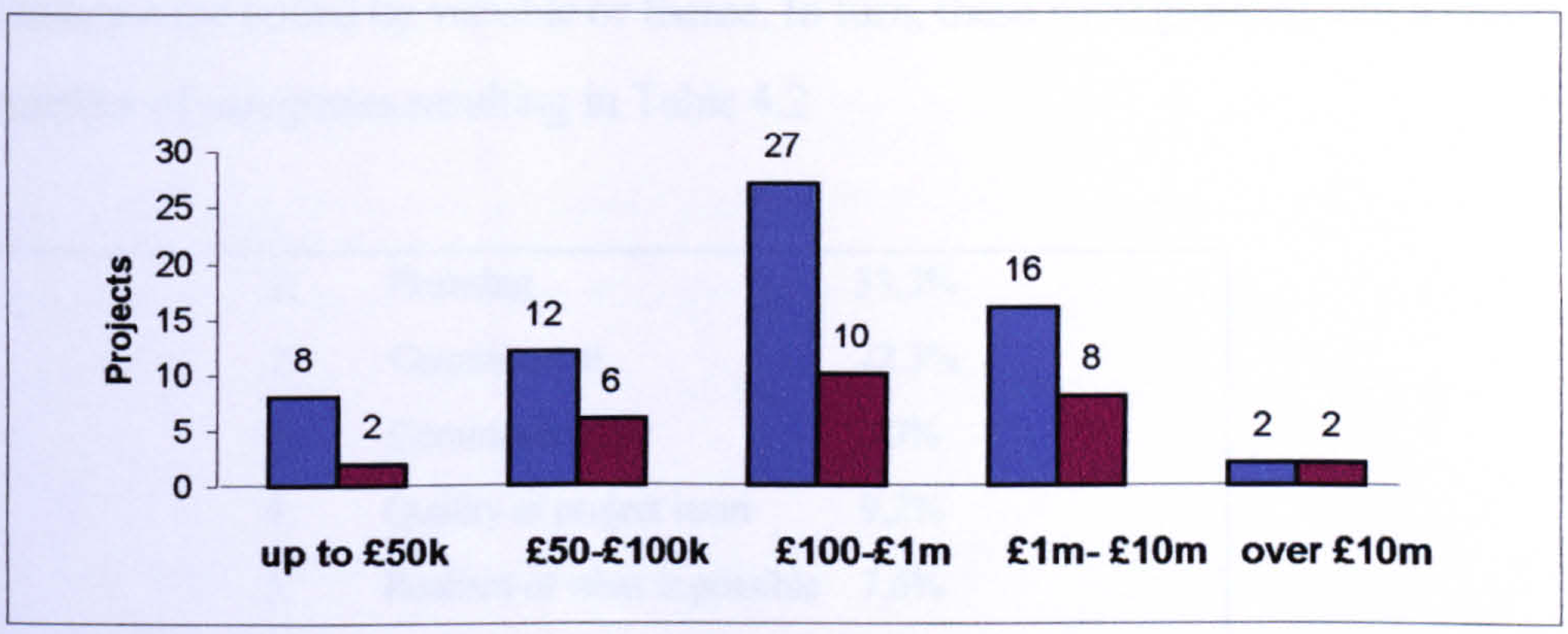


Figure 4.7 Systems Methodology by Cost

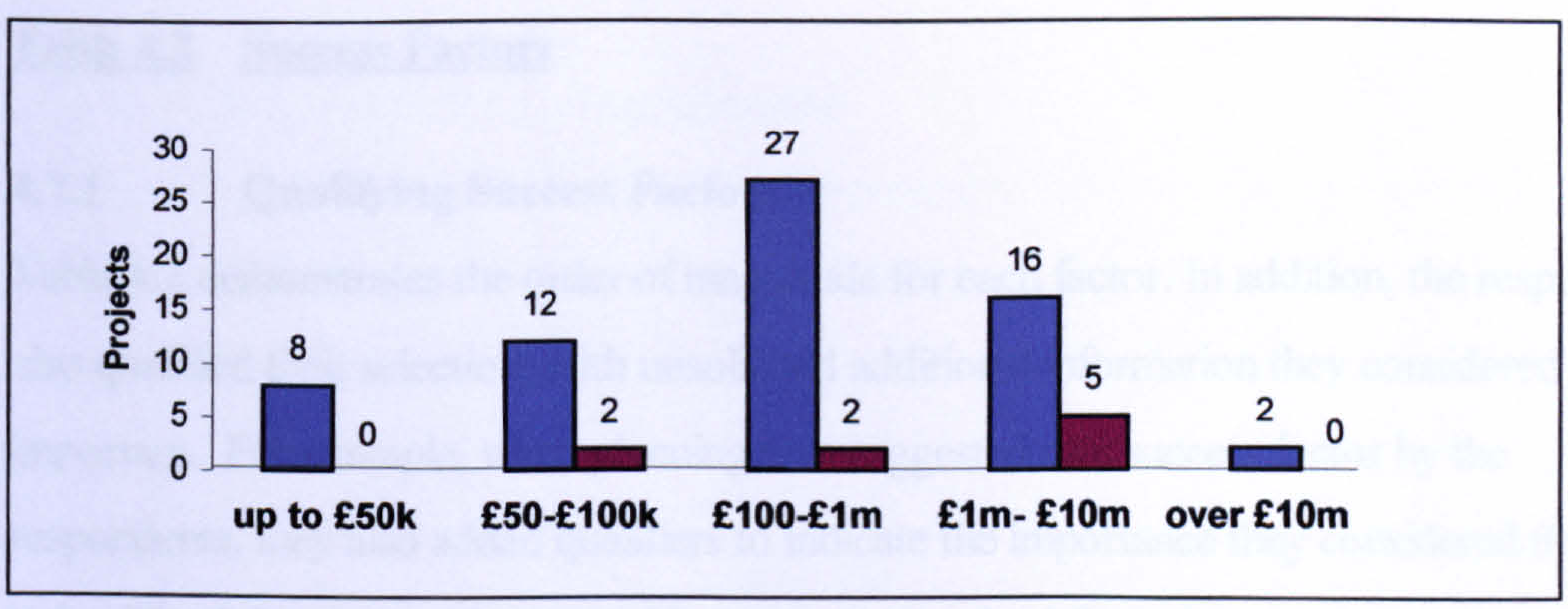


Figure 4.8 CASE Tools by Cost

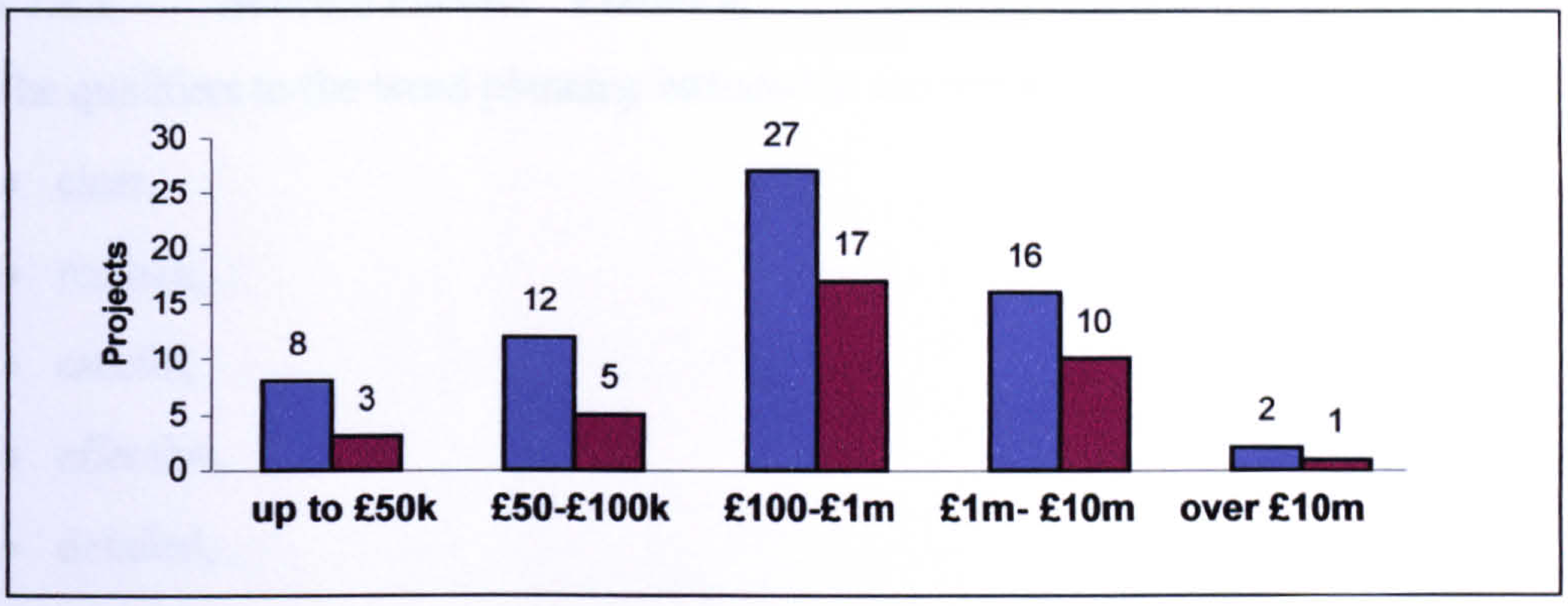


Figure 4.9 Use of Consultants by Cost

4.7 Success Factors

Lists of success factors identified by other researchers were presented in Chapter 2. Respondents for this research were asked what they considered to be the most important factors leading to the success of their projects. The responses representing the success factors were coded by variable or theme. In turn, these were grouped into a reduced number of categories resulting in Table 4.2

1.	Planning	33.3%
2.	Commitment	22.3%
3.	Communication	10%
4.	Quality of project team	9.2%
5.	Realism of what is possible	7.6%
6.	Resources	6.1%
7.	Control	5.7%
8.	Others	8.4%

Table 4.2 Success Factors

4.7.1 Qualifying Success Factors

Table 4.2 demonstrates the order of magnitude for each factor. In addition, the respondents also qualified their selection, with unsolicited additional information they considered important. For example, when planning was suggested as a success factor by the respondents, they also added qualifiers to indicate the importance they considered the factor to be. The following sections provide responses received from the respondents in respect of the three factors: Planning, Commitment and Communication.

4.7.1.1 Success Factor: Planning

The qualifiers to the word planning included in the replies were:

- clear,
- realistic,
- careful,
- effective,
- detailed,
- sensible,
- accurately,
- good.

Planning has been identified by other researchers such as Wateridge (1996) as a key success factor and was included in early attempts to list the basic principles of management by Drucker (1993), (Table 2.2) and Fayol (1997), (Table 2.3). This research supports the conclusions of these earlier works that planning is the key success factor. This could also be argued to be the reason why project managers favour using the left hemisphere of the brain as indicated in Figure 2.5 when attempting to project manage because planning was shown by Webster (1994) to reside within the left hemisphere in Figure 2.4. But it was also argued that project managers should use both hemispheres of the brain since project management involves both people and technical issues. The next 2 factors selected by the respondents provided this balance. Commitment and communication were identified in rank order as the next important success factors with a joint percentage identical to that achieved by planning 33.3%.

4.7.1.2 Success Factor: Commitment

The analysis of these results indicates that commitment received the second largest number of mentions. The qualifiers given below provide not only the rank order but also the importance to be given to a commitment from all parties involved. These qualifiers were found to have been used by the respondents when they were describing commitment as a success factor:

- user commitment,
- stakeholders,
- all parties,
- involvement,
- enthusiasm, from executive directors,
- budget,
- project team,
- business buying-in,
- management commitment,
- business information systems department,
- support from design agency,
- involvement from all staff,
- total client commitment,
- dedication,
- very high level of commitment,
- early buy-in by key stakeholders,
- strong business buy-in,
- buy-in to objectives from suppliers and customers,
- users involved throughout,
- unlimited patience,
- total commitment and senior management.

These qualifiers demonstrate the range of stakeholders that the respondents to the questionnaire considered were important factors to achieve IS project success.

4.7.1.3 Success Factor: Communications

The need for communications was placed third after the need for planning and commitment. The following qualifiers were included when communications had been identified as a critical success factor:

- good,
- regular,
- everyone to be informed,
- throughout the project,
- clear,
- open access to information,
- impossible to over communicate,
- honest communications between all parties,
- frequent,
- other departments,
- at all levels,
- giving bad news as well as good.

Planning, Commitment and Communications were considered the three most important success factors for the 85 successful projects. These results reflect those of previous research reported in Chapter 2. The respondents, however, also demonstrated how important they considered these three factors to be by including comments in their responses to an open type question, without prompting, some qualifiers to support their decisions.

The results from this research indicate an overall 62.6% response to three factors as being key factors to producing successful IS projects, these are:

- Planning (30.3%),
- Commitment (22.3%),
- Communications (10%).

The summary of the findings so far is presented in Table 4.3.

*63% used a project management methodology *44% used a systems development methodology *14% used a computer assisted software engineering support tool *54% employed external consultants on one or more project stages *Using less than the optimum number of staff (using 'Brooks Law') did not extend the project time-scale *The modal value indicated bespoke development methods to be the most used systems development method while 69 % to some extent used package solutions

Table 4.3 Factors used in Successful IS Projects

These could be termed examples of good practice in successful projects. While it would be difficult to generalise these results back into the total population of project management, as discussed earlier in paragraph 4.2 (due to the survey frame used), the agreement found with earlier research such as Pinto (1988), increases the reliability of the results.

4.8 Criteria

The criteria for measuring success of IS projects was discussed in Chapter 2. The 'Iron Triangle' comprising cost, quality and time were listed as the key criteria used for measuring success. It was further argued that the emphasis had remained on these 3 criteria over the last 50 years and continued to be inextricably linked to the definitions offered for project management, including those from the APM BoK (1995)and BS 6079 (1996). A new method to consider measuring success was presented in Chapter 2 called 'The Square Route'. This method extended the factors of the 'Iron Triangle', to include 3 additional factors, those being: The Information System, Benefits to the Organisation and Benefits to the Stakeholder Community as presented in Table 2.22.

The respondents were asked which criteria they would consider to judge whether a project was successful. From the replies there were 255 views expressed by the respondents. These were mapped against the 4 categories identified in 'The Square Route'. The number of mentions, which are not mutually exclusive, within each of the 4 categories can be seen in Figure 4.10.

The 'Iron Triangle' received the most number of mentions 114 (44%). However, the respondents also indicated that if they could select the criteria against which their projects could be measured for success, they would also include criteria from the other corners on the 'Square Route', these were:

- The information system 42 (16%),
- Benefits to the organisation 46 (18%),
- Benefits to stakeholders 53 (20%).

These results were encouraging in so far as the respondents listed 141 (54%) criteria they would use to measure success in addition to the 114 (44%) who selected cost, quality and time. These results came from an open question, not a closed Likert scale, thus giving the results additional importance since the respondents were not simply validating or ranking a limited set of criteria from which to choose. Without any prompting, the respondents proposed 255 criteria they would use to measure success. All these 255 criteria mentioned could be placed into 1of the 4 criteria options as identified in the Square Route presented in Table 2.22.

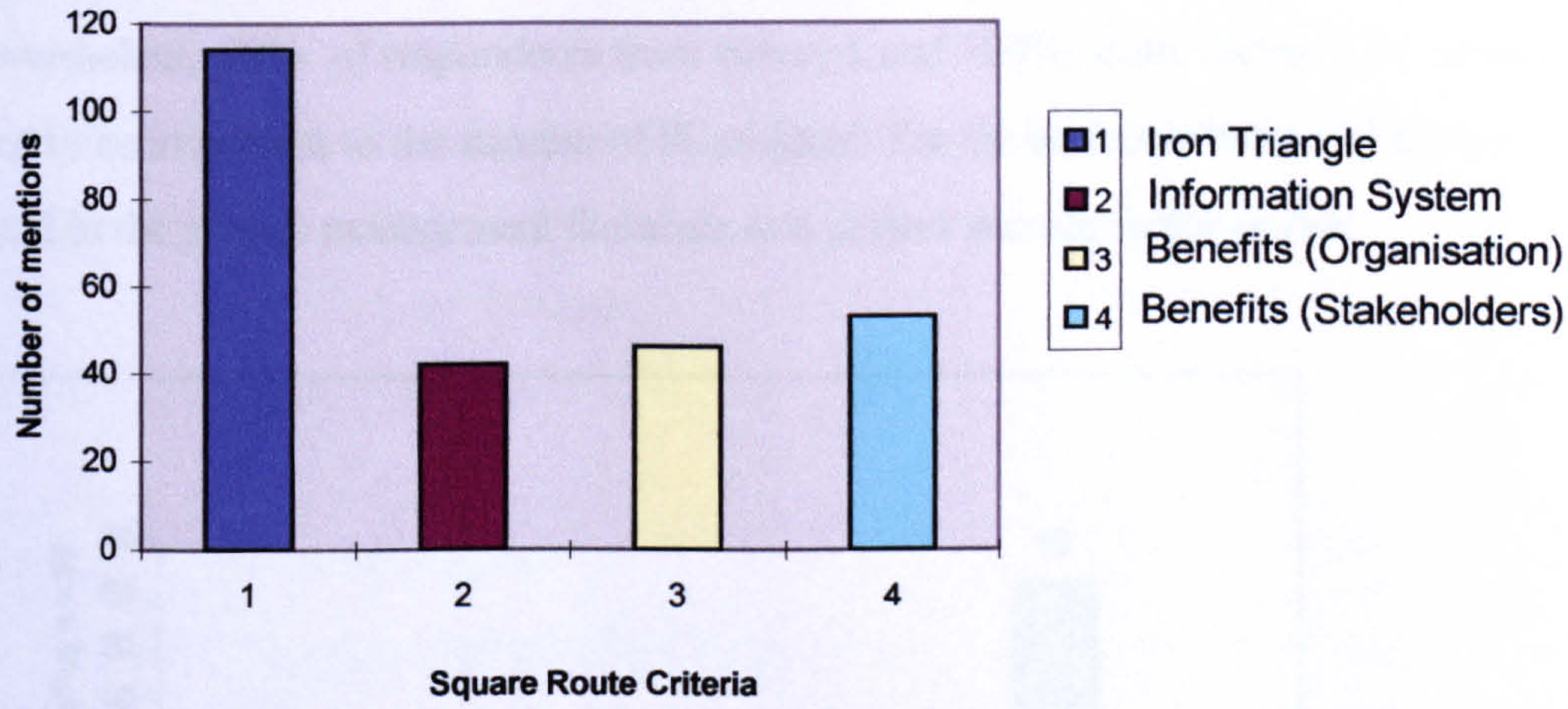


Figure 4.10 Mapping Criteria against 'The Square Route'.

4.9 Trust

The literature search in Chapter 2 identified that the subject of management had considered trust to be a factor of success but project management had not adopted the same view. This was considered to be an example of a Type II error within project management, one where all the factors had not been considered. The Questionnaire contained 3 questions relating to trust. These were included to understand how important the respondents considered trust to be within IS project management. In the first survey all 65 valid forms were usable for analysis. The results of these replies indicated a significant number of the respondents believed trust to be important. In the second survey, 20 (100%) valid replies were received. The results are described using both the surveys independently while Figure 4.11 presents the combined results.

4.9.1 The Importance of Trust

The respondents were asked 3 questions in relation to trust. The first was to rank the importance of trust between team members and project success. Each of the 5 options had an equal chance of selection. In survey 1 (n = 65), 98 % of the respondents considered trust to be of some importance, while 76% placed trust at the highest level of importance.

For survey 2 (n = 20) the results were 100% and 60% respectively. Since this was a Likert scale only the numbers or percentages are available for analysis. Although the rank order of the replies can be identified, there is no indication of the importance of the five options. It would be incorrect, for example, to suggest that if a respondent selected number 2 on the Likert scale, that choice would carry a weighting worth double had number 4 been selected. Nevertheless, 98% of respondents from survey 1 and 100% from survey 2 of considered trust to be important to the success of IS projects. Yet the subject of trust had not been found in the project management literature as a project success factor or risk.

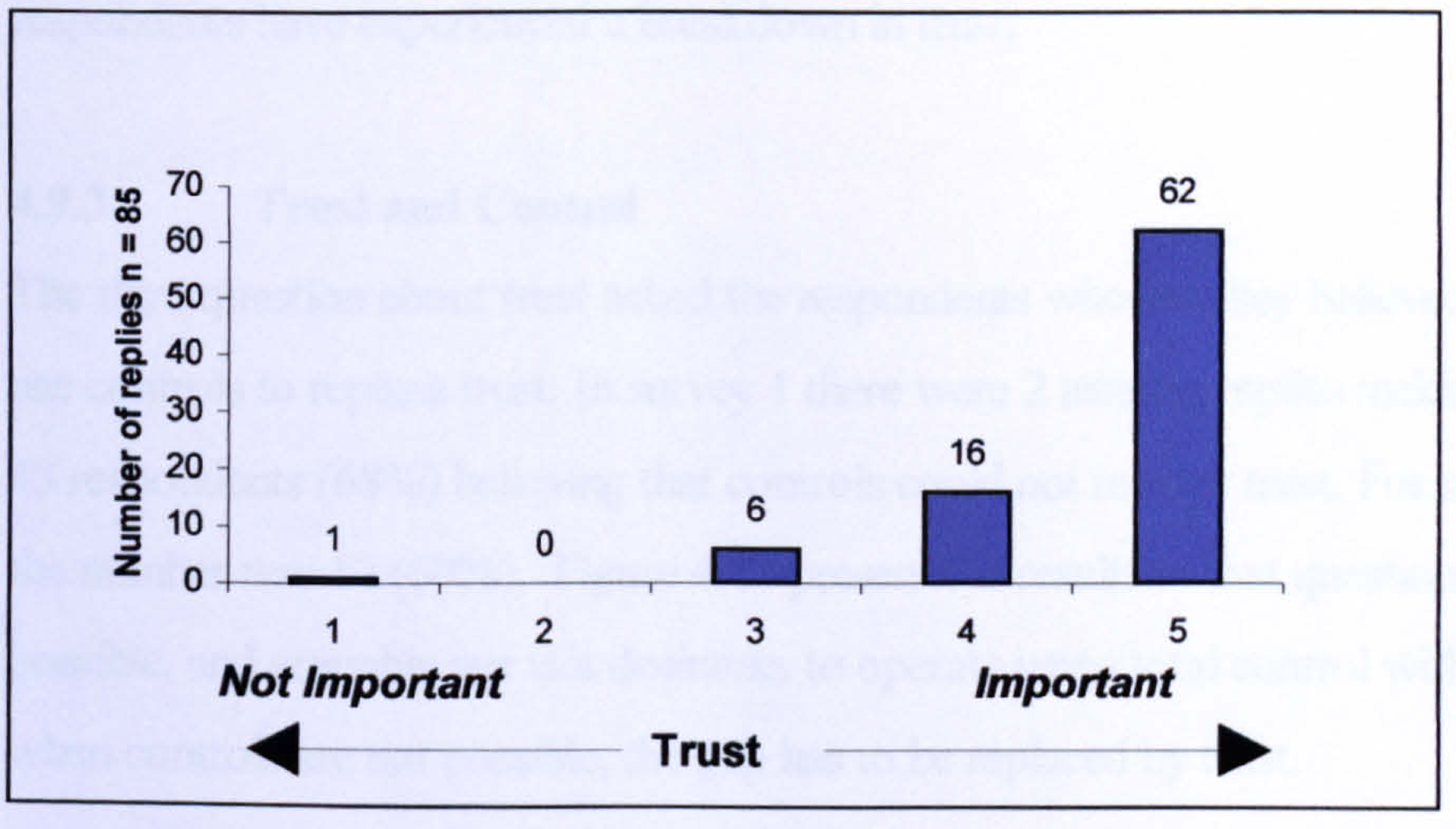


Figure 4.11 Importance of Trust and Project Success

4.9.2 Broken Trust

The next question sought whether the respondents had experienced a breakdown of trust within IS project teams. In survey 1 with (n = 65), the results indicated that 89% of the respondents had experienced some breakdown of trust, in survey 2 (n = 20) that figure was 70%. The results in Figure 4.12 (column 1) indicate 13 respondents (15%) had never experienced a breakdown of trust while at the other extreme, 5 respondents 7% (column 5) believed that on every project trust was broken.

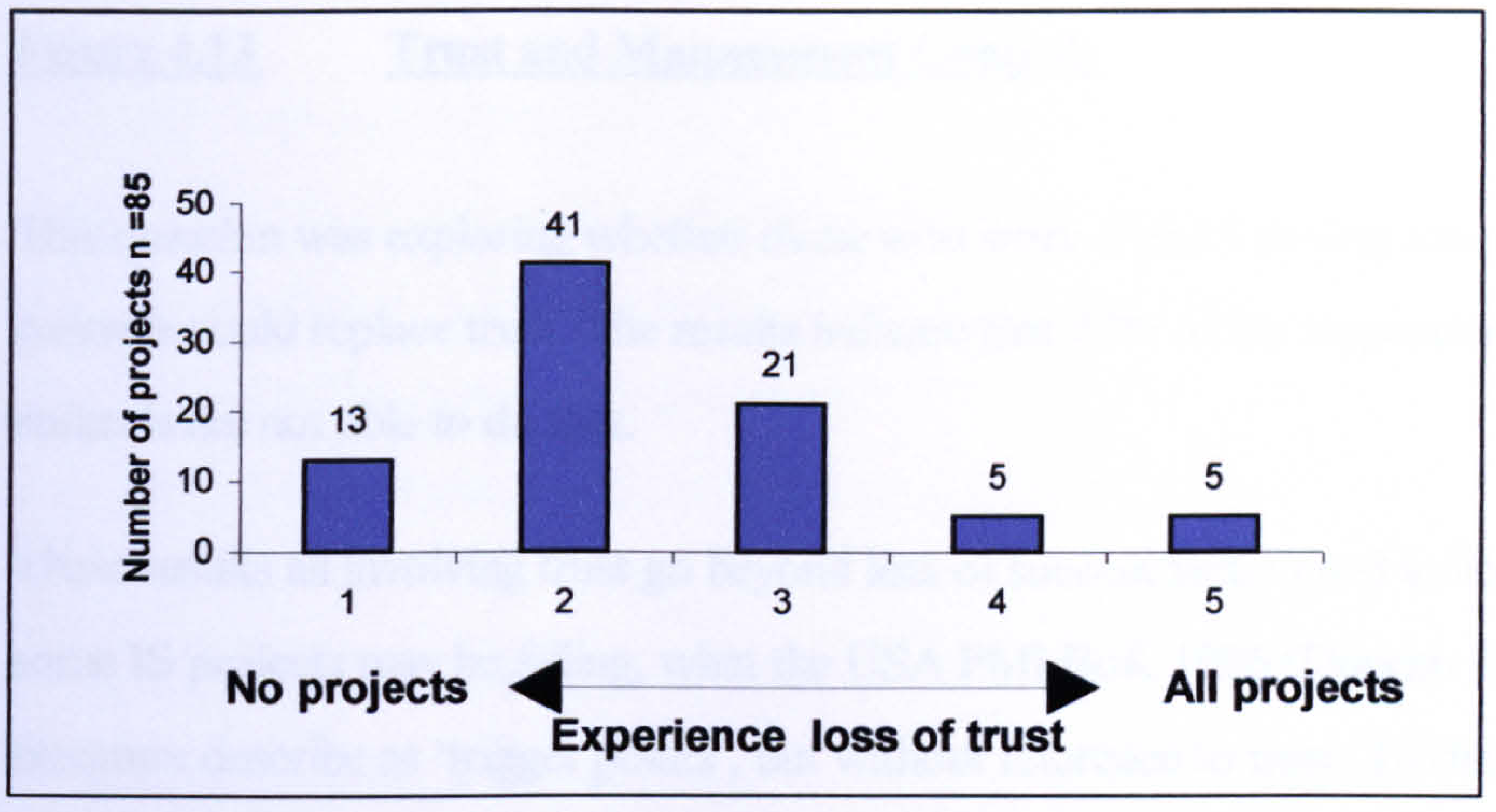


Figure 4.12 Experiencing a Break of Trust

The replies from the 85 respondents referring to trust suggested a high perception for the importance of trust (72% of respondents indicated a need of trust as their most important, while a response of 99% believed trust in some was a factor in success) and that 84% of the respondents have experienced a breakdown in trust.

4.9.3 Trust and Control

The third question about trust asked the respondents whether they believed it is possible to use controls to replace trust. In survey 1 there were 2 missing replies making (n = 63) with 43 respondents (68%) believing that controls could not replace trust. For survey 2 (n = 20) the number was 12 (60%). Figure 4.13 present the results to that question. It is clearly not possible, and arguably nor is it desirable, to operate using total control within a project. But when controls are not possible, the gap has to be replaced by trust.

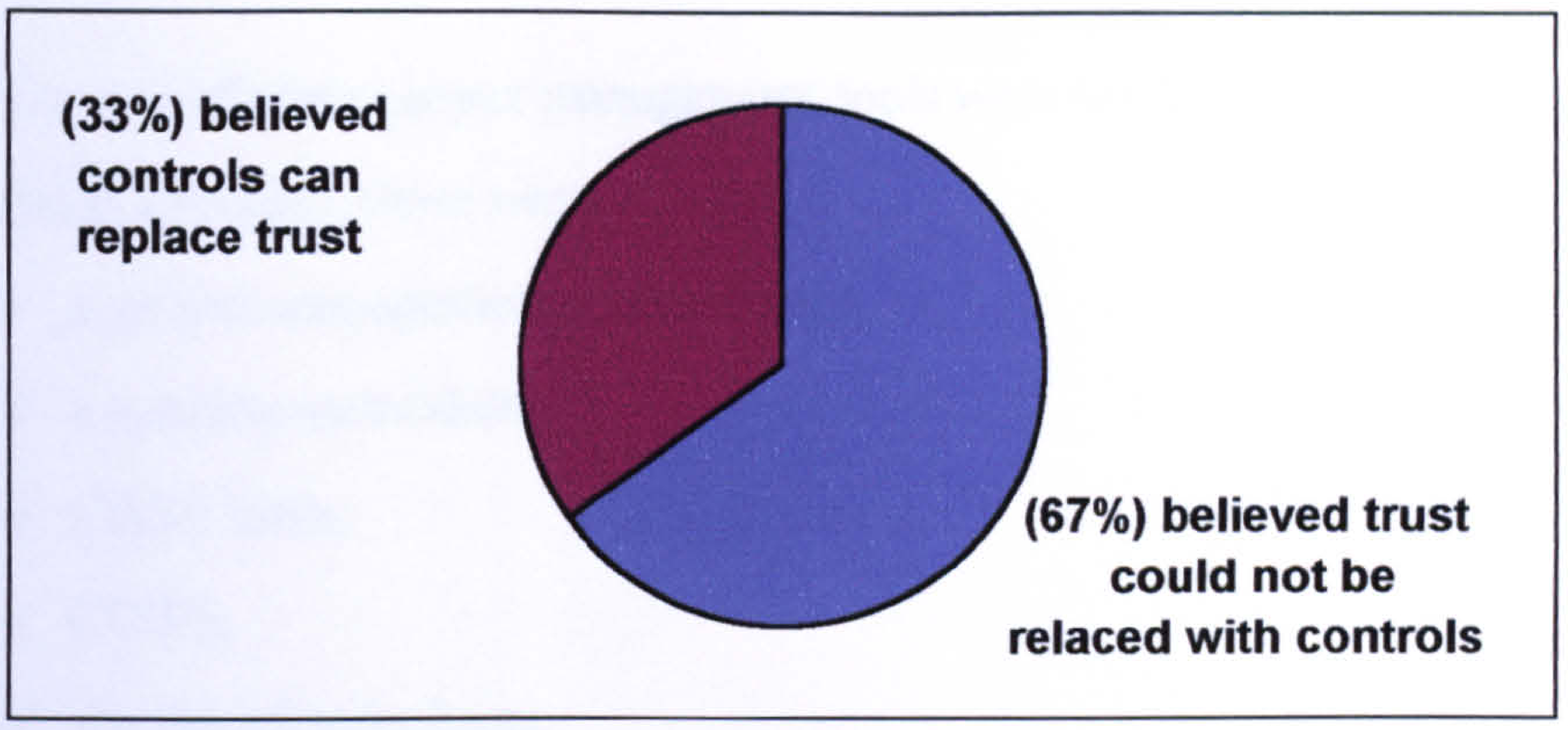


Figure 4.13 Trust and Management Controls

This question was exploring whether those who work with IS project teams believed that controls could replace trust. The results indicate that 67% of the respondents believe controls are not able to do that.

These results all involving trust go beyond lists of success factors and indicate a *reason* why some IS projects may be failing, what the USA PMI BoK 1996 (Duncan 1996) risk literature describe as 'trigger points', but without reference to trust. To discuss this further it was necessary to understand, what trust involves and how the functions of trust could impact upon the success of IS projects. These issues are covered in Chapters 5.

4.10 Summary

The results from surveys one and two, the first stage of this research, indicated that the 85 respondents had collectively been involved in 837 IS projects. Questions about projects in general indicate the respondents had been involved in more successful projects than failures. These results show that 83.8% of the projects (702 in total) had been successful. These results do not support previous studies involving IS projects. In this Chapter, it was argued that although the majority of IS projects are reported to be failing, these may simply be examples of exception reporting while success is ignored. Attempting to identify all IS projects it was further argued would be unrealistic. Assumptions about success rates have to be drawn from the consolidated results of research, to which these will contribute.

'Brooks Law' was tested to be a reliable method of calculating the optimum number of staff used on successful IS projects.

The use of other project management tools were not found to be a pre-requisite for IS project success, these were:

- a project management methodology,
- a systems methodology,
- CASE tools,
- COTS,
- the use of consultants.

When the respondents were asked how they would choose to measure the success of an IS project, cost, quality and time sometimes termed the 'Iron Triangle' received 44% of the 255 total number of replies. However, it was demonstrated that the remaining 56% of the criteria could all be mapped against an alternative approach to measure success as proposed in Figure 2.7 and termed the 'Square Route', these were the:

- resultant IS system 16% ,
- benefits to the organisation 18% ,
- benefits to stakeholders 20%.

The respondents were also asked what they believed were the factors leading to success. Table 4.2 has the list of ten factors with, planning, commitment and communication being the top three replies. These results do support earlier research as presented in Chapter 2, which identified these three success factors but with different ranking and weightings.

The responses regarding questions relating to trust were significant. The significant number of the respondents believed trust between project team members to be very important to the success of a project. Also, the respondents reported having had experienced a breakdown of trust while project controls were not considered to be a substitute for trust.

When these results relating to the perceived importance of trust were combined with the earlier observations that there was no mention of trust in the UK APM BoK (1995), USA PMI BoK 1996 (Duncan 1996), the BS6079 (1996), the PRAM guide (Simon et al eds. 1997), nor had any research taken place about the subject within project management, a gap (described earlier as a Type II error or a sin of omission) within project management was identified. This was considered to be an important finding worthy of further research and provided the focus for stage 2.

The start of stage 2 began with an additional literature search with the focus on trust. Since at that time none had been found in the project management literature, the review was widened to include that of other disciplines. This is presented next in Chapter 5.

Chapter 5

5.0 Trust as a Factor in Project Success

5.1 Introduction

The purpose of this Chapter is to discuss the effect of trust and its possible influence in project success. The structure of the Chapter is presented within the following broad themes.

Firstly, there is a discussion about the importance and need for trust supported by some definitions from other researchers. This is followed with examples of different types and levels of trust, together with an explanation of how it can be built and broken.

Next, Game theory is introduced with a discussion of different types of games that are available to test for trust. The basis of the Prisoner's Dilemma is shown to be an appropriate method to test for calculus-based trust. This is supported with examples from other researchers who have adapted the Prisoner's Dilemma.

Finally, reference is made to other researchers who have recently identified trust as a new and worthy topic for research within project management.

5.2 The Importance of trust

For the first time in more than 50 years since the BBC Reith lectures began, the subject about trust was broadcast by O'Neill (2002). The first point she made demonstrated that trust was not a new phenomenon. This was done by making reference to the Chinese philosopher Confucius (551-479 BC) when he stated that governments needed three things: weapons, food and trust, suggesting '... trust should be guarded to the end' by arguing '... without trust we cannot stand'. O'Neill (2002) makes the case for the importance of trust in that '...elaborate measures to ensure that people keep agreements and do not betray trust must, in the end, be backed by - trust', because she believes '... all guarantees are incomplete'.

Fukuyama (1995) considered the economic value of co-operation and the high level of trust within society. High levels of trust would '... permit a wide variety of social relationships to emerge', while low levels of trust would require '... a system of formal rules and regulations which have to be negotiated, agreed to, litigated and enforced'. Fukuyama (1995) believed these were used to substitute for a lack of trust, what economists call transaction costs, '... a kind of tax on all forms of economic activity'. Lane (1998) focused on trust in society and supported the view held by Fukuyama (1995) by stating '... a nation's ability to compete is conditioned by a single, pervasive cultural characteristic: the level of trust inherent in a society'.

5.2.1 The Need for Trust

Herzog (2001) reviewed the philosophical nature of trust and identified that trust and trustworthy behaviour was needed for the common good of society, and indicated that there were parallels with trust building in project teams. Handy (1995) described why trust is needed in organisations. He expressed, '... we have to manage people who we can't totally control' and '... we have to manage people who we need to trust'. It is not possible to fully control people so trust has to replace gaps in the controls. This is a true reflection of what happens in project management. Project managers, who work within IS projects are able to use the Projects in Controlled Environments (PRINCE) methodology now at version 2 that includes a structure of stakeholders to be managed (Bentley 1998). Three of these stakeholders represent the Business, Technical and User communities, collectively, called the Project Assurance Team (PAT). Other stakeholders who have different agendas and hopes were identified in the mapping of the 'Square Route' in Chapter 2. Handy (1995) proposed seven '... cardinal principles' to help build trust. Table 5.1 provides an edited extract from each of these principles together with comments of how they relate to IS project management.

1. *Trust is not blind.* It is unwise to trust people whom you have not observed in action over time and who are not committed to the same goals.
2. *Trust needs boundaries.* Unlimited trust is unrealistic. By trust organisations mean confidence. Define the goal, and the trusted can be left to get on with it, control is by assessing the results. Where we are trusted to find our own means to some agreed results we have room to explore and put our own signature to the work.
3. *Trust requires constant learning* A necessary condition of constancy is an ability to change. This requires groups to keep abreast of change exploring new options and technologies.
4. *Trust is tough.* When trust proves to be misplaced - those people have to go - or have their boundaries severely curtailed. Trust is like glass; once broken it can never be the same again. Where you cannot trust you have to check - with all the systems of control that involves.
5. *Trust needs bonding.* Self-contained units, responsible for delivering specified results, are the necessary building blocks of an organisation based on trust.
6. *Trust needs touch.* Visionary leaders - no matter how articulate are not enough. The more virtual an organisation becomes the more its people need to meet in person. These meetings are more to do with process than task.
7. *Trust has to be earned.* Organisations, who expect their people to trust them, must first demonstrate that they are trustworthy. Individuals will not be trusted until they have proved that they can deliver.

Table 5.1 **7 Cardinal Principles to Overcome a Lack of Trust** Source: Handy (1995)

Handy's fourth point suggests that where you cannot trust, you have to check with all the systems of control involved. But in IS project management, controls are automatically put in place. The automatic inclusion of controls could instil a feeling within staff that they are not trusted by the organisation, creating a negative feeling. Point 1 from Handy (1995) is that it is unwise to trust people whom you have not observed in action over time and who are not committed to the same goals, point 7 in Table 5.1 indicates the same. IS project teams often comprise staff who have not worked together, for example, through the use of consultants. These involve working in temporary matrix teams, often without a history of the team members to enable an assessment of trust to be made, thus creating an environment of low trust. The temporary nature of project teams creates an additional problem for team members who have to trust each other using only limited information.

In a research study Jarvenpaa et al (1998) identified that trust and shared communications enabled such teams to be successful. The study used the antecedents believed to be part of face to face dyadic relationships. These are the trustors' perceived ability, benevolence, integrity and the trustee's propensity to trust. The research results from Jarvenpaa et al (1998) indicated the strategies used with high and low trust teams, these are identified in Table 5.2. High trust teams were found to '... exhibit swift trust', which is discussed in section 5.5.6.

Behaviours/strategies	**High trust teams**	**Low trust teams**
Style of action	Proactive	Reactive
Focus of dialogue	Task output driven	Procedural
Team spirit	Optimistic	Pessimistic
Leadership	Dynamic	Static
Task goal clarity	Teams responsibility	Individual responsibility
Role division	Emergent/independent	Assigned, independent
Time management	Explicit/process based	Non-existence
Pattern of interaction	Frequent, few gaps	Infrequent, gaps
Nature of feedback	Predictable/ substantive	Unpredictable/non-substantive

Table 5.2 Strategies of High and Low Trust Teams Source: Jarvenpaa et al (1998)

Trust has been identified as a factor in successful teams. However, some of the features of IS projects have also been identified with an untrusting environment and these will need to be considered when project teams are formed and managed, these include:

- their temporary nature,
- teams not knowing each other,
- automatically using controls in place of trust,

5.3 What is Trust?

When attempting to answer the question, what is trust? Barber (1983) found that in 1960 the fifteenth volume of the International Encyclopaedia of the Social Sciences had no entry about trust. This relatively new interest in the impact of the topic could provide a reason for the gap in the project management literature about the subject of trust, which was identified in Chapter 2. However, Barber (1983) concluded that there were three different meanings to trust. The first was to prevent an abuse of greater power by the professions, the population at large demand trustworthy behaviour as a social control. The second meaning was for an expectation for technical competence and finally for fiduciary responsibility. Technical and fiduciary trust were both used in the 1980 democratic presidential nominations to promote the two candidates as being trustworthy, but for different reasons. Edward Kennedy was perceived to have a higher level of technical competence than Jimmy Carter, but the reverse was considered to be the case in terms of fiduciary responsibility. The New York Times reported the nominations to be operating behind a 'shield of trust'.

Lewicki and Bunker (1996) reported that trust has been studied both within, and at times between, many different disciplines, such as: psychology, economic theory, sociology, anthropology, political science and history. Naturally each of these disciplines has studied trust from a specific point of view, relevent to that discipline. In a study of trust within anthropology, MacMillan et al (2000) considered trust at a primary level. This was when a person under the control or authority of another person has to consider that the risk they face are 'non-commercial by nature'. For example, the type of trust more likely to be found in a family or kinsmanship type relationships. Blomqvist (1997) compiled the definitions of trust from: psychologists, philosophers and economists perspectives indicating how the disciplines viewed trust differently. Blomqvist (1997) concluded that a common feature across the disciplines was that, '... trust is more a property of collective units than of isolated individuals', and that there was a weakness in the contemporary research, where the unit of analysis has focused upon the individual, not the relationship.

Shaw (1997) placed trust between simple confidence and blind faith. When we have confidence in something, it is because some facts are available to support that confidence. But we may still trust someone; despite information that suggests the contrary should be the case. Some facts are required for trust to be positioned between confidence and faith.

Faith can be qualified further as being total faith or blind faith. Some religions are grounded in blind faith, where no argument or evidence can remove that level of faith. Trust is not as strong as blind faith, as the later rejects any attempt to provide alternative arguments even when reliable evidence is produced. Trust implies that some risks have been taken into consideration with the hope that they will not be realised. For example, 'I trust your estimates will be accurate', while accepting there will be some possibility of inaccuracy.

5.4 Trust and Risk

Ward and Chapman (1995) described four Phases, eight Stages and 31 Steps involved within a project risk lifecycle. None of these involved the risk of low trust in project teams. When Chapman (1997) reviewed a generic process for Project Risk Analysis and Management (PRAM) written by Simon et al 1997, trust was not included. Chapman (1997) did however make a point within what he termed 'alternative perspectives', that '... a contract which leads to confrontation is perhaps the biggest single risk most projects encounter'. Chapman (1997) had described a factor of risk but had not specifically linked it to the domain of trust.

Zaghloul and Hartman (2003) discussed the risk of mistrust within construction projects in terms of the cost savings that can be obtained through the use of disclaimer clauses. Their summary included the view that there was '... a significant relationship between trust and risk', and concluded with four stages that would help identify the risks and build a trust relationship between the parties involved in the contract, these are:

- understanding the risks and who owned them,
- sufficient time to manage or mitigate the risks,
- building trust through negotiations prior to the written contract,
- risk-sharing or risk-reward system.

Pender (2001) argued the weakness of the probability-based framework that underpins most risk analysis and suggested an alternative, based on the management of incomplete knowledge. Baba (1999) stated that '... an emerging consensus among scholars, suggests that trust may be defined as the subjective expression of one actor's expectations, regarding the behaviour of another actor (or actors). Baba (1999) continues that '... trust exists when one actor expects that another will behave in such a way that the safety and security of the first actor will be preserved, under conditions in which the first actor is both dependent upon and vulnerable to the actions of the second, that is, the first actor does not have control of the second, and there is risk of harm'.

5.4.1 Relational and Performance Risks

Das & Teng (2001) differentiate between relational and performance as two types of risks that would take place in an organisational setting. Relational risk was considered to result from opportunistic behaviour of firms having a conflict of interests. Performance risk can occur due to a lack of competence, or just bad luck, even though there has been co-operation between firms. Das & Teng (2001) concluded, '... unlike relational risk - which is unique to inter-firm co-operation, performance risk is present in all strategies, including strategic alliances'. IS projects are vulnerable to both relational and performance risks and need to be managed correctly. This research does not examine the effect of performance trust as a factor of project success. Performance trust requires that all members of the project team to have the correct skills, knowledge and experience to undertake the tasks required of them. Reassurance of performance trust for example can be obtained by asking for references and checking that the claims made on a curriculum vita with regard to qualifications are correct. There is however, no test or measure of relational trust currently available in project management. Consequently, IS project teams have no reassurance of the level of relational trust that exists in their teams. This research considers relational trust in IS project teams. The risks involved with relational trust are influenced by the level of co-operation project teams afford each other. The results from this research (discussed in Chapter 7) indicate the influence that relational trust could contribute to the successful outcome of an IS project.

The risks each discipline face, following the loss of trust, are different. While anthropology is concerned mainly with non-commercial type risks, marketing and other sectors of organisations are faced with commercial realities. Humphrey (1998) stated that '... the question of trust arises from the element of risk in economic transactions' and continued, '... under perfect competition, economic transactions do not involve risk'. Individuals can assume that '... contracts will be honoured and risk is ruled out by the assumption candid rationality and perfect information'. Humphrey (1998) continued by stating '... when these assumptions are abandoned, the question of risk and trust arise'. In the real world it is not possible to obtain perfect information (Phlips 1988) as this would require everyone to know all that others know, therefore, trust will always be required to bridge the gap between perfect and imperfect information. Humphrey (1998) concluded that '... entering into an economic exchange exposes the individual to risks arising from the action of others, if these risks are uncontrollable, then exchange is reduced, paralysed, or rendered costly by the need to take precautions, if the 'other' can be trusted, exchange is facilitated'.

Parallels between the findings of Humphrey (1998) and IS projects can be made. For example, if project team members attempted to achieve individual aims before project objectives this would reduce trust between team members.

The risks within marketing include an increased social distance between two or more parties and having to rely on imperfect information for decision making. These create the uncertainty about whether the 'other' will honour a business transaction. Hart and Johnson (1999) used the successful marketing of life insurance, as a poignant example of trusting by a customer. Clearly an insurance company could take an advantage, i.e. at a time when the customer is totally vulnerable to the actions of 'the other', because life insurance is only paid out after death.

Trading over the Internet has some similarities with those in marketing but at the same time Internet business includes an increased social distance, time delay, limited information flow and possibly no prior experience that the supplier will fulfil their agreement. This has resulted in trust becoming an important consideration for those trading over the Internet, as noted by writers such as Urban et al (2000) and Gefen (2000). The unique risks of Internet trading have created a need for a different type of trust. In turn these required additional controls to be set in place such as the use of Trusted Third Parties, who act as a bridge between supplier and customer preventing personal financial details from having to be repeatedly sent over the Internet.

5.5 Types of Trust - Rational Choice

Tyler and Kramer (1996) indicated that '... the evolving social landscape and consequent emergence of trust as a social issue is linked to rational choice' which also encompasses economic, political, legal and organisational relations. The rational choice model is founded on the idea that individuals are motivated by self-interest and who aim to obtain the best outcomes for themselves and keep any personal loss to a minimum. Tyler and Kramer (1996) described how '... people's decisions about whether to co-operate relied upon their willingness to trust others'. This was based on the probability that others will reciprocate co-operation as the '... underlying assumption that trust is rationally based'. Lane (1998) summed-up the literature of trust with the view that '... trust begins where rational prediction ends'. The above points indicate that people have to rely on imperfect information for decision making. The imperfection of information is also caused in part by there being a time delay in obtaining information, that itself is a factor of social distance. Projects will often operate with imperfect information and it is unusual for all stakeholders to be co-located in one office. Consequently this places the reliance on trust as a central requirement for successful project work.

However, rational choice is not the only model available for individuals to use for their decision making. For example, trust within anthropology is based on a non-commercial basis and it can be argued that relying only on rational choice to understand all decision making does not explain why some people act in an altruistic way, such as entering into burning buildings to save someone. However, many decisions are based on rational choice and it is reasonable to suggest that those using the rational choice model in organisations will shape the outcome of projects as they focus upon improving personal gain at the expense of organizational goals.

Fukuyama (1995) describes self-interest as a neo-classical economic theory. This is where human beings will seek to acquire the best for themselves in a rational way, before they co-operate towards the benefits of a group of which they are part. Not knowing which individuals are likely to base their judgement upon rational choice, increases the potential of risks to the success of a project. This prevents the possibility of targeting specific risk avoidance action and results in the reliance upon blunt, generic, project control mechanisms to combat potential self interests from conflicting with project objectives.

Bachmann (1998) provided a balanced view of trust and stated that the economic view of trust was based upon '... whether man is primarily seen as a rational egoist, or whether social interaction is viewed as being informed by either moral considerations or by cultural scripts and meaning system'. This later view is the social aspect of trust that does not base decision-making only on an economic model. The social view of trust, also known as 'value' or 'norm based', starts from the point that trust is built where there is a shared common aim and that a 'solidarity' in society exists to create such a level of trust.

5.5.1 Social-Based Trust

Lane (1998) stated that social norm-based trust is posited on the basis of '... the expectation on the part of the trustor that the trustee - particularly if s/he is in a position of power - will meet a social obligation and exercise responsibility'. Lane (1998) added that social, norm-based trust benefits from obligational trust that acts as a support mechanism for social trust. Tyler (2001) reported that obligation trust relies on the notion that people have a duty or obligation to co-operate with others. It is possible to find examples of obligation trust in western society. However, research undertaken by Fukuyama (1995) suggested it would more usually be found in a 'cultural context' such as that found in Japanese society.

Lane (1998) pointed out that to ensure social-based trust was to function, it would also require the fiduciary form of behaviour. Baba (1999) described fiduciary trust as '... we expect the another will behave in a way that preserves and advances our interests, while abstaining from opportunism'. This has also been called 'goodwill trust', where fiduciary responsibility can extend beyond the call of duty, to inspire individuals to exploit opportunities that further another party's interests, while at the same time refraining from self interest.

Clearly the economic and social-based models of trust are almost polarised in the anticipated behaviour that individuals will adopt. Both groups of academics attempt to suggest that their model is the only one in operation. It would be reasonable to suggest that in reality, both the economic and social-based models would inform decision making to some extent at different stages within an organisational setting comprised of individuals who have different beliefs and intentions.

There is believed to be a third model for trust termed cognition or expectation-based trust, which is discussed next.

5.5.2 Cognition-Based Trust

Lane (1998) explained cognition also known as expectation-based trust as those who regarded trust as '... expectations of persistence, regularity, order and the stability in the everyday and routine moral world, ... where trust resides in actors' expectations of things as usual, with the actor being taken for granted, to take under trust, a vast array of features of social order'. For example, a project manager exhibiting cognition trust would expect a team to behave in an ethical manner when dealing with other project stakeholders and to demonstrate consistency in their decision making.

It is possible that individuals and teams will use three types of trust i.e. economic, social and cognition. This research provides a focus upon the trust from an economic standpoint, where the decisions made by individuals or teams, would be through rational choice, as in the economic model.

The literature covering rational choice within organisation's settings has had a focus upon co-operation between individuals and teams. Axelrod (1984) studied co-operation through experiments, using a game called the Prisoner's Dilemma, a theoretical model of rational choice. Tyler and Kramer (1996) viewed the results of Axelrod (1984) experiments and concluded that '... it is the expectation of an ongoing relationship that sustains trust in the actions of others' and supported the view of trust from the rational perspective as '... a calculation of the likelihood of future co-operation'.

Viewed from the rational choice perspective, the possibility that team members may not co-operate can help explain how trust fits within the boundary of risk. The co-operation required to enable trust in others using rational choice is not a given. When this is in operation, individuals have to expend finite project energy and time attempting to reduce the risk to themselves, and expect some form of controls to be in place to protect them. In Chapter 4, the respondents to the research questionnaire indicated that they did not believe controls could replace trust. In that questionnaire the types and levels of trust had not been specified or defined. Those questions sought to obtain the overall opinion from the respondents concerning their views about the ability to replace trust with controls. The search for a reliance upon controls could therefore, reduce limited project resources, and at the same time may not achieve the aim of reassuring project staff that a lack of trust had been replaced by those controls.

Coopey (1998) argued trust to be central '... in situations where we are interdependent in our work, relying on many others in complex social contexts, especially organisational settings', concluding that trust was far from wide spread in UK organisations. The study by Black et al (2000) indicated that trust has been identified as the key success factor in business sectors other than in IS project management. Coopey (1998) pointed out the practices of management undermine the '... foundations upon which trust is built'. For example, when staff are required to be creative and innovative within a framework of organisations that expect increased profits, (encouraged by project managers who motivate staff). Coopey (1998) believed that a lack of trust produces a '... dynamic that serves to ratchet up the controls mechanisms', thus preventing success.

5.5.3 Trust as Encapsulated Interest

Hardin (2001) viewed trust at a social level, but another view of trust proposed by Hardin (2002) suggested that the question about trust is '... implicitly to ask about the reasons for thinking the relevant party to be trustworthy'. This is a type of trust that project team members would also be likely to use in determining the future intent of the other members of a project team. One factor that would help create a positive feeling would be a project environment where both sides would want to co-operate with the others. Such an environment would typically have shared project objectives as opposed to individual targets.

Hardin (2002) explains the meaning of encapsulated interest as follows, '... I trust you because I think it is in your interest to take my interests in the relevant matter seriously in the following sense; you value the continuation of our relationship and you therefore have your interests in taking my interests into account, that is you encapsulate my interests in your interests'. Cook (2001) had previously suggested that when encapsulated trust was used it would be for a specific reason and described encapsulated trust as:

- 'A trusts B with respect to X when A believes B has some reason to act in A's best interest or take A's interests fully into account'.

To help create encapsulated trust, Cook (2001) advised that uncertainty could be reduced by knowing the competence of other staff while vulnerability could be decreased by the use of enforceable contracts and insurance schemes. Heimer (2001) explained the method required to promote a trust strategy '... worked by reducing uncertainty' while a distrust strategy '... worked by reducing vulnerability'. Overall, Heimer (2001) suggested that trust was solved by manipulating vulnerability and uncertainty about intentions and competence. It is therefore logical that a requirement would be to provide information to address these and other points related to trust which, are discussed further in Chapter 8.

Hardin (2002) suggested that to enable the development of encapsulated interest type of trust, would require teams or individuals to have repeated (iterated) exchanges. These exchanges could be represented in the following forms of games:

- the iterated one-way game,
- the iterated exchanges as to reflect the Prisoner's Dilemma game,
- interactions in 'thick' relationships.

A common feature of the three methods available to identify encapsulated trust is that they are all examples of relational trust. In all cases, the individuals involved must have some information about other team members in order to build these types of trust. IS project team members work with each other so it is reasonable to suggest that they could benefit from the use of encapsulated interested type trust.

5.5.4 Thick Trust

Hardin (2002) positioned 'thick' trust as a type of relational trust. This type of trust is possible when individuals are able to build an ongoing history of others through several overlapping and often complex relationships. Having more than one data source of information about others, helps to improve the reliability of that information about them. Hardin (2002) suggested that the trust created using 'thick trust' is also less likely to be broken due to the threat of the loss of reputation or worse by the '... shunning by others' if they do not co-operate. It is, therefore, reasonable to suggest that one measure of trust within a project team would be to identify the amount of triangulation of 'thick' relationships within the team. Such as, are there family groups or do some staff play sport with other staff? Hardin (2002) concluded that '... because trust in our lives is generally relational and is commonly to be explained by relational considerations, one may hope that empirical studies will begin to take relational elements into account'.

Bacharach and Gambetta (2001) pointed out that the results from Rapoport (1960) had identified that '... the analysis is that rational choice theory is an appropriate tool for the analysis of trust'. The Prisoner's Dilemma has been positioned within the area of both relational trust and encapsulated trust and indicates that it is an appropriate approach to be used for this research.

5.5.5 Trust as Shallow Morality

According to Messick and Kramer (2001) a feature of trusting is that sometimes the rules that can be used to gauge trust are not always used. When this happens the type trust in operation is called 'shallow' trust. As an example, Messick and Kramer (2001) point out that when people return from shopping, they do not usually re-weigh items such as pre wrapped goods to ensure they have not been under sold. Shallow trust, they add is used in '... scripted situations' when behaviour is '... habitual and automatic' and it is possible to rely upon others not to take advantage.

The development of 'shallow' trust is achieved through three stages. The first stage involves '...t he insistence and coercion of trust is organisationally adaptive' but this Messick and Kramer (2001) suggest is more likely to happen if trust already exists. The second stage is the '... managing of the risks of the group'. The final stage is the outcome for the organisation, when it becomes '... transformed from an object of trust to an arena of trusting interactions'.

The reason given by Messisk and Kramer (2001) for the use of 'shallow' trust is that '... humans are imperfect information processors and decision makers' and that rationality may not be achievable since the information is '... biased and flawed' so '... good enough replaces best'. In these situations we employ what Messisk and Kramer (2001) called a '... heuristic of veracity where on average it is better to give people the benefit of the doubt and keep trust in others intact'. When team members do not have a 'shallow' type of trust for their fellow team members it is possible that would create a spiral of distrust. For example, if a project team member constantly had their work checked beyond the level required for normal quality procedures. Individual team members would know whether this was taking place. Collecting that information would indicate whether the organisation or project was operating under a culture of trust, or excessive controls, the latter of which, has been linked to lower levels of trust.

5.5.6 Swift Trust

A feature that differentiates project management from other forms of management is that projects have a finite time scale. Projects have a clear start and end point. One requirement for trust is to have it built-up over time. This can be observed to be taking place when individuals do what they say they will do, thus creating a basis of trust building. However, with project work time is there is often limited time to build trust with a person and there is often no history of their behaviour, but they still have to work together to achieve the project objectives. This requires 'swift' trust as discussed by Jarvenpaa et al (1998).

Meyerson et al (1996) studied temporary groups (projects are an example of temporary groups) and explored how 'swift' trust is built. This entailed '... high risk, high stake projects, yet seem to lack the normative structures and institutional safeguards to minimise things going wrong'. Temporary systems require teams to behave in a trusting way. However, those same temporary systems lack the time for familiarity to develop via shared experiences or demonstrations of none exploitation of vulnerability, from which the stable organisations are able to benefit. Characteristics of temporary systems considered to have potential relevance for the formation of trust are included in Table 5.3.

When the factors in Table 5.3 which, together make up 'swift trust' are present in a project or organisation, the safeguards that are normally required to create a trusting environment would be missing. It is, however, further believed that 'swift' trust can compensate when those normal safeguards are missing. 'Swift' trust operates best when it is less interpersonal and more of a cognitive form. The suggested requirements for 'swift' trust to operate are for the project to have:

- a focus,
- a clear output,

  (to enable)
- team members interacting within roles rather than personalities.

For example, in respect of the PRINCE 2 project management methodology, Bentley (1998) includes an organisational structure where individuals and teams have titles allocated to them. Being able to refer to the Business Assurance Co-ordinator in a meeting rather than to address individuals by name, is an example of how PRINCE 2 supports (possibly unintentionally) the requirement and conditions of 'swift' trust, a factor that other project teams could benefit from adopting.

The factors of 'swift' trust are required when comprehensive information about the teams is not available. In this respect, high trust project teams are identified as those who enter into a state of 'swift' trust as outlined by Jarvenpaa et al (1998). It is argued that trust could be reduced in IS project teams due to the temporary nature of the IS project. This reduces the chance for team members to get to know each other, leading to the automatic use of controls. The conditions to enable 'swift' trust to operate can compensate where teams do not know each other or when little or no history of team members is available.

1. Participants with diverse skills are assembled by a contractor to enact expertise they already possess.
2. Participants have limited history of working together.
3. Participants have limited prospects of working together again in the future.
4. Participants often are part of limited labour pools and overlapping networks.
5. Tasks are often complex and involve interdependent work.
6. Tasks have a deadline.
7. Assigned tasks are non-routine and not well understood.
8. Assigned tasks are consequential.
9. Continuous interrelating is required to produce an outcome.

Table 5.3 **Temporary Systems and Trust** Source: Jarvenpaa et al (1998)

Evans (1997) stated, '... the concept of trust, like that of faith, implies the opposite of security, since, for trust to exist, each participant has to have prior confidence in the reliability of the other party'. It is for this reason that team-building activities are sometimes carried out early in the life of a project in the belief that they aid the future success of a project. But the activity of team building does not automatically produce trust between team members. Team building exercises provide information about team members, which could indicate that a person is not trustworthy. Furthermore, the type of trust that is being tested during outdoor team building is technical and fiduciary trust. It is unlikely that one person would let another become injured if they could prevent it. But when the teams are working on a project it is possible that the type of trust that could be used would be the lowest form, rational economic or calculus trust (see sections 5.6.1 and 5.6.2). It is, therefore suggested, that project teams could improve their team building knowledge by using a project simulation, to reflect more accurately the type of trust likely to be used during the project.

Dobing (1993) considered that trusting a group of people is less likely than trusting an individual. This is in contrast to the view that for 'swift' trust to operate it requires staff to work within project roles, rather than interact as individuals. Projects operate in teams or groups of which individuals are a part. As discussed earlier, the PRINCE 2 methodology (Bentley 1998) has a project structure which, includes Business, Technical and User groups. Other stakeholder groups also exist within IS projects, representing such as suppliers, contractors and consultants. The team or group culture also provides an additional reason why project teams may be associated with low trust.

5.6 Levels of trust

Tyler and Kramer (1996) described how developing trust within a working environment would take place by moving through three different stages, evolving into a state high level of stable trust. The three development stages and their respective levels of trust are discussed in the next sections, together with comments about how these relate to project teams.

5.6.1 Calculus-Based Trust

This mode of trust is the lowest level and requires some real penalty to be imposed if trust is broken, such as not obtaining a further business contract. However, a reward would be received when trust was maintained, such as an improved professional standing. People become more consistent in their behaviour, if a deterrent (punishment) is known to them, and when it is clear that the deterrent will be implemented if needed. At the same time it is possible to understand the need for benefits or rewards for not breaking calculus-based trust. Controls are an integral part of calculus-based trust. Personal short-term gains are seen to be more important than long term potential project benefits with this type of trust. Time is needed for individuals to demonstrate that they will do what was agreed, and to repeat those actions several times, building trust slowly but gradually.

On the other hand a single failure to fulfil an agreement, would reduce the level of calculus-based trust, previously built by positive work. Project management uses formal methods to control a project that possibly prevents trust from moving into the higher levels possible.

5.6.2 Knowledge-Based Trust

Improved information and an ability to forgive are the key differences between calculus and knowledge-based trust. Regular communication provides a vehicle to enable this type of trust to develop. As information is built up, it is possible to predicted future behaviour following repeated undertaking of expected behaviour. Some actions that would cause a breakdown of trust within calculus-based trust would be forgiven, within some tolerance, within knowledge-based trust. Within project management, it is sometimes possible for external factors to prevent an agreement from being achieved. For example, being late for meetings. Team members who work at knowledge levels of trust, would defend a colleague for such an event, when the person had previously demonstrated repeatedly that they would, if possible, be on time. No consequential action would be taken, neither would a penalty be used within knowledge-based trust, the incident is simply forgiven due to the level of trust in operation. Messick and Kramer (2001) stated that '... whatever matters to human beings, trust is the atmosphere in which it takes place' and that '... because the cost of misplaced trust are high credibility is lost only once unless the mistake is reasonable'. What Messick and Kramer (2001) suggested was that the forgiveness in knowledge-based trust should only be applied if the action to be forgiven was not a deliberate action but simply a mistake.

5.6.3 Identification-Based Trust

Moving into what is considered the top level of trust, can be described by using the terms such as having an empathy with others, or mutual understanding of others priority of needs. No control or proof is required that something agreed will be done. Messick and Kramer

(2001) described the four factors that they suggested were needed to transfer from a knowledge-based-trust to identification-based-trust. These are:

- collaborative collective identity - achieved by such as a team name and or logo,
- co-location - through close proximity of working environment,
- creating joint goals - collaboration in setting objectives,
- commitment to common values - ability to act on behalf of other team members.

The three different types of trust described above (calculus-based, knowledge-based and identification-based) can be mapped onto the project management environment. Firstly, all project management methodologies suggest some form of control mechanism, which implies some use of the calculus-based trust. At the same time having some flexibility and tolerance to unavoidable problems would be useful, rather than always having to invoke a penalty. Knowledge-based trust would be a positive factor to help achieve successful IS projects. But it was argued earlier that information may be withheld in project teams, not always deliberately. This could prevent the calculus-based trust from developing into knowledge-based trust. Also, teams may have not worked with each other previously, for example, in cases when consultants are used. It would therefore, be unreasonable to expect identification-based trust to be automatic or sometimes even possible in IS project teams.

Some professional relationships may not migrate to higher levels of trust because there is a need to retain business independence. Some of the features of trust can at times appear to be in conflict with each other. For example, when some project team members use economic rational choice for their decision making in preference to considering their fiduciary responsibilities, thus increasing the risk for the team or the project, as discussed earlier.

It would not be possible to create a level of 'perfect' knowledge-based trust because this would require perfect or total information for all involved, which itself is not achievable (Phlips 1988). However, the increase of information that is needed to build knowledge-based trust could itself reduce the final level of trust in operation in an IS project. Some information could become known about a team member that could reduce the level of trust. Tampere (2004) for example, identified that trust improved with a corresponding increase in information flow. However, when the information level reached between 80-90%, the level of trust suddenly was reduced to zero. Tampere (2004) has re-affirmed the 'salt curve' theory. This states that just because something is good and that more is better, there will be a point when even more is positively bad. Therefore, in addition to being unable to achieve perfect information, Tampere (2004) discovered there would be a point where too much information would create a down-turn in the level of trust. The issue however that remains is, to identify the critical information required in the 80-90% before trust become less.

An example of too much information linked to IS projects is to imagine an organisation that becomes closer to some contractors, via the use of a preferred contractor list, formed often through higher levels of trust, as found in knowledge or identification trust. By using preferred staff, the project is prevented from a fair or equal competition between other contractors and the opportunity is lost for those who have less information, causing the level of trust to be reduced.

There is also a potential problem with relying only on high levels of trust. When the higher levels of trust are in operation, controls have usually been dispensed with. When trust is broken under these conditions the results are often spectacular, as shown by the collapse of the Barings Bank. The trader who worked for the Barings Bank and caused the losses was convicted of fraud and was reported to have falsified records and fabricated letters, (Barings Bank Debacle 2004). The Bank of England Report (1995) discussed the collapse of the Barings Bank and concluded that '... the losses were incurred by reason of unauthorised and concealed trading activities' and '... the true position was not noticed earlier by reason of a serious failure of controls and managerial confusion within Barings'. The trust awarded to the trader by the Bank had been broken. However, the Bank of England Report (1995) identified that the environment within which the trader was working had failures in the controls used. Had the controls been in place it would have been less likely that the fraud would have gone undetected. The Baring Bank Debacle (2004) identified other organisational problems in Barings. A 'matrix' approach was operated and this would not have automatically been a problem, but employees had '... complained that lines of reporting were not always clear' and '... there was no single person within Baring responsible for supervising' the specific trader involved. The environment had, therefore, permitted the trader to take advantage of a lack of controls who had then carried out actions linked to untrustworthy behaviour such as falsifying reports and accounting entries.

Lander et al (2004) identified the mechanisms of trust-building specifically within outsourced information systems development (OISD) projects and identified where they fit within the different three levels of trust described above. These are presented in Table 5.4.

<u>Calculus based trust</u>	
Initial interactions	Using reputation Getting to know various stakeholders well prior to beginning of project Using early team building efforts
Integrity	Fulfilling promises, Telling the truth
Predictability	Consistency, Dependability, Responsibility/accountability
	Rewards/punishment
<u>Knowledge-based trust</u>	
Communication	Encouraging communications
	Sharing knowledge and appropriate information
	Providing timely feedback, Creating common language
	Creating shared vision, Offering explanations for decisions
	Openness, Receptivity
<u>Identification-based trust</u>	
Sharing control	Delegating obligations, Sharing and delegating control
Concern for others	Fairness, Respecting others
	Apologising for unpleasant consequences
	Showing concern for various stakeholders' interests
Joint identification	Using co-location, Availability,
	Involving in meaningful participation
	Attachment to group, Interactions/co-operation
Commitment	Loyalty, Stressing the long-term interests of participants
	Job satisfaction
Potential for Success	Achieving early success, Competence
Managerial Decisions	Providing training and personal growth opportunities
	Selection of vendor/negotiation of contracts
	Commitment of appropriate resources (people)
	Change management

<u>Table 5.4</u> **<u>Trust-building Mechanisms</u>** Source: Lander et al (2004)

Naturally, the date of the paper from Lander et al (2004) indicates that it did not influence the questionnaire and the business game that had both been developed for this research.

However, Table 5.4 indicates the emerging interest in the subject of trust which is specifically linked to IS projects during the period of this work.

Hardy et al (1998) considered that if we are confident that our predictions will come to pass, we trust them through predictability. It would be difficult for every stakeholder to obtain everything they wanted from a project. But if individuals are disappointed at the outcome of a project, it is likely this has been caused because their expectations had not been managed correctly. At the completion of an IS project some individuals may not be satisfied with the outcome, but provided this did not come as a surprise, there should be little disappointment. Dissatisfaction and disappointment are different. For example, the customers who use a 'fast food' organisation may not be totally satisfied with the meal. But the marketing is such that the customers are not surprised by what they have received, unless it is their first visit. The marketing activities produce a cognition or expectation-based trust (Lane 1998) and when the service to the customer matches what the organisation lead the customer to believe would occur, Lane (1998) described how the '... expectations of persistence, regularity, order and the stability ...where trust resides in actors' so the expectations of things to be as usual have been achieved. Customers may not be totally satisfied with their meals but they are not disappointed because the product and service achieved the level of expectation that the marketing had created. The result is that these organisations are trusted because they do not surprise their customers and this is achieved through repeatedly meeting the customers expectations that organisations have originally promised.

Individuals in IS projects can also be prepared for a level of dissatisfaction. Some stakeholders for example, may request more features from a new IS project than can be provided, resulting in them being dissatisfied with the result if the features are not provided. Consider then if regular and open communications took place during a project, the dissatisfaction by some stakeholders may still occur if they did not receive all their requirements but this would not come as a surprise. Disappointment on the other hand comes from a mismatch of what the stakeholders expected and what was achieved, indicating a failure in communication. This produces a breakdown of trust.

5.7 Spiral of Trust

Trust can spiral, both positively and negatively. If a relationship is to start in a state of mutual trust, it would require prior confidence in the reliability of the other party, otherwise those involved are being asked to trust without evidence that it is safe to do so. The only paper found in the project management literature at the start of this research that attempted to link trust with project success was Munns (1995). In that paper Munns (1995) presented the Graduated and Reciprocated Initiatives in Tension reduction (GRIT) proposal as displayed in Figure 5.1, a model to be followed in the continual building of mutual trust.

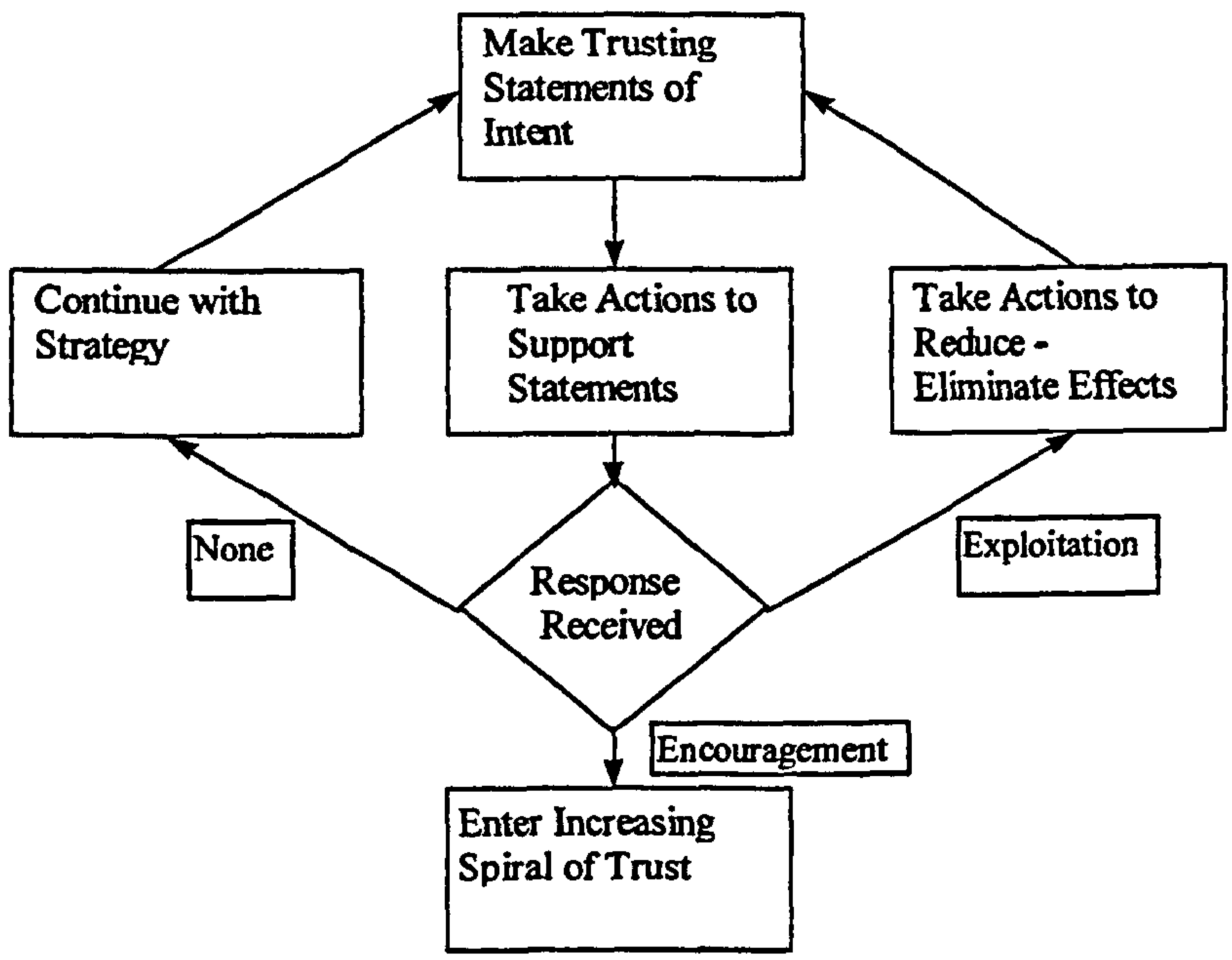
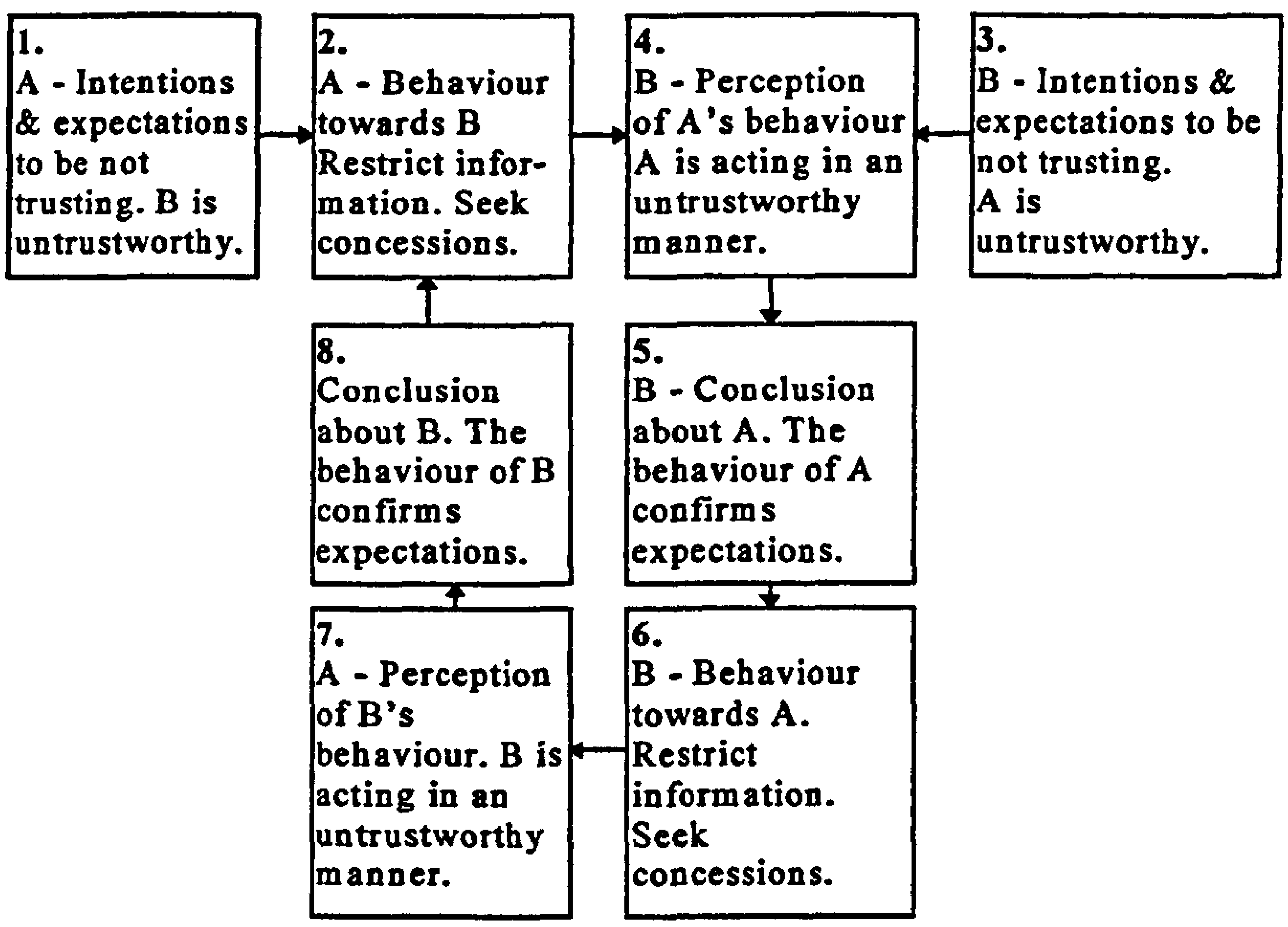


Figure 5.1 **GRIT Model** Source: Munns (1995)

For a positive spiral of trust to develop, the intent or desire to want to trust must be mutual. A relationship that starts even with only one party having a position of mistrust will spiral into greater mistrust. Munns (1995) developed a model to represent '... two parties who start with pessimistic intentions and expectations' as can be seen in Figure 5.2. This is based on a model originally presented by Zand (1972) who examined '... the dynamics of trust when two individuals enter into a relationship with similar expectation and intentions', either optimistic or pessimistic.

Withholding information in a project team has been considered to be the key trigger to begin the spiral of mistrust. Having built and broken trust, can it then be repaired? Repairing or rebuilding trust depends upon the reason for and severity of the breakdown. A requirement to rebuild trust is an acceptance that a problem exists, followed by stages of forgiveness and an agreement of the new starting point for trust to begin, to be rebuilt with some method of validating the new commitment. Gray and Larson (2000) and Kobielus (1995) noted that there is less literature in respect of building trust, than that of breaking and preventing a breakdown of trust. Gary & Larson (2000) believe that the building of trust within a project environment appears to focus more on trustworthy behaviour and fiduciary trust as it requires team selection, team building and stakeholder team building, which supports the view presented in Barber (1983).



<u>Figure 5.2</u> <u>Spiral of Mistrust</u> Source: (Munns 1995 after Zand 1972)

5.8 Features of Trust

Gill & Butler (1996) catalogued the main features of trust and distrust in joint-ventures. This is reproduced in Table 5.5. What is interesting in the research of Gill & Butler (1996) is the suggestion that a feature leading to trust was to have ambiguous goals but with sufficient agreement to proceed. Gallagher (1995) on the other hand included the need for a clear and unambiguous aim or goal in the list of critical success factors. But the findings of Gill and Butler (1996) given in Table 5.5 identified that high trust is generated when ambiguous goals are present indicating that these two factors are mutually exclusive. A paradox would seem to exist:

- trust in project teams has been argued to be a requirement for project success,
- creating trust has been linked to having ambiguous gaols,
- project success has been linked to having unambiguous gaols.

The findings of Gill and Butler (1996) are in direct conflict with Gallagher (1995) and other studies by Posner (1987), Pinto (1988) and Geddes (1990) which, suggested the importance of a clear project goal would be linked to project success. Positing that the results from the study by Gill and Butler (1996) are correct, the question could be asked, 'is it more important at the start of a project to have a *clear aim* or to have a *high level of trust?'*

Features Leading to Trust	Features Leading to Distrust
Parent expectations low at formation Ambiguous goals but sufficient agreement	Parent expectations high at formation Apparently clear goals with latent goal of one parent coming to light later
Contract viewed as unimportant except as focus for early discussions, low reliance upon procedural trust	Increasing shift to procedural trust
Pooled interdependence (low), parents not competitors joint-venture relatively unimportant to each other, a situation that is maintained	Sequential interdependence, dependence of one parent on the other increased due to endogenous competition
Personal trust built up over time and contingent upon performance, high level of interaction at different levels maintained	High personal trust linkage broken, performance disappointed, personal trust not maintained, reliance upon procedural trust
High and increasing autonomy Separate physical and organisational identity	Low autonomy Joint-venture intermingled with main facilities and located on sit of one parent, lack of physical and organisational identity
Forbearance during problems	Preparedness to take away support

Table 5.5 **Features of Trust and Distrust** Source: Gill & Butler (1996)

Starting an IS project with a clear aim, such as identifying the criteria against which the project would be measured for success, has received support within the literature. However, the alternative is to have a high level of trust with some flexibility over the aim. This may be more appropriate to consider at the start of a project. The project management literature points towards having a clear aim, which seems to imply projects may possibly be starting with a low level of trust, while a high level of trust has been argued to be an important factor to achieving project success.

5.8.1 Rapid Applications Development (RAD) and Trust

IS projects may have a system to overcome the paradox of having clear aims and low trust. Avison and Fitzgrald (1995) described how the Rapid Applications Development (RAD) method does not require a fully defined goal at the start of a project. In RAD, change is expected during the development cycle and the resultant system is produced following several iterations to define and refine the project objectives. Using RAD would support the findings of Gill and Butler (1996) as it promotes high levels of trust by starting with ambiguous goals. It would appear reasonable to suggest that an ambiguous aim at the start of an IS project would appear to conflict with the main views of project management. The RAD systems development methodology appears to offer the opportunity of combining the need for a trusting team with a clear but flexible project aim. However, in Chapter 4, it was reported that the analysis of the questionnaire from this research indicated only 44% of the respondents used any systems development methodology. These results indicate that the use of systems development methodologies (RAD in particular) and links with IS project success and trust could benefit from further research.

5.9 Testing for Trust

Attempts have been made to assess organisations and teams for their trustworthiness. For example, Shaw (1997) developed a set of questionnaires to address three areas that he believed were the key factors to identify trust:

- results,
- integrity,
- concern.

Cummings and Bromiley (1996) meanwhile presented a questionnaire called 'Research Items in Instrument to Measure Interorganisational Trust' as part of an Organisational Trust Inventory (OTI). The core of the argument and the need for an OTI was '... that trust reduces transaction costs in and between organisations'. The OTI basis of the OTI was that the three forms of trust originally assumed by Williamson (1975) to be completely absent in organisations, was false. Cummings and Bromiley (1996) pointed out that in order for Williamson's transaction cost theory to be correct it would require people to:

- lie in negotiations,
- cheat on any deals if it is profitable to do so,
- exploit opportunities for renegotiation to their utmost.

Cummings and Bromley (1996) believed that these assumptions were incorrect and designed their OTI '... in a manner directly contrary to the assumptions of Williamson (1975)'. The foundation for the OTI was therefore based on the following explicit definition of trust by Cummings and Bromley (1996).

> 'Trust will be defined as an individual's belief or common belief among a group of individuals that another individual or group:
>
> (a) makes good-faith efforts to behave in accordance with any commitments both explicit or implicit,
> (b) is honest in whatever negotiations precede such commitments,
> (c) does not take excessive advantage of another even when the opportunity is available'.

In reality it is unlikely that only one of the polarised set of beliefs by Williamson (1975) or Cummings and Bromley (1996) would exist at any one time. However, the questionnaires for trust developed by Shaw (1997) and Cummings and Bromley (1996) have contributed to the idea of measuring trust, although their structures and questions do not specifically address trust in IS project environments or IS project teams.

5.9.1 Testing for Secondary Trust

Bacharach and Gambetta (2001) discussed the unobservable properties of a person, that they called 'Krypta' and suggested that it was not possible to '... tell trust from observation'.

Bacharach and Gambetta (2001) argued alternatively that it was possible to display some secondary signs of trust that called manifesta or t-Krypta (i.e. trust Krypta). These being trust warranting properties such as behaviour. A problem with secondary trust is that observed manifesta are not always accurate because it is possible to mimic some of them. A Personal Identification Number (PIN) can be mimicked since they are an example of Krypta. Alternatively, fingerprints cannot be mimicked, but they can be faked because they are objects. Within secondary trust, the two properties of either being able to mimic or not mimic are known as 'Can' and 'Cannot' conditions. Bacharach and Gambetta (2001) argued that manifestum are secure against mimicry '... if and only if it's cheap enough for Krypta to be displayed and too expensive for an opportunist to display'. Bacharach and Gambetta (2001) considered that the '... full analysis of trust may involve attitudes that are indeed peculiar to games of trust' also that it would be better if the secondary signs of trust (t-Krypta) '... are correlated with other things'.

It has been discussed in sections 5.6.1 - 5.6.3 that there are different types and levels of trust. Although it was not possible for this research to test the complete range of trust, it was possible to identify one level of trust (calculus) which is linked to project teams and a test was developed to explore the effect of that level of trust. Project teams could enter into a calculus, knowledge-based or identification-based trust. Factors that could contribute to the level of trust achieved are:

- the temporary nature of project work,
- clear or ambiguous project aims,
- an individual's decision whether to seek higher personal benefits or to work towards a project goal.

As discussed in section 5.6.1 when calculus trust is in operation, the decisions that individuals make are more likely to be based upon a rational economic transaction, where opportunistic behaviour is more apparent than when the higher forms of trust are in place; for example, with social (norm) based trust. The latter rely upon social obligations, professionalism and fiduciary behaviour. Das and Teng (2001) explained opportunistic behaviour would take place within relational trust rather than within performance trust, since performance trust included a measure of luck.

The economic model of trust can be considered to equate to the use of 'rational choice' by individuals as they decide whether to co-operate with other team members. Tyler and Kramer (1996) described how '... people's decisions about whether to co-operate, for example, their willingness to trust others, are based on their estimates of the probability that others will reciprocate that co-operation', from the generally accepted '... underlying assumption that trust is rationally based'; a view not supported by Williamson (1993).

5.9.2 Testing for Calculus-Based Trust

To test calculus-based trust, the Prisoner's Dilemma game may be used (see section 5.10). This would also explain co-operation verses opportunistic behaviour . Burt and Knez (1996) stated that '... the essential tension of trust is illustrated by the decision rule of the Prisoner's Dilemma'. Murdoch (1999) described 'game' theory in general consists of '... complex mathematical formulae that shows how decisions affect each other'. Murdoch (1999) concluded that the business profession is only beginning to use game theory while economists have for some time used the theory to 'solve practical problems'. In a dynamic changing environment, where stability is not certain, there is likely to be conflict or competition between others in the organisation, who are considered as threats. These possible conflict interactions could be considered to be similar to those involved in IS projects, where there would be several 'stakeholder' groups each deciding whether to co-operate, or not, with each other. It is possible to investigate whether conflicts in teams exist by using the essential tension of the Prisoner's Dilemma. Hollocks (2000) explained that to represent a competitive or conflict environment, the following 4 factors needed to be in place:

- a finite number of competitors or players,
- each of the competitors has a finite number of possible options,
- multiple players make their decisions simultaneously and independently,
- outcomes of the decisions determine the return to each player.

These factors are in place in the Prisoner's Dilemma, but they are not in other types of games such as the Trust-honour game (Miller (2001), or the Trust game (Messick and Kramer 2001) and (Yamagishi 2001).

5.10 Game theory - the Prisoner's Dilemma

Understanding whether project teams are operating in an environment of conflict or co-operation can be demonstrated using the rules of 'game theory'. Game theory can be divided into either zero or non-zero sum games. In a zero sum game, what one team wins, is at the direct expense of the other team. In a non-zero sum game the intention is not to beat the other people. The intention of a non-zero sum game is that both sides would benefit if the teams co-operated. In the Prisoner's Dilemma, the 'Payoffs' that teams are awarded for the decisions taken are make by a third party called a 'banker'. When both teams co-operate, both receive the same value of Payoff. But the Payoffs that players receive can be improved if they base their decisions on co-operation and not by using opportunistic behaviour. At the same time, for players to co-operate, they have to trust that the other players will not attempt to obtain a higher result for themselves.

The benefit for groups or teams that can trust each other is that they will work with and not against each other. Miller (2001) described how groups '... can produce more as a team than they can working separately'. An individual's 'marginal productivity' is therefore a function of other team member's efforts and as Miller (2001) stated '... an individual can contribute more if others contribute more'. The situation this creates according to Miller (2001) is an 'N' person Prisoner's Dilemma where effort is '... costly to the individual but rewarding to the group'.

In other words, in a Prisoner's Dilemma environment, those taking part are vulnerable to the actions of others. This is a risk and the decision of whether to co-operate or not, depends on the ability to trust the other players, who may act from a position of self interest. The vulnerability to the teams is caused by what has been described as the 'essential tension' within a Prisoner's Dilemma game.

IS project management requires the stakeholders to co-operate for the benefit of the project, ideally this would be a non-zero sum game. However, many projects result in failure. Those failures may be caused by stakeholders such as the 'Users' having obtained a greater proportion of the project's resources than it was agreed at the project inception. With finite project resources available, those representing other stakeholders such as the Technical or Business would need to compensate for the increase that the Users achieved by accepting a reduction in their objectives. Alternatively, the project would exceed the planned time or budget, i.e. criteria often used to judge the success or failure of a project. Such a scenario could only take place, if the environment in which the project was conducted enabled such a result. It is therefore clear, that to achieve success in IS projects it would require an environment that did not create or tolerate destructive conflict. For this to work in practice, it would require groups of stakeholders to accept that project success would be considered to have been achieved when they had only obtained a sub-optimum of their total requirement.

5.10.1 Trust-honour Games vs. the Prisoner's Dilemma Game

One key difference between the Prisoner's Dilemma and the Trust-honour game was included as the third factor in the list produced by Hollocks (2000). In a Prisoner's Dilemma, multiple players decide whether to co-operate or not simultaneously and independently of each other. Whereas with Trust and Trust-honour games, multiple players make their decisions sequentially. A consequence of taking decisions sequentially is that one team has to declare their intentions about whether they have decided to co-operate or not and the result of that decision is known to the other team. Naturally, this means that there is no dominant strategy for the team who have to make the first decision about whether to co-operate or not.

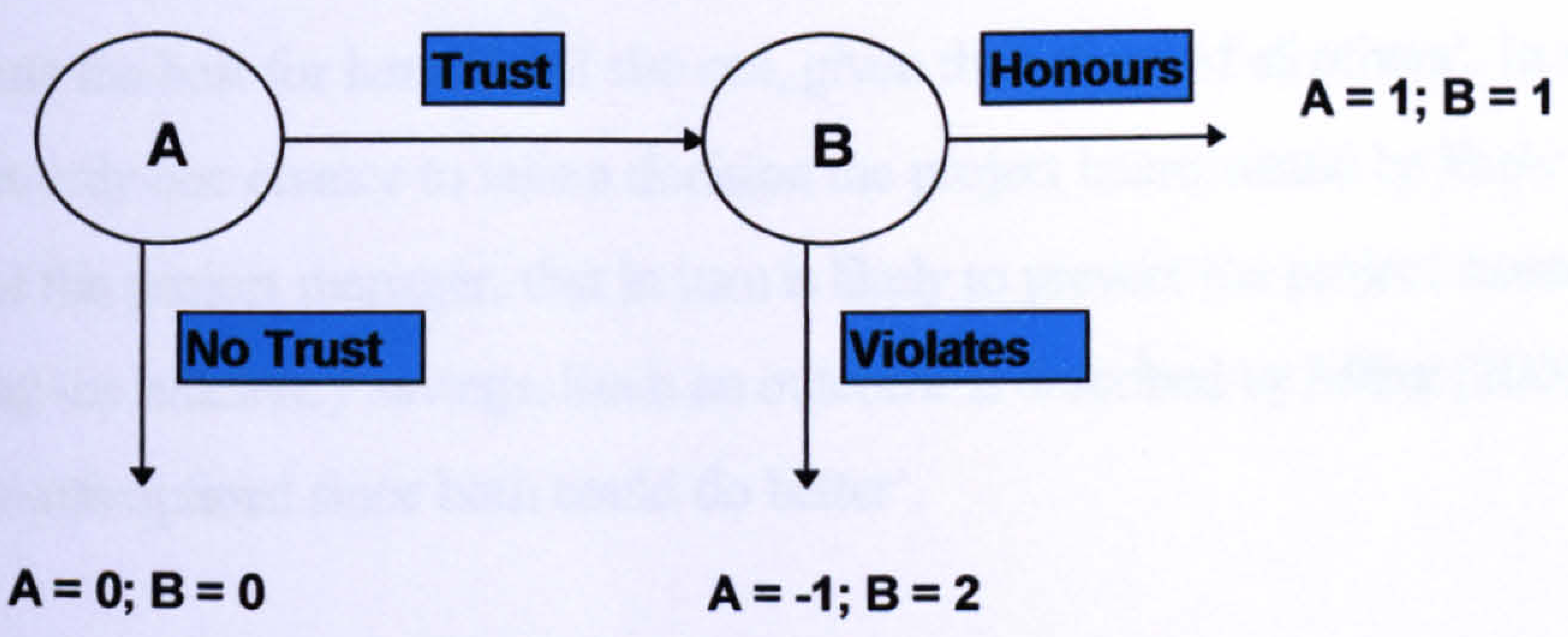


Figure 5.3 Sequential Trust Game Payoffs Source: Yamagishi (2001)

5.10.2 Sequential Games and IS projects

In Figure 5.3 the logic and Payoffs according to Yamagishi (2001) are given for a sequential decision making game. The issues relating to trust in a sequential game could work in an IS project as follows. Imagine 'A' is a project manager in an IS project who identifies a new method of doing some work in a more efficient way. At the same time, the project staff are under pressure to deliver a project and would benefit from the additional time the new method from the project manager would produce. The project manager has the option of either going to the project board 'B' and informing them about the efficiency saving method while trusting that they would share the benefits from the method. Alternatively, the project manager could decide not to take the proposal to the project board. The problem for the project manager, is that if (s)he informs the board it would be with the 'trust' that the board would 'honour' the efficiency method and that the board would allow the staff to benefit from some of the time saving.

The alternative, is that the project board could receive the efficiency saving method from the project manager but decide not to share the time saving benefits, thus the project board 'violate' the 'trust' given by the project manager. The project manager therefore has to decide in a sequential game (before the project board declare their decision) whether to trust the board with the new method. If the project manager decides that s(he) cannot trust the project board, neither will obtain any benefit. This is shown in Figure 5.3 |with both the project manager and the project board receiving a Payoff value of zero.

Miller (2001) described a situation as shown in Figure 5.3 in a game or business situation when only a one-shot decision was taken. This would produce what is termed a Nash equilibrium, which was described by Miller (2001) as '... an outcome in which every person has done the best for herself that she can, given the actions of all others'. In a game when there is only one chance to take a decision the project board would be likely to violate the trust of the project manager, that in turn is likely to prevent the project manager from offering the efficiency savings. Such an outcome is described by Miller (2001) as a '... Pareto-sub optimal since both could do better'.

Yamagishi (2001) pointed out that when people interact over time, '... threats and promises concerning future behaviour may influence current behaviour and that repeated games capture this fact of life'. Yamagishi (2001) continues that a defector in a repeated game '... weighs up the present value of continued co-operation against the short term gain'. Miller (2001) suggests '... having safeguards (not controls) that allow employees to make product enhancing actions that don't put them at risk'. This would require an organisation to have a culture to support such actions.

5.10.3 Repeated Games

Yamagishi (2001), Messick and Kramer (2001) and Miller (2001) discussed that when a game has repeated decisions, the outcomes from those decisions have been found to be different than if there was only a one-off chance to decide what action to take. Miller (2001) concludes that in a repeated Trust-honour game, '... a strong corporate culture implies that employees and owners have consistently strong beliefs about how every-one else will play the game next week'. The ability to take a decision in a 'one-shot' or repeated sequential game rests upon the level of trust that the person or team who make the first decision have on those who make their decision later. A question is, how can equilibria be assured for games (IS projects are not games but they do have repeated decisions) where repeated decisions have to be taken? Yamagishi (2001) considered that '... issues creating sustaining equilibria are at the forefront of research on repeated games and deserve substantial attention in the future'.

Gibbons (2001) added that '... according to the repeated game approach, if you understand my long-run self interest, you may "trust" me not to yield to certain short run temptations' continuing that, '... calculative trust is important in the world and that repeated-game models can help us understand it'. Gibbons (2001) concluded that '... leadership can and should develop around and change equilibria and that '... such a theory will grope toward ideas such as building and utilising trust, but even sketching the outlines of this theory must await another essay'. It is predictable in project teams that iterative or repeated decisions would be taken and that at times some of these decisions may need to be taken in a sequential order.

Throughout the previous sections an argument has been developed to indicate that trust would be a factor to influence or enable some decisions in IS projects. However, it was considered that while the sequential game models represented some of the factors of trust in decision making, the literature indicated that the 'essential tension' in the Prisoner's Dilemma game was more representative. The Prisoner's Dilemma game was therefore adopted and adapted for this research to simulate an IS project, a detailed description of which follows in section 5.12.

5.10.4 The Iterated One-way Game

The iterated one-way game exists if a group or individual in a project have the opportunity to beat other team members. The opportunity to have an advantage over the others could be during any stage of the project, but most importantly at the final decision. Such an environment indicates that the relationship of power is one sided and that one team have the potential to exert control over the other team members, if they wished. The trust used is limited by the extent that the more powerful team need the other team. In other words, total encapsulated interest is limited to one team while another team have only a limited set of reasons to need the others.

5.11 Adaptations of the Prisoner's Dilemma Game

Researchers have adapted the Prisoner's Dilemma game to test the co-operation of individuals in different settings. In order to achieve this, the basic decision rule that creates the tension between trust and opportunistic behaviour has always been maintained, while other independent variables have been altered. Tichy (1999) found that women co-operated significantly more than men in the first round of decisions, but that the difference disappeared by the final decision. The reason why those women co-operated less in the final rounds was attributed to the experiences they had obtained from previous rounds. Tichy (1999) observed in his experiment that information over time had influenced those women to lose their trust and develop a spiral of mis-trust, which supports the views of Munns (1995).

Lindskold (1978) reported that the GRIT strategy had worked in a Prisoner's Dilemma, even when the game was run in a sequential play condition. That is to say, the principle of GRIT (to reciprocate the behaviour of others) improves the level of trust even when one player knows the intended action of another i.e. as in a trust-honour type game. The usual method of playing experimental conflict games is to operate a simultaneous selection of options by the players, so that no player knows the selection of the other until the results are given, as reflected in a Prisoner's Dilemma game.

Gordon (1999) changed three conditions usually held constant during his adaptation of the Prisoner's Dilemma resulting in a high degree of co-operation. The usual conditions are:

- the contestants are usually pre-selected,
- communication is prevented,
- teams may not change their members during the game.

Barbara (1999) also found that co-operation between players increased in a 'noisy' adaptation of the Prisoner's Dilemma game; that is when the history of the previous decisions taken by the players in the same game were made known to other players.

Burnham et al (2000) changed the preconscious state of players in their adapted Prisoner's Dilemma experiment by replacing the word 'partner' with 'opponent'. The findings from the Burnham et al (2000) work identified that when the label 'partner' was used, there was a 100% increase in the trustworthy behaviour of the players than when the word 'opponent' was used.

Rapoport (1960) considered John Von Neumann to be the creator of game theory and included a report of how Deutsch (1958) experimented with different adaptations of the Prisoner's Dilemma. Deutsch (1958) used four different levels of communications between the players and 3 different orientations. The communications used were:

1. No communications, the strategies were selected independently and in secret.
2. Communications allowed before the game in writing.
3. Reversible decisions, no prior communications but players given 30 seconds to decide whether to change their initial decision.
4. Non simultaneous decision making, i.e. no prior communications but one player makes a choice followed by the second players deciding after seeing the selection of the first player.

With each of the four types of communication, three orientations were used to stress to the players their different intentions, these were:

1. To co-operate and achieve a joint maximization.
2. Each player was told to look after him or herself.
3. Each player was to play against the other.

The results from the Deutsch (1958) experiments are presented in Table 5.6.

	Orientations used		
	Co-operate	Individual	Competitive
Communication type			
No Communications	89.1	35.9	12.5
Written Communications	96.9	70.6	29.2
Reversibility	94.6	77.1	36.1
Non-simultaneous	78.3	20.8	16.7

Table 5.6 Adaptations of the Prisoner's Dilemma Source: Rapoport (1960)
Figures given represent % of co-operation.

The key findings were considered to be; when it was stressed to players that they should play from an individual orientation position, the co-operation increased from 35.9% to 70.6% when written communication was permitted. It was surprising to note that almost 23% failed to co-operate even when their decisions to co-operate or not were reversible.

5.11.1 Axelrod's Prisoner's Dilemma Experiments

Lane (1998) indicated that most of the work involving the Prisoner's Dilemma had '... built on the work of Axelrod (1984)', who offered a challenge to find a winning strategy when playing the Prisoner's Dilemma game. While suggesting changes to the way that the Prisoner's Dilemma could be tested, Bendor et al (1991) and Hoffmann (2000) both cited the Axelrod (1984) experiment as the key study. (Dawkins (1989) reported the results of the experiment initiated by Axelrod (1984) in which 15 different strategies were submitted and played against each other. The playing options were simply to either co-operate or not co-operate with the other person playing the game. The decision rule for the Prisoner's Dilemma presents what are called Payoffs. These have different values and are dependant upon the joint decisions of the players. The values of these Payoffs and how they are determined are discussed in the following section.

5.12 Payoffs for the Prisoner's Dilemma Game

Harper and Lim (1982) suggested that the fundamental feature of game theory is '… the fact that each player has the ability to a greater or lesser extent of being able to reproduce the reasoning of the other'. In order for that to be possible, the values of Payoffs linked to decisions are made known to all the players. Having Payoffs known to the players, creates an environment were as Harper and Lim (1982) stated '… he knows we know he knows we know he knows'. It is therefore possible, when the Payoffs are known to all the players, for them to act or behave in either a co-operative way or to attempt to achieve self interest, dependant on what the player(s) wish. The Payoffs for the 'true' Prisoner's Dilemma are known to the players. The differences between the two available strategies to either co-operate, or not, defines the motives of the players in the teams. Thus using the basis of the Prisoner's Dilemma would indicate whether team members were demonstrating the use of either trusting co-operative behaviour or opportunistic behaviour. The Payoffs of the Prisoner's Dilemma game are presented in Figure 5.4.

	What B does	
What A does	Co-operate	Defect
Co-operate	Fairly good Reward *for mutual cooperation* 3 points	Very bad Sucker's Payoff 0 points
Defect	Very good Temptation *to defect* 5 points	Fairly bad Punishment *for mutual defection* 1 point

Payoffs in relation to A

Figure 5.4 The Prisoner's Dilemma Game

5.12.1 The Dilemma of the Payoffs

Using the values in Figure 5.4, let us consider what will happen to 'A' when the decisions are made. The actual values or 'Payoffs' do not matter. What does matter is that the rank order of those Payoffs adheres to the following rules.

The Payoff value to 'A' is higher when 'A' does not co-operate while at the same time 'B' co-operates, than when both 'A' and 'B' co-operate. That value in turn is higher than when both 'A' and 'B' do not co-operate which is higher than when 'A' co-operates but 'B' does not. A stipulation for a 'true' Prisoner's Dilemma game is that the average of the 'temptation' to defect plus the 'Suckers Payoff' values, must not exceed the value of 'reward' for mutual co-operation.

Referring to Figure 5.4, the Payoffs for the Prisoner's Dilemma game are as they apply to 'A'. The following four examples refer to the Payoffs in relation to 'A' after the players have selected the strategy for their decisions simultaneously and independently.

- 'A' decides to co-operate, as does 'B'. This scenario would result in 'A' receiving what is termed the 'Reward' Payoff. Note this is only the second highest rank order result for 'A'.

- 'A' decides to co-operate, but 'B' does not co-operate. This is the worst result for 'A' in rank value order and is termed the 'Suckers Payoff'.

- 'A' decides not to co-operate while 'B' decides to co-operate. This is the best result as far as 'A' could obtain in rank order value and is called 'Temptation'. By not co-operating, 'A' can obtain the best individual result, and beats 'B' in this scenario.

- 'A' decides not to co-operate, as does 'B'. This scenario is termed 'Punishment' and both players would receive the same second rank order value. Both players have decided not to co-operate so both receive a low result. Remembering the rank order of the Payoffs is important not the values.

The dilemma can now be seen. It is possible to co-operate with the other player and obtain the (optimum) same Payoff. However, should 'A' decide to co-operate, but simultaneously and independently, 'B' decides not to co-operate, 'A' will receive the least Payoff value (the Suckers Payoff). What happens to 'A' depends not only upon what 'A' decides but also upon the decision that 'B' makes. The decisions needed to co-operate requires the players to trust each other, because there is opportunity that either player could act in an opportunistic way and attempt to obtain a higher score than the other.

At the start of a new game, the player has limited information about the strategy that the other player may use. Phlips (1988) described this as 'imperfect information', when there is uncertainty about actual behaviour. At the same time the players have full information about the rules of the game and the Payoffs that would result from the decisions. Phlips (1988) described these scenarios as having 'complete' information'. Such a situation means there is a risk associated with the game as players cannot be certain about the intentions and actions of others. Hardin (2002) described the risks and the logic that would be used in a finitely repeated Prisoner's Dilemma game when rational thought is used for the decision making. This is discussed in the following section.

5.12.2 The Backward Induction Argument

When a game has a finite number of decisions to be made, the logic that can be used for decision making is to consider the final decision as if the game was a one-shot game. In such a situation this would normally lead individuals towards defecting.

According to Hardin (2002) '... if one should defect on the final play, however, then the penultimate play is de facto a final play in the sense that it can have no effect on anything thereafter, and so one should defect on the penultimate play as well'. He continues that '... by tedious backward induction, one should defect already on the first play in the series'. It can then be suggested that if decisions are taken using the '... backward induction argument' individuals would not be able to trust each other. The logic of the backward induction argument is sound, which indicates that for society and organisations to function as they do, not all individuals are acting at a rational economic level, but as Hardin (2002) suggested, from '... something extra-rational' and more '... decent than rational'. It is therefore reasonable to suggest that some project team members would not behave from the rational economic stand-point, preferring instead to demonstrate fiduciary behaviour and co-operate with other team members. The risks involved to a project are that some team members may use the backward inductive argument and attempt to achieve personal benefit before project success. A risk for IS projects is having to rely on imperfect information to evaluate the future intent of the stakeholders.

The results from the Prisoner's Dilemma when only a single decision is taken was also found by Rapoport (1960) to be different to those when the game had iterative (or repeated) decision stages. In an iterative game, there is a chance to win back some of the losses from a previous decision, should the other player have decided not to co-operate. For a single decision game, the usual strategy would be not to co-operate, as there is no chance to catch up and make good from a previous bad decision. Axelrod (1984) argued that in an iterative Prisoner's Dilemma game, players have the chance to trust each other and are more likely to do so than for a single decision game.

5.13 Strategies used in the Axelrod Experiments

A range of strategies were found to be used in Axelrod (1984) experiments. A strategy was termed as Pure, when the same decision is made each time. An alternative to a Pure strategy is a Mixed strategy, when the decisions taken change each time.

From the 15 strategies which were entered into the Axelrod (1984) experiment, the top scoring eight strategies were those termed 'Nice' strategies, where the teams co-operated at the first decision. While seven, what were termed 'Nasty' strategies obtained the lowest total Payoffs. An additional strategy, referred to as a Non-strategy was also included in the Axelrod (1984) experiment. The Non-strategy reflected decisions taken to co-operate or not at random. In the Axelrod (1984) the Non-strategy was beaten (i.e. achieved less points) when it was played against all the eight 'Nice' and seven 'Nasty' strategies.

In the Axelrod (1984) experiment a game was deemed to have started as a 'Nice' strategy when all players elected to co-operate at the first decision. The 'Nice' strategy would change to a 'Mixed' strategy whenever, when the other players did not co-operate. That is to say, a 'Nice 'strategy would be taking place if all the teams decide to co-operate on their first decision within a finitely repeated game. By deciding to co-operate at the first decision, a team was implicitly sending a message to say they trusted the other team and would not act in an opportunistic way for personal benefit. Such behaviour could be an example of the trust warranting properties that Bacharach and Gambetta (2001) called manifesta or t-Kripta. It should, therefore, be reasonable to expect that teams would co-operate more when there is trust within and between the teams. The results from the Axelrod (1984) experiment identified which strategies produced the higher total Payoffs, when a game operated under the Prisoner's Dilemma rules.

The top scoring strategy when playing the Prisoner's Dilemma game is called Tit for Tat; a strategy devised by Rapoport (1960). Providing the other teams co-operated, the Tit for Tat strategy would result in the subsequent decisions to play co-operate and continue to trust. In a Tit for Tat strategy the players always co-operate at the initial decision. If, however, the other player did not co-operate, the Tit for Tat strategy simply mirrors the decision of the other players at the next decision. Tit for Tat could result in a simple strategy to always co-operate, however, when the players of a Tit for Tat strategy observe that trust has not been reciprocated, at the next decision they play not to co-operate, thus changing to a 'Mixed' strategy.

Axelrod (1984) later simulated a game using a strategy called Tit for two Tats which, resulted in a higher total Payoff than even the Tit for Tat strategy had achieved.

A spiral of mis-trust is created when one team defect and the other team operate a Tit for Tat strategy. However, Tit for Tat could use both a 'Nice' and 'Forgiving' strategies. When a team play Tit for Tat, they demonstrate that they are not trying to win. On the other hand, a 'Forgiving' strategy is prepared to revert to co-operating before the other team indicates they will co-operate. Recall that the second level of trust is called knowledge-based and relies upon team members being able to forgive actions that under calculus-based trust would have resulted in some penalty being applied. In order to operate the Tit for Tat strategy, team members would need to be operating at the knowledge-based level of trust. Also, when a team use the 'Nice' strategy, that is to say they have co-operated on the first decision, they have demonstrated that their aim is not to beat the other team. The Tit for Tat strategy can be seen to have signalled a willingness to co-operate, demonstrating a trusting action, one that can begin a spiral of trust for subsequent decisions.

Another strategy used in the Axelrod (1984) experiment, identified what was termed a 'Naive Prober'. This strategy gives the impression of being 'Nice' for a while and then changes to a 'Mixed' strategy to obtain the higher Payoff, but then reverts to co-operating. A 'Remorseful Prober' strategy is one that does not forget that the other team did not co-operate and will often much later in a game play a none co-operate strategy, as a form of revenge. A 'Remorseful Prober' strategy has a long memory, players who use this strategy never forget that trust had been broken, and eventually, play a Defect strategy of none co-operation.

With a 'Grudger' strategy, a team never forgive the other team if they do not co-operate. When trust is broken in these circumstances, it is not possible to repair that trust and the team from that point, will play a Simple Strategy of none co-operation for the remaining decisions of a game. Trust is not repairable after it has been broken in a 'Grudger' strategy.

The Axelrod (1984) experiment identified that the Non-strategy obtained the lowest result of all strategies. The strategies described above including the None-strategy will be contrasted with the results from Project Paradox, designed for this research. These results are presented in Chapter 7.

5.14 Trust within Project Management

In recent research studies into the effect of trust within project management Hartman (2000) and Herzog (2001) indicated that they considered trust to be a key factor for project success. Hartman (2000) stated that '... virtually every aspect of project management requires trust as an enabler' and that '... the role of trust in the effectiveness of project management is becoming more significant, as the need for faster delivery of new products, more effective corporate change and responsiveness to market needs continues to increase. Hartman (2000) continued by stating that '... managing the relationships between people and organisations is a significant part of the role of project management'. Hartman (2000) identified 36 aspects of project management where trust is considered to have a significant impact and has started work on the following topics:

- More accurate risk identification (through more open communication).
- Reduced costs and schedule (e.g. through faster and better contracting).
- More effective teams (improved confidence and trust).
- Improved client satisfaction (better management of client expectations).
- Better project plans (resulting from more honest specification and estimating).

Hartman (2000) provided a framework constructed of three types of trust, which he believes could be identified to be taking place in project teams, but that needed to be tested further, these were:

- competence,
- emotional,
- integrity.

Hartman (2000) concluded that '... trust has intuitively been an important but largely incidental part of effective project management' and that '... understanding the mechanisms of trust will help us to understand the human interaction that leads to greater success on projects'. Hartman (2000) further considered that '... considerable research remains to be done on trust and its implications to project management' and that '... the research is still in its infancy'. He continues by stating that '... significant new insights to how we might manage projects in the future, adapt to and adopt new technologies and generally improve project and project performance are potential outcomes of further study and implementation of findings related to trust in project management'. The conclusion by Hartman (2000) supports the analysis and evaluation of the literature review for this research, which identified that prior to the start of this research trust in project management had not been considered as a factor in the success of IS projects. This failure is an example of a sin of omission, a Type II error. That is to say, trust had not previously been managed incorrectly, but that it had not been recognised as a factor for project success.

Herzog (2001) studied the link between collaborative project teams and trust, concluding that '... trust has been identified as a success factor in successful collaborations'. Herzog (2001) maintained that '... levels of trust are based on collaborative team members perceptions of themselves, of other collaborative team members and of other collaborative stakeholders involved with the project'. Herzog (2001) supports the view of Hartman (2000), that almost all aspects of project management would be influenced in some way by trust between team members.

5.15 Summary

Trust has been discussed as being based on one of three levels:

- calculus-based,
- knowledge-based,
- identification-based.

Improving from the calculus-based level of trust requires prior knowledge of the other parties involved. When knowledge-based trust is in operation team members will forgive mistakes rather than invoke penalties that are used at the calculus-based level. An argument was presented in this Chapter that project managers should exercise care when they increase to the highest level of trust that often uses no control mechanism. Some business practices such as using preferred contacts it was argued could limit the information to some teams and create low levels of trust. It has also been described that trust could be considered as being relational or performance-based. The second stage of this research would focus on relational trust.

Several disciplines have studied trust and identified that the factors involved are different for each. For example, within anthropology, the type of trust that exists is non-commercial. On the other hand, marketing needs trust for business to operate, but this is a commercial type of trust and the individuals involved would be likely to use rational choice in their decision to co-operate and trust each other. To build trust, information needs to flow between the project staff. Withholding information creates an environment where a spiral of mis-trust can develop. Links were made between trust and risk with particular reference to IS projects.

The RAD systems development methodology was discussed. An argument was offered to demonstrate how it could bridge the conflict between a need to enter into a state of rapid trust, due to a new project team forming with limited information about each other, and having an ambiguous project aim.

A discussion was presented where alternative types of trust games were presented. These included the Basic Trust game also know as the Trust-honour game, which required the players to make their decisions sequentially. It was considered that two persons sequential games did not reflect the decision making process in IS projects in such a way that has been discussed in the literature in respect of an 'N' person Prisoner's Dilemma game, where decisions are made simultaneously. For players to co-operate in a Prisoner's Dilemma game it would need them to trust that the other players in the game would also co-operate. Different strategies for playing a Prisoner's Dilemma game have been discussed, using the results from the Axelrod (1984), Deutsch (1958) and Rapoport (1960) experiments. More recent discussions, adaptations and variations to the Prisoner's Dilemma by, Tichy (1999), Gordon (1999), Barbara (1999) and Burnham et al (2000) have been included to illustrate the results obtained when some conditions from a 'true' Prisoner's Dilemma are altered, such as allowing communication between players, which produced different levels of co-operation.

Secondary types of trust called t-Krypta were also discussed The literature indicated that manifesta or components of t-Krypta were found to be difficult, or impossible to observe. The various strategies that could be adopted by the players in the Prisoner's Dilemma game were also discussed.

Chapter 6 provides a description of how the Prisoner's Dilemma was adopted and adapted for this research. Two different communication types and orientations were used to create a new game which is referred to in this thesis as Project Paradox. Chapter 7 discuses the results of Project Paradox when decisions are taken to co-operate at random (representing a Non-strategy). Those results are compared with the behaviour of teams who played Project Paradox using different strategies which, indicated the level of co-operation and trust within those teams.

Chapter 6

6.0 Development of Project Paradox

6.1 Introduction

In Chapter 5 an argument was developed which positioned trust as a possible factor in the success of IS projects. Different types and levels of trust were reviewed and it was argued how individuals and teams would consider these from either a rational economic, social or cognitive perspective. Higher levels of trust were believed to be achieved through individuals and teams co-operating by sharing information. The lowest level of trust was termed calculus and would entail individuals or teams behaving from a position of self interest, rather than for the benefit of an organisational target, such as the success of an IS project, which would be a risk to the project. A lack of co-operation, caused possibly by limited or imperfect information (Philps 1988) was associated with the calculus-based trust. The question could then be asked: which type or level of trust would teams in an IS project be likely to use? The Prisoner's Dilemma was identified as a validated method of testing for co-operation between teams, with trust being the variable under test. The 'essential tension' created within the Prisoner's Dilemma, discussed by Burt and Knez (1996), was adopted and adapted to become Project Paradox.

6.2 Hypothesis for Stage 2

The hypothesis for this stage posits that, *IS project teams would co-operate (trust) no less than if the decisions to co-operate were decided at random.*

6.3 Design of Project Paradox

The basis of the Prisoner's Dilemma, restricts the teams to having only two options they could take, these were to either co-operate or not co-operate. The strategy selected by the teams would determine whether:

a. they wished to maximise personal gain (demonstrating they were using rational economic choice and using the lowest level of trust) or
b. they wished to co-operate (signalling they were operating at a higher level of trust by not seeking to maximise personal benefit).

If a team co-operated they did so from a position of trust, because by so doing, they were vulnerable to the risk that the other teams could take advantage of that trust and increase the benefit to themselves.

Project Paradox requires the players to decide whether to co-operate or not to co-operate with other teams. In Chapter 5 an explanation was given to show how players of Project Paradox are vulnerable to the actions of others and the results of their decision making would reflect the level of trust they were using. These were discussed in Chapter 5 and were termed 'calculus' for the lowest level, 'knowledge' for the next higher level and 'identification' based trust for the highest level.

6.3.1 Communication and Orientation used in Project Paradox

The Prisoner's Dilemma is a two-person game. It would have been a weakness for this research to have used the same number of players in Project Paradox, since IS project teams have to consider the actions of more than one stakeholder at any one time. The first modification or adaptation of Project Paradox was to design it as an N-person game, thus better reflecting an IS project environment. Rapoport (1960) believed that N-person games would represent a more realistic environment because they allow coalitions to form, 'especially in the absence of communications'. Levin et al (1982) also pointed out some benefits of using N-person over two-person games, i.e. those with more than 2 opposing interests. This includes the opportunity for collusion by some of the participants against others. In addition, if the N-person game is designed to be non-zero sum then there is the opportunity for the participants to co-operate in a way to 'maximise the total Payoff rather than maximising the payoff to one participant'.

The decisions in a Prisoner's Dilemma game would normally be made without the benefit of negotiation. This, it was also considered, did not reflect an IS project environment, hence the second adaptation of the Prisoner's Dilemma for the design of Project Paradox was to permit communications to take place between the members of the teams. Levin et al (1982) described these as negotiable games (known as a 'noisy' Prisoner's Dilemma). The experiments by Deutsch (1958) also used the basis of the Prisoner's Dilemma but permitted different methods of communication as discussed in Chapter 5.

Two different scenarios were created for Project Paradox. The first scenario simulated co-located project teams, which made decisions with reduced negotiations. This was achieved by limiting the communication between teams. For scenario one, when communication between teams took place, they did so face to face, as would be possible with co-located project teams.

The second scenario simulated a distributed project team, whose team members had the opportunity to make decisions with an un-restricted amount of negotiations, by allowing unlimited communication between the participants. When teams communicated for the second scenario, they did so without face to face contact.

During scenario one, a random selection of comments and discussions made by the team members were recorded. Since the comments were collected at random, they could be considered to be a representation of what those playing the games were considering, before decisions were made. An analysis of the comments is included in the following Chapter. A summary of the comments indicated that in all the 14 runs for scenario one, the teams were discussing the level of trust between the teams. Recall, Project Paradox was developed as a placebo scenario, where the participants would not be informed in the rubric that a variable under observation was their propensity to trust. This was done to increase the internal validity of the data, as suggested by Gill and Johnson (1991). However, although the rubric contained no mention of trust, when the teams were deciding whether to co-operate or not they had translated this as a function of trust between the teams, as the comments indicate.

Each run of Project Paradox lasted an hour. This included the time to read the rubric and make the seven decisions. Teams made their decisions simultaneously, and submitted the results on a pre-forma that was provided before the game started. The decisions made by the three teams and the Payoff value of the decisions were made available to the all teams after each decision. This provided the history of the teams actual behaviour compared with their stated intended behaviour before the decisions were made.

The rubric developed for Project Paradox placed three teams in a realistic IS project environment by utilising the structure as indicated in the PRINCE 2 project management methodology (Yeates & Cadle 1996). The project organisation within PRINCE 2 includes a

Project Assurance Team (PAT). The PAT include representatives of three different stakeholders in an IS project. Those stakeholders represent the requirements for the Business, the Technical and the User and are termed respectively, the Business Assurance Co-ordinator (BAC), the Technical Assurance Co-ordinator (TAC) and the User Assurance Co-ordinator (UAC). Within the PRINCE 2 organisational structure, there are other roles such as Stage manager(s) and Project manager. But for the purpose of this research, only the three PAT stakeholders are built into the rubric for Project Paradox to reflect a part of the IS environment, while acknowledging the existence of other roles within the PRINCE 2 methodology. A copy of the rubric for Project Paradox and information for the participants can be found in Appendix G.

Each of the two scenarios involved 14 complete runs of Project Paradox with all runs requiring teams to make seven decisions. Why was Project Paradox designed as a repeated decision making game? In a single decision game, it is likely that teams will opt for a Simple strategy, to not co-operate. This is the likely strategy because there is no chance to 'catch up' later in the game, as discussed by Axelrod (1984) and Dawkins (1989). Single decision games influence the decision making of teams and introduce bias into the results. A multi-decision game such as Project Paradox enables teams to consider playing different strategies. Teams could decide to play a Nice strategy and discover that the other team decided not to co-operate. Had that scenario been within a single decision game, the team who played the Nice strategy would have received a reduced Payoff, compared with the other team, and would have no chance to recover from that 'poor' start.

Designing Project Paradox with seven decisions made it specifically reflect a finitely repeated Prisoner's Dilemma. It was discussed in Chapter 5 that in a finitely repeated game there is the chance that the participants would operate a 'backward inductive' logic and not co-operate at any stage. In the Axelrod (1984) experiment the strategies for playing the Prisoner's Dilemma were developed using a matrix from a finitely repeated game. However, Nachbar (1992) considered that the Axelrod (1984) game '... was not a 'true' repeated Prisoner's Dilemma' and believed that there would be differences in the strategies that would be played in a finitely repeated Prisoner's Dilemma compared with an infinitely repeated Prisoner's Dilemma. Nachbar (1992) stated that his comments relating to Axelrod's game were '... basically methodological in nature' and '... not intended as a rebuttal to Axelrod's basic intuition that co-operation is dynamically fit, in some sense, even in hostile environments'. However, Nachbar (1992) believed that the finitely repeated game was '... a world more hostile to co-operation than the infinite game, and the environment with which Axelrod originally began', thus supporting Neyman (1985) who stated that '... co-operative behavior may emerge in non-co-operative situations when the nature of the interactions is long term'.

One reason to design Project Paradox as a finitely repeated game was to reflect the typical number of stages or phases of an IS project, each requiring decisions to be made over a period of time. In Project Paradox, the time period is reduced to the duration of the game. Naturally the decisions still had to be made sequentially but the outcome of one decision could influence the strategy for the next stage, as Miller (1996) explained; when the '... actual scores... become common knowledge ... based on this information, each person is allowed to adjust his or her own program for the next round'. Teams were therefore permitted to reconsider their strategy, as more information became available.

To place Project Paradox into context, the participants were permitted if they so wished to name each of their decision stages to reflect those of a development project. They would typically follow these seven stages: inception, feasibility, analysis, design, development, testing, and implementation. However, it is acknowledged that not all IS projects are developmental projects. As discussed in Chapter 2, some projects may be conducted by selecting and modifying a 'Commercial Off The Shelf' (COTS) package solution. But these projects are also broken down into manageable stages and include several decisions to be made. The main point being made is that IS projects usually have more than one stage, all of which require decisions to be taken. This is a further reason why Project Paradox was designed as a finitely repeated decision scenario.

Having described the design of Project Paradox, the next section presents the values, known as Payoffs, of the decisions the teams made.

6.3.2 Payoff Values for Project Paradox

In Chapter 5 the rank order of the Payoffs for a Prisoner's Dilemma game was described and the model was illustrated in Figure 5.3. Part of the design for Project Paradox was to allocate a value to the Payoff for each possible set of decisions to either co-operate, or not, made by the teams representing the Business Assurance Co-ordinators (BAC), Technical Assurance Co-ordinators (TAC) and the Users Assurance Co-ordinators (UAC). The Payoffs for Project Paradox are set in Table 6.1 below.

Business	**Y 300**	**Y -100**	**Y -100**	**Y -100**	**N 500**	**N 250**	**N 250**	**N -10**
Technical	**Y 300**	**Y -100**	**N 500**	**N 250**	**Y -100**	**Y - 100**	**N 250**	**N -10**
User	**Y 300**	**N 500**	**Y -100**	**N 250**	**Y -100**	**N 250**	**Y -100**	**N -10**

Table 6.1 Payoff Values for Project Paradox

In Table 6.1 the letter **Y** represents a decision to co-operate while the letter **N** represents a decision not to co-operate by the teams. As can be seen from the Payoff table, if for example, the Business, Technical and User teams all decide to co-operate simultaneously, the Payoff would be 300 to each team. Since there are three teams in Project Paradox the values of the Payoffs represent either what one or two teams will receive. In the design of Project Paradox key elements and tensions of the Prisoner's Dilemma as described by Axelrod (1984) were considered to reflect an IS project life-cycle. This is in keeping with the framework within which the Prisoner's Dilemma can be applied.

For example Axelrod (1984) clarifies that:

- the payoffs of the players need not be of comparable units,
- the payoffs do not need to be symmetric,
- the payoffs need only to be measured relative to each other.

Also '… the only thing that has to be assumed is that, for each player, the four payoffs are ordered as required for the definition of the Prisoner's Dilemma'. Bringing those rankings forward will serve as a reminder of those given in Figure 5.3 and demonstrate that the 'essential tension' of the Prisoner's Dilemma has been achieved.

- Temptation to Defect (5) must be better than the reward for mutual co-operation (3)
- Mutual co-operation (3) must be better than the Punishment for mutual defection (1)
- Mutual defection (1) must be better than the Sucker's Payoff (0)

Taking the Payoff values from those for Project Paradox, it can be seen the ranking has remained correct.

Using Figure 6.1 (following page), the Payoffs can be described from the position as seen by the Business team. A decision by the Business team not to co-operate (temptation to defect) when both the Technical and User teams voted to co-operate, would result in a Payoff value of 500. That Payoff is higher than the value when all three teams decide to co-operate (mutual co-operation), that has a Payoff value of 300. This value in turn can be seen to be greater than the value achieved when all three teams decide not to co-operate, (mutual defection), resulting in a Payoff value of -10.

Finally, the lowest Payoff to the Business team (the Suckers Payoff) occurs when they co-operated but both the Technical and User teams have decided not to Co-operate; the Payoff value for this is -100. To fully comply with the Prisoner's Dilemma, the average Payoff for Temptation and Suckers Payoff has a value of 200, which is less than the value of the Reward Payoff value 300.

The Prisoner's Dilemma could have been used to test the trust between more than two teams by using the following playing order: 'A' would play 'B' and then play 'C' separately, 'B' would also play 'C' as a separate game. The team with highest total Payoff identifying the winner. Project Paradox, however, was designed to reflect the Payoffs to teams when they played as an N-person game simultaneously. This was done to represent a more realistic project scenario where each stakeholder has to consider the actions of multi stakeholders at any one time.

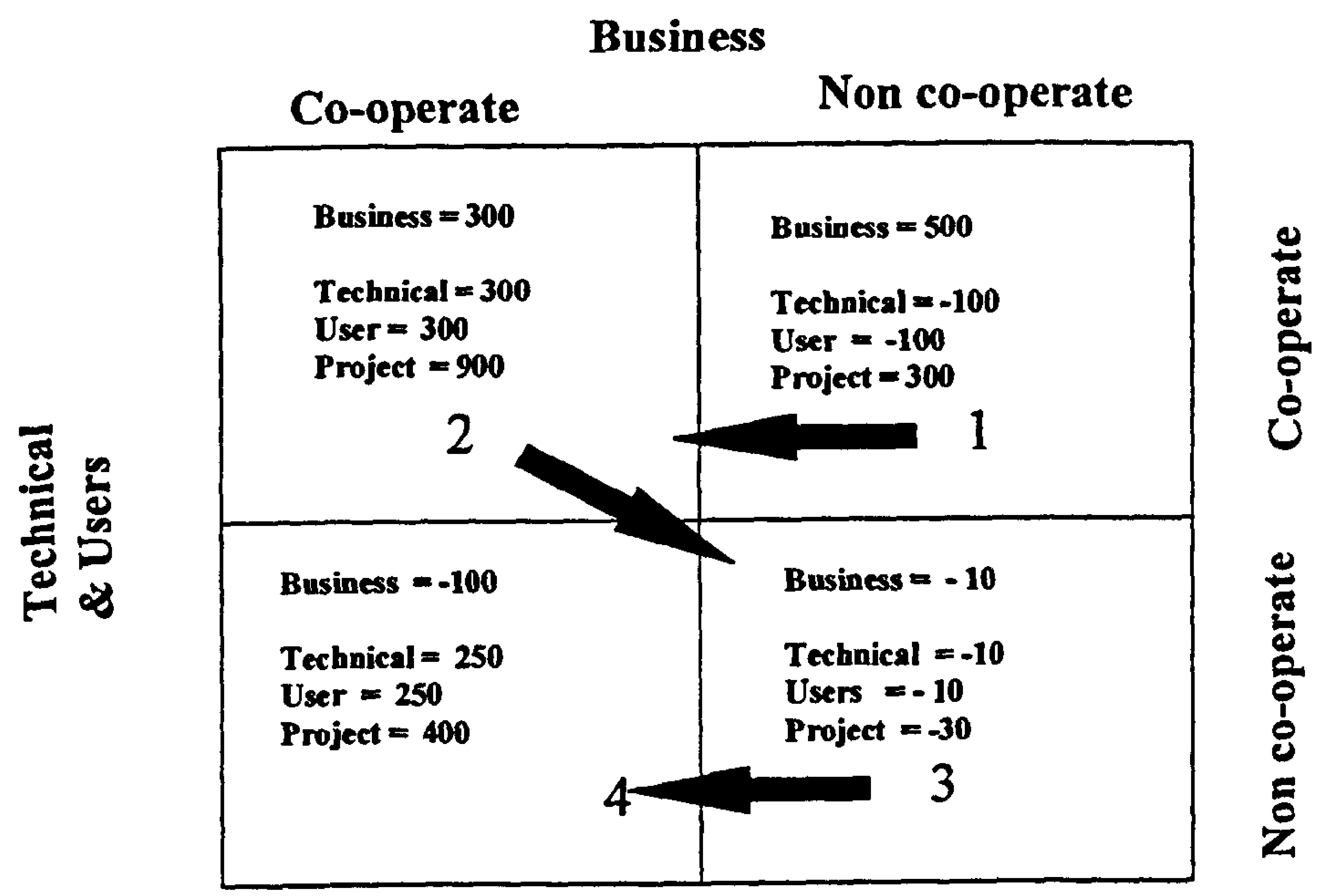


Figure 6.1 Matrix of Playing Project Paradox - Payoff values for decisions

The values of the Payoff for Project Paradox have thus far been allocated to the three individual teams within the game. There is, however, another view that should be considered from the overall perspective, i.e. was the project a success, at the end of a run?

For example, if the three project teams co-operate the total Payoff value for each decision would be 3 x 300 totalling 900. There are 7 decision stages in each run of Project Paradox to be made by each of the 3 teams. If, for all the 7 decisions, the three teams decide to co-operate, the total value of 900 x 7 = 6300 would be achieved. The value of 6300 was considered to be the optimum value for the 'project' and was used as a basis for comparison purposes when Project Paradox was run with real teams. If the project achieved a value of 6300, it could be classed as being successful. The value the project could achieve, naturally, depended upon whether the three teams would co-operate or not with each other. A total value of 6300 in relation to the 'project', could be achieved simply if the teams in the game fully co-operated.

The following would be the possible Payoff values achievable by the team(s) after all 7 decisions were made:

The maximum value for a team would be;

7 (decisions) x the value, when they alone did not co-operate (value 500) = 3500.

The optimum value to each team if all teams co-operate;
7(decisions) x value for complete co-operation (300) = 2100.

The least a team could receive would be if they co-operated but the other 2 teams did not co-operate;
7 (decisions) x individual decisions to co-operate (-100) = -700.

The Payoff value for teams if they decided simultaneously not to co-operate;
7 (decisions) x the value for complete non co-operation (-10) = -70.

If one team decided not to co-operate, the Payoffs to the two teams had would be as given below.

Joint co-operation and joint defection would attract the same Payoff as the individual team, giving 2100 and -700 respectively. When two teams created a coalition and decided to not co-operate they would have a total value of 500 divided equally between them.

None co-operation by two teams over seven iterations would produce a Payoff:
7 (decisions) x 250 = 1750.

The optimum value for a 'project' is when there is total agreement to co-operate producing a value of 6300, indicating the highest level of trust had existed between teams.

6.3.3 Simulating Project Paradox using Random Data

In Chapter 5, different strategies for playing a Prisoner's Dilemma, which had been identified by the Axelrod (1984) tournament, were described. One strategy comprised decisions of whether to co-operate or not, at random, this was called a Non-strategy. The Non-strategy when used in the Prisoner's Dilemma was found to produce the lowest overall score. It was, therefore, decided that a second measure of success, for teams playing Project Paradox, would be to compare the total of the Payoffs that their teams achieved, against a value that had been achieved using a Non-strategy.

How was the Non-strategy Payoff value achieved? One hundred complete runs of Project Paradox was simulated using random data that represented whether teams co-operated or not for each of the 7 decision stages, for each of three teams. This equated to a total of 2100 decisions made up as follows:

7 (decisions) x 3 (teams) x 100 (iterations of the game) = 2100 decisions.

2100 evenly distributed random numbers greater than or equal to 0 and less than 1, were generated using the Microsoft Random number generation analysis tool. A number within the range 0 to 0.499999 represented a decision of co-operate = Y. Numbers between the range 0.5 to 0.999999 were treated as a decision not to co-operate = N.

6.3.4 Output from the simulation of Project Paradox

When the simulation of Project Paradox was completed, two values became available for comparison with later run results. The first related to the project teams. The second was the value that the 'project' could be considered to have achieved, obtained as a non-participant. The value assigned to the project for this research was the total of the three values that the teams had earned. The individual Payoffs for the three teams after random decisions were: Business Team 919, Technical team 825, User team 824.

The average Payoff to a team, after 100 complete runs using a Non-strategy, resulted in an average value of 856. Recall that had each team simply co-operated, the value to each team would have been 7(decisions) x value for complete co-operation (300) = 2100 Payoff value per iteration.

In summary, using a Non-strategy produced:
The average value to the teams = 856,
The average value to the project = 2568 (Total of three teams Payoffs).

To validate the average achieved by using 2100 runs using random numbers, a more accurate calculation would be to consider all the configuration of YYY, YNN, NYY and NNN equally. Using the values in Table 6.1 the calculation would be:

Average random to the project = {900 + (300 x 3) + (300 x 4) - 30} / 8 = 371

For 7 decisions making one complete iteration this produces a value of 2597

If teams fully co-operate these values become:

The value to the teams = 2100,

The value to the project = 6300.

These will be the basis for comparison with respect to the output from teams and the project when playing Project Paradox.

The values in respect of the teams and the project were obtained when both a Non-strategy was played and when full co-operation between teams took place. It is unlikely in an IS project that the teams would randomly make their decisions to co-operate or to always co-operate. The literature of trust indicated, it was possible the teams would make decisions that would be of benefit to them, using a rational economic choice model. But that depended at which level of trust they considered the others teams would operate.

6.3.5 Simulating a Coalition within Project Paradox

Designing Project Paradox as an N-player game enabled coalitions to form; should the teams believe it was in their interest to do so. It was therefore decided to observe the behaviour of Project Paradox and obtain the values that a team and the project would achieve, if two teams decided to form a coalition and always co-operate, while the third team only co-operated at random. Consider the following example. The members of the User team are only prepared to randomly co-operate. This could be argued to equate to the situation of a team whose support or trust it was not always possible to depend upon. The other two teams, the Business and Technical have decided for the 'benefit' of the project, to always co-operate. In this example, the User team would have played a Non-strategy while the Business and Technical teams operated a 'simple' strategy of co-operation.

To simulate this new scenario, Project Paradox was run a further 100 times, needing 2100 decisions. The 700 decisions representing those of the User team were generated by using the Microsoft random number generation analysis tool as discussed above. The 1400 decisions for both the Business and Technical teams were all set to a 'Simple' strategy to co-operate.

For this scenario, the value to the Business and Technical teams (when they fully co-operated) was 727. At the same time, the value to the User team (who decided at random whether to co-operate or not) was 2731 and the value of the 'project' i.e. the sum of the three teams has increased to 4272.

Comparing the results from the decisions of a complete Non-strategy and this Mixed strategy, provide the following observations. The value to the 'project' can be seen to have increased compared against a Non-strategy when two teams create a coalition to co-operate. However, the value to the teams, who, (for the benefit of the project played a Simple strategy of co-operation), have been reduced. The values to the teams and the 'project' for both simulations are presented in Table 6.2.

	'Value of Project Paradox to team members'		
	Users Decisions made at Random	**Business and Technical fully co-operate, User co-operates at random**	**All Teams co-operate**
Business	919	757	2100
Technical	825	757	2100
User	824	2731	2100
		'Value to project'	
	2568	4272	6300

Table 6.2 Value of Playing Project Paradox

When two teams form a coalition in an attempt to improve the chance of success for the project, they received a reduced total Payoff value. The value for the Business Team reduced to 82% of the random value. For the Technical team the value was reduced to 91% of the value achieved if the decisions were made at random. By not always co-operating, the User team achieved an improvement of 331% over the value of a Non-strategy. Had all three teams co-operated, the Payoffs per team would have been 2100. The User team have, therefore, improved their Payoffs from 856, (when using a Non-strategy), to 2731. They have also obtained a higher value than 2100, a value achieved when all teams co-operate. The project obviously has benefited when two teams form a coalition and fully co-operated compared to the scenario when all 3 teams played a Non-strategy. But those teams who did co-operate, (the Business and Technical) each received a reduced Payoff value, compared to the time when they played the Non-strategy.

It can be seen from the simulated random data, when the Business and Technical teams formed the coalition in an attempt to improve the 'Project success', the User team were able to benefit from the 'Too Nice strategy' played by the other two teams. The User team was able to 'invade' the game and operated a random 'Prober' type strategy. A Too Nice strategy was considered by Dawkins (1989) to be one where a team would continue to co-operate despite the posibility that the other teams may not co-operate. The Too Nice strategy played by the Business and Technical teams was part of the scenario to examine the behaviour of Project Paradox and the effect on the teams and the project values.

6.3.6 Payoff Value to the Project.

The discussion so far has centred on the decisions taken by the teams and the value of the Payoffs the teams would receive. However, consider now the value in respect to the 'project'. In Figure 6.1 the direction of the arrows indicated the relative values the Business Team could achieve, depending upon the decisions of the teams to co-operate or not. It is worth pointing out that the values to the 'project' have a different ranking to those of the values to the teams. The top values for a project would occur if the three teams co-operated. As can be seen in Figure 6.2, if the Business team co-operate the 'project' would achieve a value of either 900 or 400 dependent upon whether the Technical and User teams co-operate or not. The arrows in Figure 6.2 reflect the sequence of the values with respect to the project, starting from the top left box.

The paradox for the teams and the project (a non-participant in the game) has therefore been set. If the team(s) decide to co-operate, the project receives the best value. The teams however, have the chance that they may receive the lowest Payoff (-100 points), depending upon which decisions the other two teams make. On the other hand, the Business team may decide to obtain the highest points for themselves (500) with only a value of (-10) points should the other two teams decide not to co-operate.

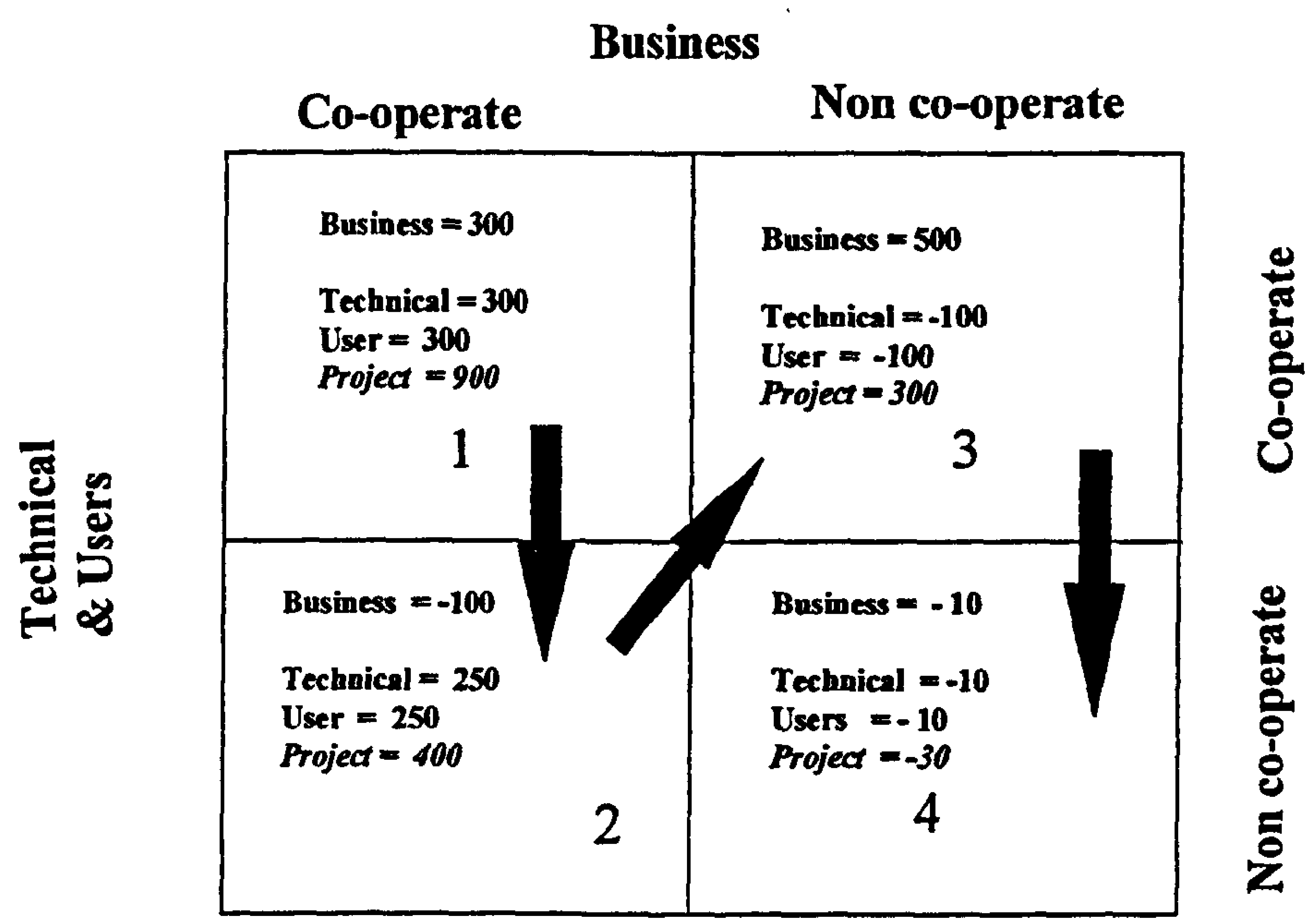


Figure 6.2 Rank Values of Project Paradox

When reading Figure 6.2 it is possible to see Payoffs for an individual team, a coalition and the project. For example, if all three teams co-operate they all receive the same Payoff equal to 300, while the project receives a Payoff value of 900. The values in Figure 6.2 reflect a coalition between the Technical and User teams, but could equally represent any individual or coalition team combination.

Project Paradox has been designed with a built-in paradox, hence the reason for the name. If each team co-operated, giving the project the best chance of success, this carries with it the possibility for the lowest team score (-100). To make a decision to co-operate, required teams to trust that the other teams would also co-operate. The alternative was for teams not to co-operate which was less risky. A decision not to co-operate would either produce a Payoff of small a penalty (-10) for the team, or the highest higher Payoff for themselves

(500). But a decision by the Business team not to co-operate could produce the lowest Payoff to the project.

6.4 Running Project Paradox

The players were placed in teams and given a copy of the rubric, a copy of which can be found in Appendix G. Postgraduate and undergraduate students with previous project experience participated in the teams. Sufficient time was allowed to read the rubric and to answer questions from the players who were seeking clarification before the run started. The values for the decisions both to teams and the project were provided with the rubric and explained to the players. The consequences of the decisions that each team made, were, therefore, clear to all before the game formally started. The players understood the rank order of the Payoffs and that the Payoff values the teams would receive, which would depend, not only upon their decisions, but also upon those made by the other teams. The orientation set for the Project Paradox games was for the players to do what they thought was best. Built into the rubric was a performance-related bonus for the team who achieved the highest team Payoff at the end of a complete game. What the players were therefore considering was whether to co-operate for the benefit of the project, or whether to attempt to achieve an improved Payoff for their own team. As a Project Paradox game progressed, the teams intuitively realised that a vote to co-operate also required them to trust the other teams.

6.5 Summary

This Chapter has described how Project Paradox was designed as a finitely repeated non-zero sum game that included the 'essential tension' and rank order of the Payoffs used in the Prisoner's Dilemma. At the same time it was also adapted to be a 'noisy' and N-person game.

Payoff values were obtained for the teams and the project, by observing the behaviour of Project Paradox by playing different strategies. The first used what was termed a Non-strategy. This was achieved by simulating Project Paradox using random decisions by all three teams to co-operate or not.

The second value represented two teams who formed a coalition to play a Simple strategy to always co-operate, while the third team played a Non-strategy of random co-operation. The results indicated that if two teams co-operated to achieve a successful project, the project would achieve a higher Payoff, but the two teams who co-operated would receive a reduced Payoff than if they adopted a Non-strategy.

The third value represented the optimum for a team. This was obtained by the teams playing a Simple strategy of full co-operation. The final value was the optimum value for a project. This was the product of the three optimum values achieved by the teams.

The rubric was written to reflect the environment of an IS project with a performance related scheme for the teams, to help create the 'essential tension' of a Prisoner's Dilemma.

The following Chapter presents an analysis of the results from each of the two Project Paradox scenarios. Full communication was used in scenario one and limited communication in scenario two; this required 28 runs using 54 teams. The results from the strategies used in the two scenarios are compared with those from the Axelrod (1984) experiment. The Payoffs achieved in the two scenarios are compared with the results obtained from the three simulations. The first simulation used a Non-strategy, the second used a coalition between two teams and the final was a Simple strategy of full co-operation. Finally, the hypothesis set at the start of this Chapter is tested and an indication of the type and level of trust that the teams were using in their decision making are discussed.

Chapter 7

7.0 Output from Project Paradox: scenarios 1 and 2

7.1 Introduction

The layout of this Chapter is presented as follows. First, the outputs obtained from running scenario 1 (that used limited communications) are presented. An analysis of the strategies used by the teams are discussed in detail and compared with those obtained from the Axelrod (1984) experiment, which were described in Chapter 6. This is followed by an analysis of the overall outputs from scenario 2 (that used unlimited communication).

Next, tables containing the overall results from all 28 games from scenario's 1 and 2 are presented. The tables contain the number of the decisions to co-operate and their associated Payoff values. These are compared and contrasted with the results obtained when Project Paradox was simulated using:

- a Non-strategy (random co-operation),
- a Simple strategy (total co-operation),
- a Coalition strategy (two teams always co-operate while one team co-operates at random).

These discussions are supported with tests to determine whether the results from scenarios 1 and 2 were significantly different from those obtained when either the Non-strategy (i.e. by chance) or the Simple strategy were used. A final test was presented, to indicate whether the populations from which the teams for scenario 1 and scenario 2 came from were different (i.e. did unlimited communication cause the difference in the results) or again could chance have produced the differences observed.

In the next section, the recorded comments made by the players of scenario 1 are discussed. From the analysis of these comments it was concluded that the players in all 14 runs of scenario 1 were discussing the trust, or lack of it, between the teams, was influencing their decisions about whether to co-operate, or not.

It was argued in Chapter 5, that the decisions taken by players of the Prisoner's Dilemma game could be based upon the rational choice model of trust. This factor identifies whether teams were prepared to co-operate with each other. A competitive element was included in the Project Paradox rubric, in the form of an incentive for each team to achieve the best result for themselves. The competitive element helped to create the paradox that the teams had to consider before making decisions about whether they would co-operate.

7.2 Strategies Used in Scenario 1

In scenario 1, the rubric reflected an IS project having co-located project teams, using limited information, upon which they made their decisions. The results from scenario1, run 1 are shown in Table 7.1.

7.2.1 Analysis of scenario 1 - run 1

From Table 7.1, it can be seen that both the Business and Technical teams voted to co-operate at the start of the game. The User team on both the first and second decisions decided not to co-operate.

Teams	Decisions 1	2	3	4	5	6	7
Business	Y	Y	N	N	Y	N	N
Technical	Y	Y	Y	Y	Y	Y	N
User	N	N	Y	N	Y	N	N

Table 7.1 Decisions taken in scenario 1: run 1

Three other observations from the first run are as follows. The Business team did not strike back until the User team defected twice. This is what Dawkins (1989) reported as a Tit for Two Tats strategy which, he found produced a result to 'beat' all other strategies. In run 1, the Technical team continued to co-operate despite having had both the Business and User teams voting not to co-operate. This is an example of a 'Too Nice strategy', and demonstrates how the Business and User teams were able to use an alternative strategy to 'invade' the Technical team who were trying to co-operate.

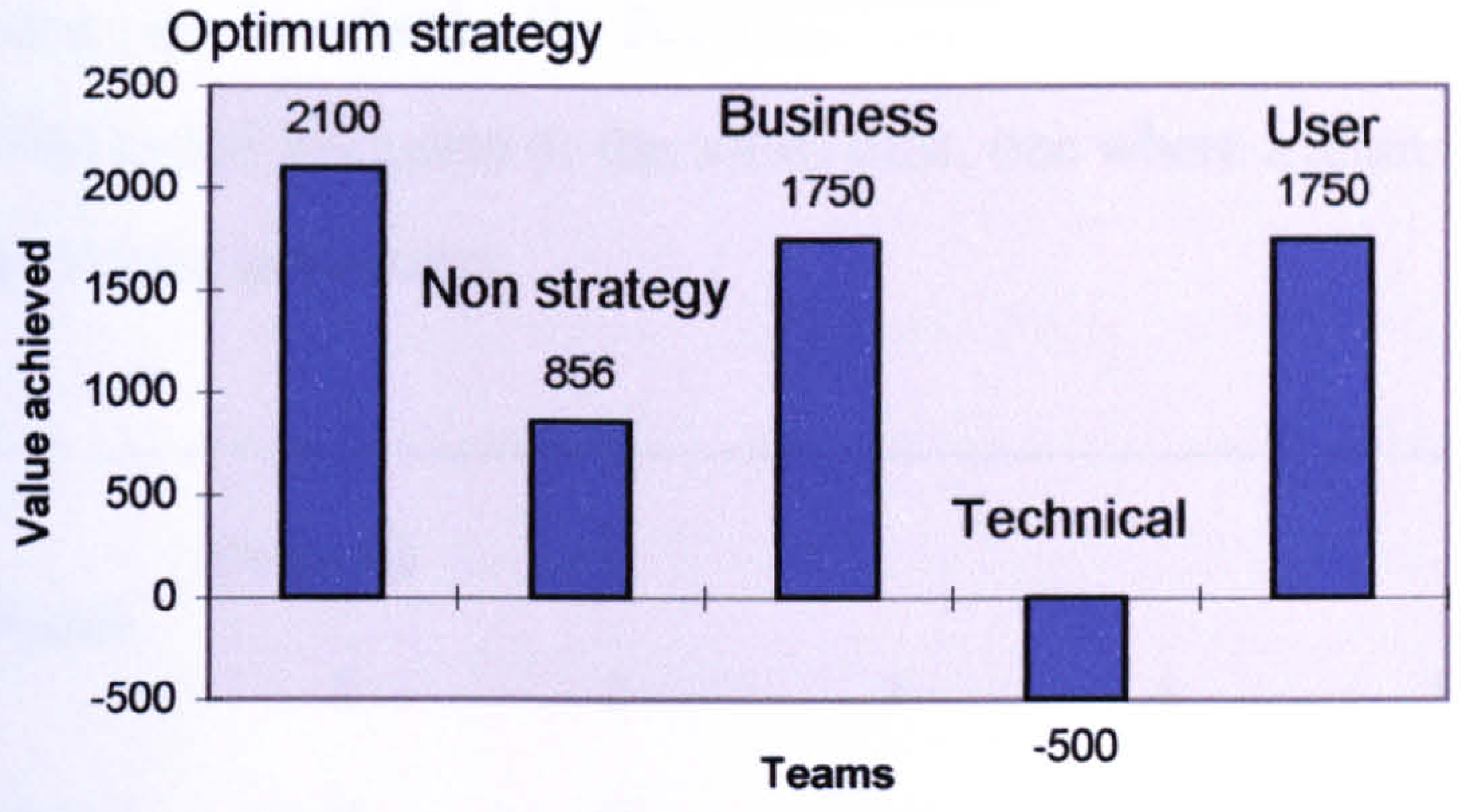


Figure 7.1 Payoffs from scenario 1: run 1

The result from the Technical team point of view is an example of a 'Grudging Finisher', a type of strategy identified in the Axelrod (1984) experiment. The Technical team can be seen to have never forgotten that the other teams had previously decided not to co-operate, and when the final decision was taken, they also did not co-operate. From Figure 7.1, it can be seen that the Business and User teams in their attempt to achieve a higher individual Payoff by not co-operating, can be shown to have received a better value than they would have achieved had they used the Non-strategy. However, they still only received 83% (value of 1750) compared with a strategy of full co-operation (value 2100). Following the final decision, the Technical team commented that they considered themselves to have been 'beaten', by the other two teams in the same project.

7.2.2 Analysis of scenario 1 - run 2

The results from Table 7.2 indicate the Technical and User teams started by co-operating while the Business team elected not to co-operate. Before the second decision was taken, the teams spent some time discussing the various decision options and their ramifications. At the second decision, the Business team did not to co-operate. This was contrary to what was observed by the author, when they agreed to co-operate during a meeting between the teams. At the third decision, the Technical team played the Tit for Two Tats strategy against the Business team, but reverted immediately at the next decision to co-operate. This is an example of a Nice strategy. Where the first decision was to co-operate, changing to, Tit for Tat (or Two Tats) when the other teams did not co-operate, but having a level of forgiveness and returning to co-operation. The Technical team was demonstrating that they were not functioning at the lowest level of trust (calculus). They were prepared to forgive having been invaded by the Business teams, which indicated a higher level of trust. Lane (1998) called this norm or the social trust, one where a team was not attempting to obtain a competitive advantage.

Teams / Decisions	1	2	3	4	5	6	7
Business	N	N	N	Y	N	N	Y
Technical	Y	Y	N	Y	Y	N	N
User	Y	Y	Y	Y	Y	Y	N

Table 7.2 Decisions taken in scenario 1: run 2

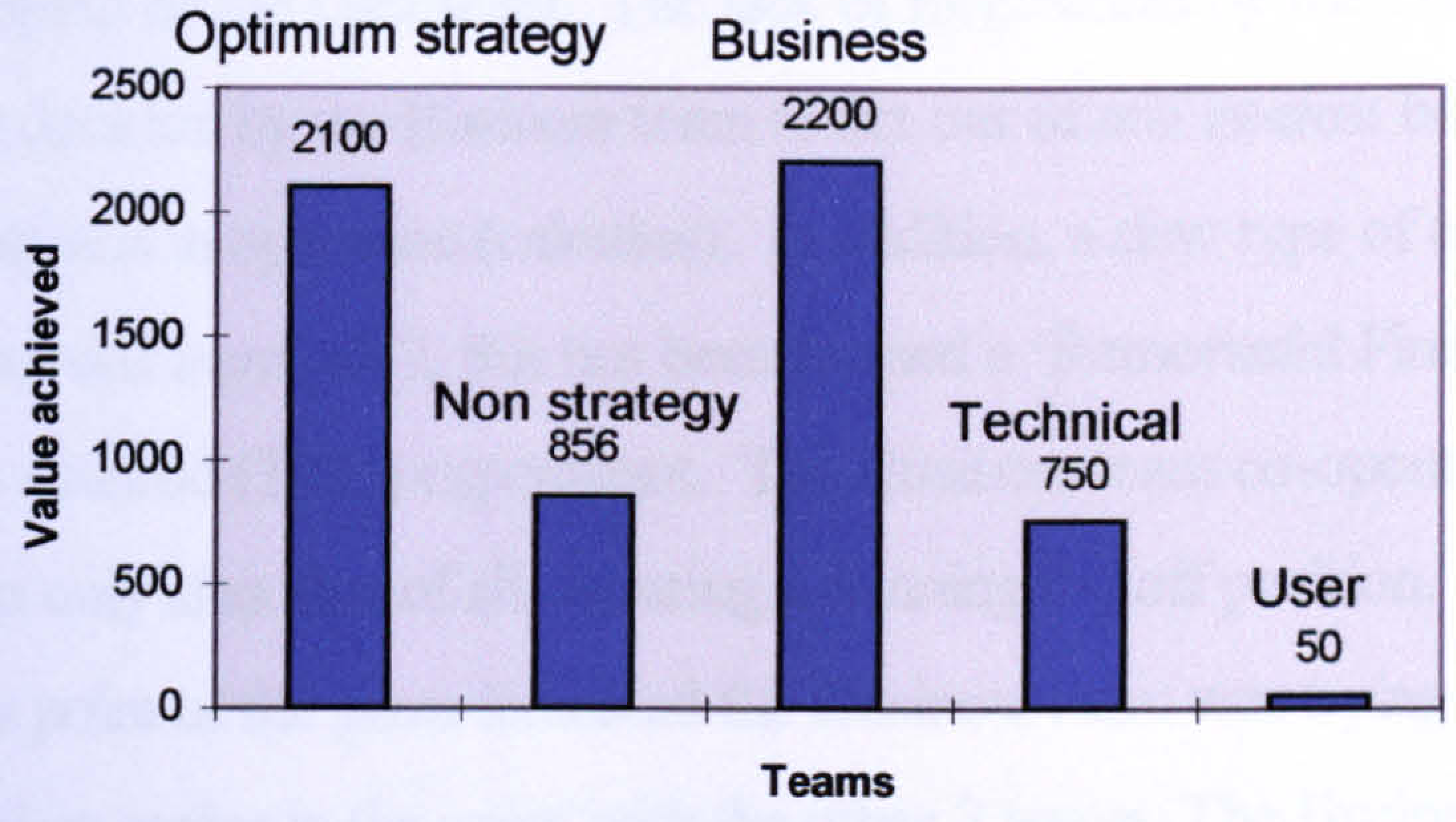


Figure 7.2 Payoffs from scenario 1: run 2

The values for run 2 can be seen in Figure 7.2. The strategy played by the Business team, was predominantly based on none co-operation and achieved their aim of invading and beating the other teams. Tyler and Kramer (1996) described how some teams would attempt to play a strategy base upon self interest, which demonstrated they were operating at the lowest level of trust. The Business team achieved a score of 2200 that was higher than both the value of the Non-strategy and the optimum value for complete co-operation. The User team co-operated on six decisions yet received only 50 points. The strategy used by the User team was a further example of a Too Nice strategy. As the game progressed, the User team was able to witness that the strategies played by the other teams were not to co-operate, despite this, they continued to do so. At the same time, the Business team was able to analyse the strategy played by the User team and 'invaded' the Too Nice strategy played by the User Team. As can be seen from Figure 7.2, Too Nice is not a sensible strategy in a game where rational choice could, and in this run did, invoke others to adopt a position of self interest. The Payoff to the project was 3000, better than a Payoff value of 2568 which would have been obtained had the decisions been taken using a Non-strategy. However, the Payoff to the project was less than the possible 6300 value had all three teams decided to play the Simply strategy of complete co-operation.

From run 2, in scenario 1, a further example of the 'Grudging Finisher' strategy identified in run 1 can be observed. Having attempted to co-operate during the game, these teams finally decided there was little to lose and did not co-operate at the final decision. These are teams who do not forget and eventually do not forgive the decision by other teams who have previously not co-operated. A good example of this can be seen in Figure 7.2, the strategy adopted by the User team. The lack of forgiveness by the Technical and User Teams and the decision by the Business team to act out of self interest both indicates the lowest level of trust was in operation (calculus). In addition, a new type of end game strategy can be observed from run 2, this has been termed a 'Remorseful Finisher'. This was not discussed in the Axelrod (1984) experiment. The Business team co-operated at the last decision, but this was only after first of all, securing a winning Payoff position. The conversations overheard at this point of the game indicated the Business team was trying to repair the trust they had broken earlier in the game with the other 2 teams. The Business team appeared to be attempting to provide some rationale for their actions of not co-operating and were trying to end the game on a positive and friendly note, hence the term chosen for this strategy, the 'Remorseful Finisher'.

7.2.3 Analysis of scenario 1 - run 3

Run 3 started with two teams playing a none co-operate strategy and continued to play none co-operate until the third decision when, communication between the teams took place. At the third decision, all three teams agreed to vote yes, and did. In this run, after teams communicated, (observed by the author), the result was for the three teams to all decide to co-operate. However, the results show that despite the discussion, all the teams attempted to bluff the other teams into believing that they were about to co-operate. At decision 4, all teams voted not to co-operate, resulting in a 'punishment' value of -10 for each of the teams. The communications in this case had clearly not worked and producing a vote to not co-operate.

Teams	Decisions 1	2	3	4	5	6	7
Business	Y	N	Y	N	N	Y	N
Technical	N	N	Y	N	N	N	N
User	N	N	Y	N	N	N	N

Table 7.3 Decisions taken in scenario 1: run 3

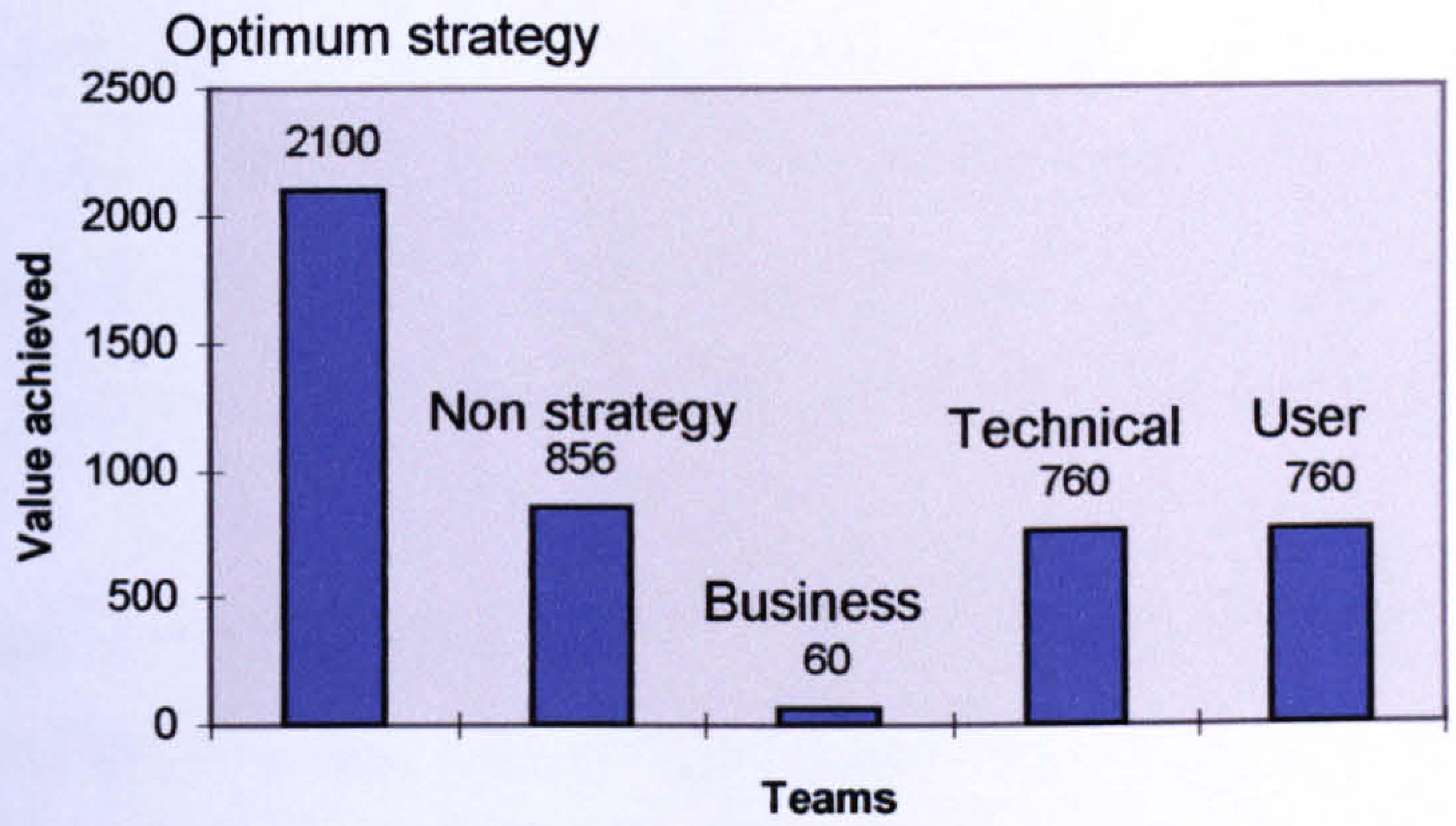


Figure 7.3 Payoffs from scenario 1: run 3

The Technical and the User teams can be seen to have adopted a 'Grudger' strategy by not forgiving the Business team after a previous decision not to co-operate. None of these teams managed to produce a strategy equal to that achieved by using the simulated Non-strategy. As a consequence, the Payoff for the project was 1580, lower than the value (2568) achieved when the decisions were taken randomly.

What can be seen to have taken place is that before the third decision was made, the teams communicated, and agreed to co-operate, which they all did. All three teams also entered into further talks before decision 5, but it would appear with the intention of not honouring that agreement. After that meeting, before decision 5, only 1 from 9 decisions were made to co-operate. All parties involved had broken trust, they had attempted to operate a strategy of self interest, resulting in the teams distrusting the other teams. Munns (1995) commented that when this happens, there is low level of trust operating without a level of forgiveness, making it likely that a spiral of distrust will develop when teams have learned that they cannot trust the other teams.

7.2.4 Analysis of scenario 1 - run 4

Run four produced a unique result. After the teams had read the rules and having had their questions answered, the User team, was prepared to hand in all 7 of their decisions without having had any communications with other teams, thus having no knowledge of the decision intentions of the other teams,. The User team had decided at the start of the game, to operate a Simple strategy of none co-operation.

The User team was asked to hand-in their decisions throughout the game when requested. As can be seen in Table 7.4 all 7 decisions from the User team were not to co-operate. This scenario could happen in a live project, when a stakeholder has not been able to achieve their requirements, following which, they withdraw all co-operation.

However, the decision was taken by the author, not to release the strategy of the User team to the Business and Technical teams until each of the decisions had been taken, thus retaining the consistency of the way the runs were executed. The overall Payoff for the project for run 4 was 1540, a poor result compared with even a Non-strategy value of 2568.

Decisions people make are based upon anticipated events, but can also be influenced by the knowledge of historical events. What is surprising for run 4 was that the Business and Technical teams, could, over time, have observed that the User team were not co-operating and may have anticipated that they would continue not to co-operate. Yet the Business and Technical teams continued to do the best for the project and not themselves.

Teams \ Decisions	1	2	3	4	5	6	7
Business	Y	Y	N	N	Y	Y	Y
Technical	Y	N	N	N	Y	Y	Y
User	N	N	N	N	N	N	N

Table 7.4 Decisions taken in scenario 1: run 4

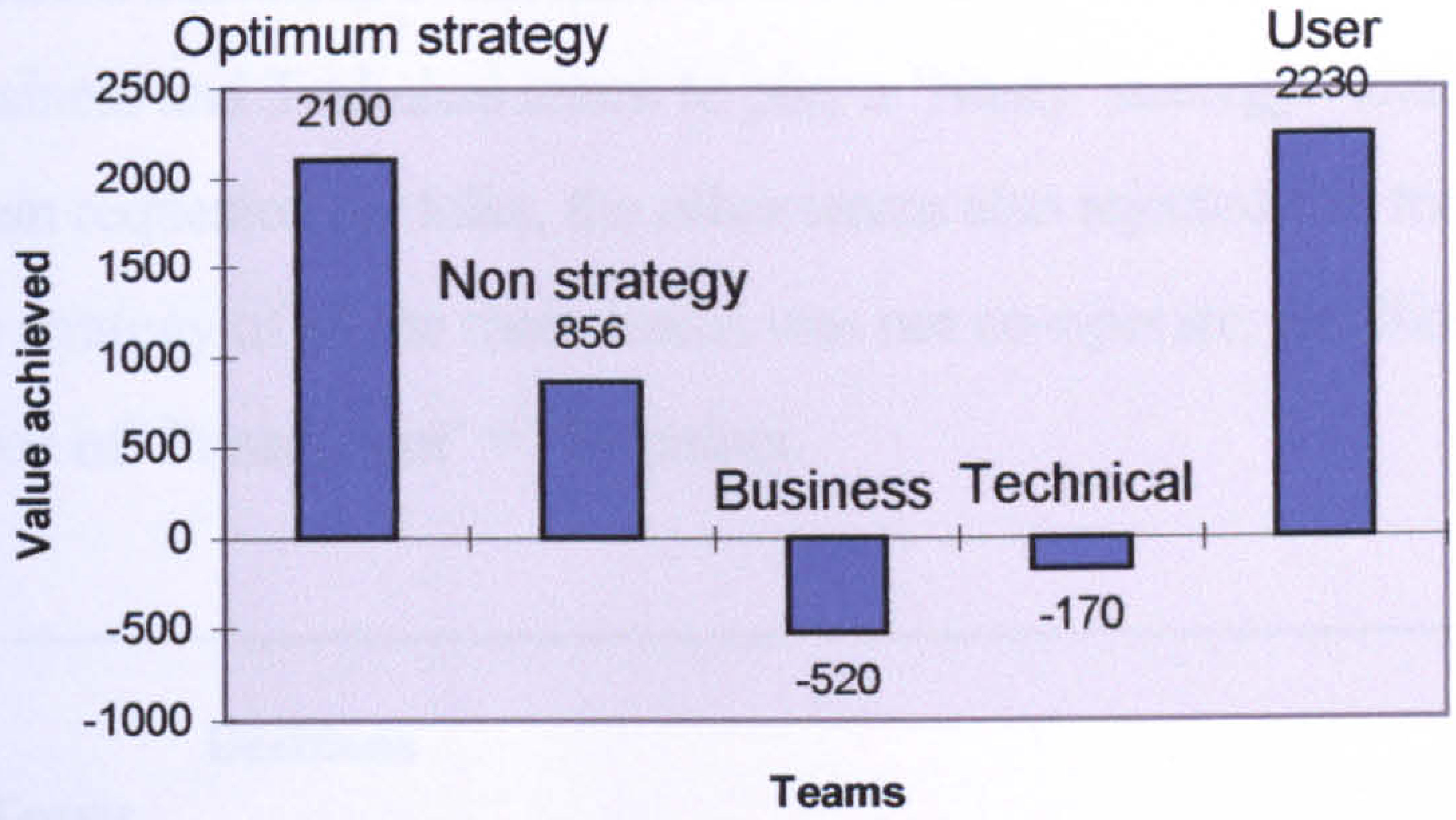


Figure 7.4 Payoffs from scenario 1: run 4

The User team generated 2230 points. Had all teams simply co-operated they would have obtained 7 x 300 = 2100 points. Their strategy of not co-operating was used to obtain the best result for the team, while for the project, the Payoff was worse than could have been achieved with a Non-strategy. This was a deliberate Simple strategy of none co-operation, and had been decided at the start of the game. This strategy was simulated prior to scenarios 1 and 2 being run and the results were presented in Chapter 6, although it was not envisaged that any team would play such a strategy. The results identified in Chapter 6, and repeated in this run, have demonstrated that the team who for self interest play a Simple strategy of none co-operation, have achieved a value greater than the optimum value of 2100, at the direct expense of the other two teams.

If, in live projects, staff took similar decisions, the project would not be a success. One difficulty for project teams is when the staff publicly appear to be co-operating, but in reality they are not, possibly with the intention to deliberately sabotage the project. This behaviour can be considered to be dominant or recessive trust. Trust could be on show, while actual distrust is hidden. This is difficult to identify for live projects and is an example of the manifesta or t-Krypta of secondary trust as discussed in section 5.9.1 (Bacharach and Gambetta 2001). However, the results of run 4 have demonstrated the consequences of a team that decided not to co-operate for the duration of a project.

7.2.5 Analysis of scenario 1 - run 5

In run 5 the User team asked whether the other teams would communicate before any decision was taken. Both the Business and Technical teams rejected that opportunity where decision intentions could have been discussed. The result from the first decision was for the Business and Technical teams to play a 'Nasty' strategy. Before decision 2, the User team again requested for talks, the other teams also rejected this request. At the second decision, the strategy of all the three teams was not co-operate, resulting in all the teams receiving the value of 'Punishment' = -10 points.

Teams \ Decisions	1	2	3	4	5	6	7
Business	N	N	N	Y	N	Y	Y
Technical	N	N	N	N	N	N	N
Users	Y	N	N	N	N	N	N

Table 7.5 Decisions taken in scenario 1: run 5

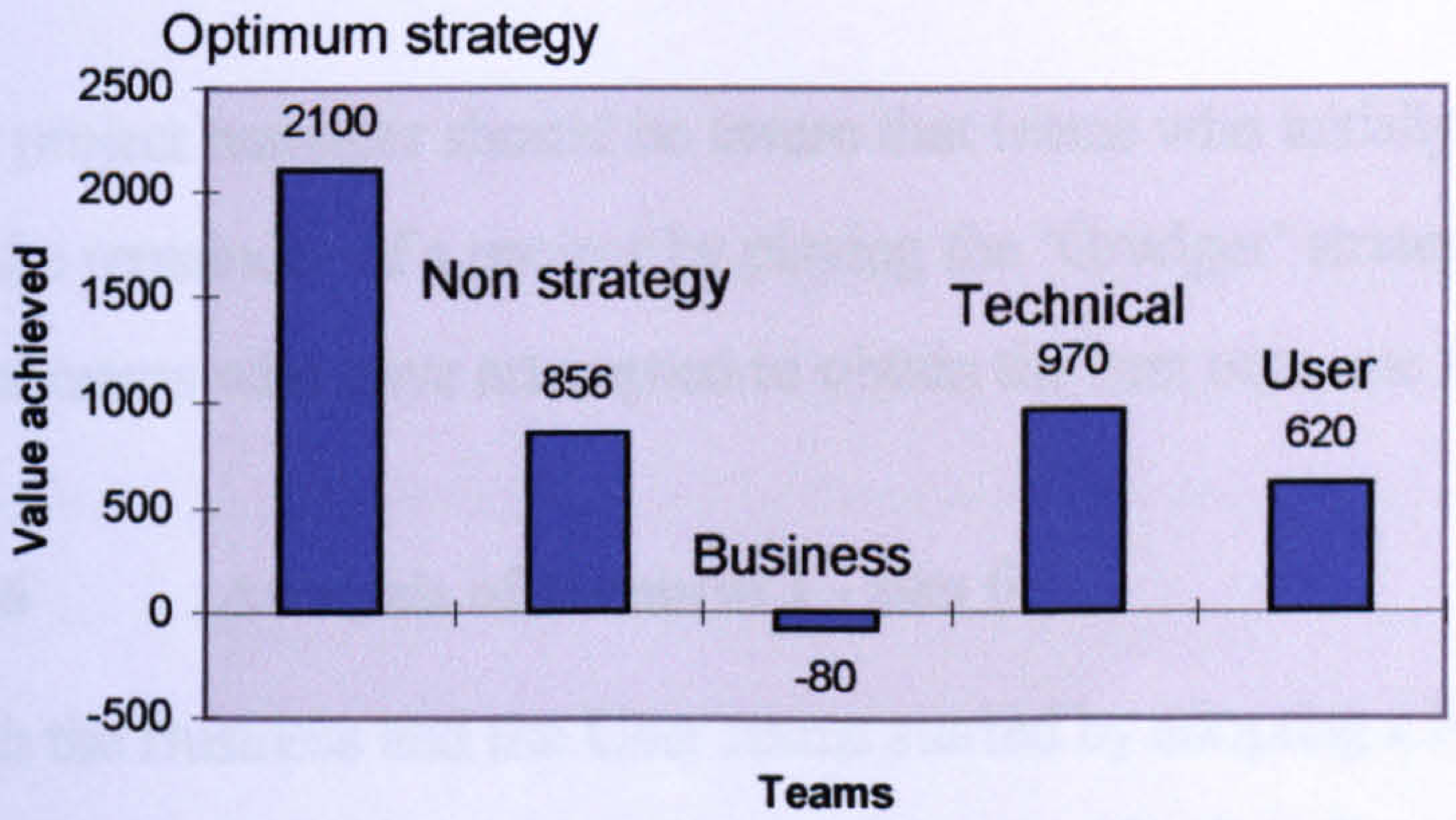


Figure 7.5 Payoffs from scenario 1: run 5

As with run 4, one of the teams in this case, the Technical team decided they would play a Simple strategy of none co-operation. The difference between run 4 and run 5 was that while in run 4 the Users played a strategy of total none co-operation that produced a Payoff value of 2330. In run 5 when that same strategy was used by the Technical team the Payoff value of 970 points was achieved, only slightly better than the Non-strategy Payoff value of 856 points. The difference was caused by the none forgiving behaviour of the other teams in run 5 compared to the run 4. Following the first decision of the Technical team not to co-operate in run 5, the Business and User teams decided for nine occasions not to co-operate. It could be considered that these decisions were taken in retaliation. In contrast, during run 4, following the first decision of the User team not to co-operate, the Business and Technical teams decided not to co-operate on only 5 occasions.

One observation from run 5 is that because the User team requested a meeting at decision stages 1 and 2, it demonstrated they started by operating at a higher level of trust than the base level of calculus trust. The User team wished to share information at the start, although their actual strategy was not known. After the first decision, the User team never co-operated again.

The teams did have some discussions before the decisions 3 and 5 were taken. But the spiral of distrust had started for the User team, following the rejection for talks before decision one and after the other teams selected not to co-operate at the first decision that resulted in the User team receiving the lowest value, the 'Suckers Payoff'. As can be seen from Table 7.5 following the first decision, the User team played a 'Grudger' strategy.

The project manager should be aware that teams who initially co-operate, can 'switch off' for the remainder of a project by playing the 'Grudger' strategy caused by the actions of other teams who have attempted to obtain the best outcome for themselves.

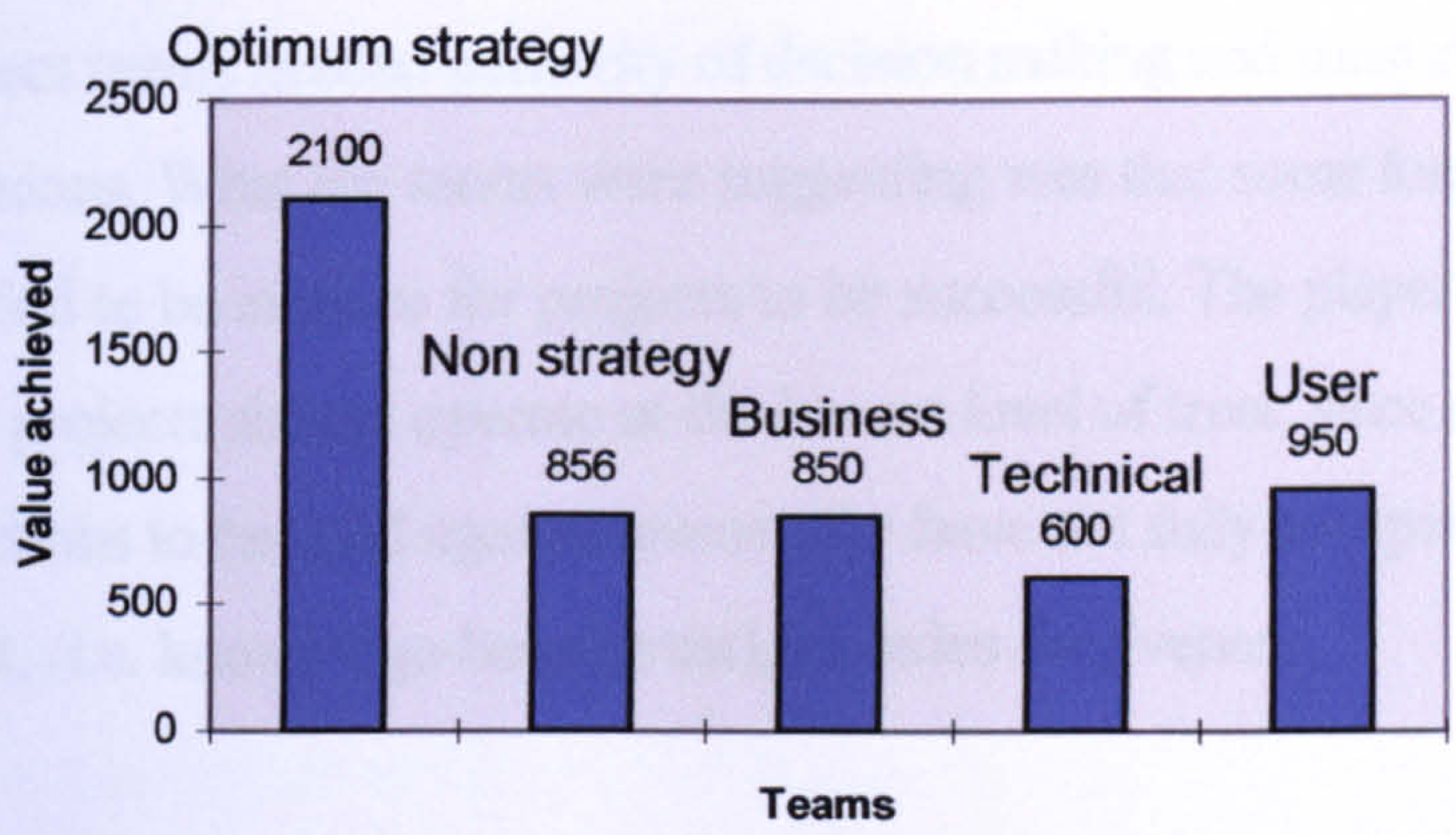
7.2.6 Analysis of scenario 1 - run 6

Both the Business and the User teams started by adopting a Nice strategy to co-operate. This resulted with the User team receiving the 'Suckers Payoff' causing them not to co-operate for the next decision, while the Business team continued to co-operate. Talks between the teams took place before decisions 3 and 5. Neither of these communications resulted in all teams co-operating.

When the teams entered into talks, they decided to select one member from each team to negotiate on their behalf. Those representatives decided to leave the room and talk in private.

Teams \ Decisions	1	2	3	4	5	6	7
Business	Y	Y	Y	N	N	Y	N
Technical	N	N	Y	Y	Y	N	Y
User	Y	N	N	Y	Y	N	N

<u>Table 7.6</u>   <u>Decisions taken in scenario 1: run 6</u>



<u>Figure 7.6</u>   <u>Payoffs from scenario 1: run 6</u>

Representatives of the teams, who carried out formal discussions, produced a written agreement to co-operate. Meanwhile, the remaining members of the three teams, entered into informal talks while the formal meeting took place in private. The decision finally taken by the teams, did not reflect the written agreement to co-operate that was agreed during the formal talks. After the negotiations but before the vote for decision 5, the Business team members had further internal talks, resulting in the written agreement to co-operate being reversed. The private internal decision by the Business team resulted in a 'temptation' Payoff of 500 points. The Technical and User teams both retaliate in the next decision (No 6) and did not co-operate, a clear example of a Tit for Tat strategy.

The problem for this project was identified by the teams to be the ability for the Business team not to respect an agreement, even when the agreement had been written down and signed by representatives from all the teams. This provides an example of the view presented by O'Neill (2002), given in Chapter 5, where she believed that '... elaborate measures to ensure that people keep agreements and do not betray trust must, in the end, be backed by - trust since all guarantees are incomplete'. The Business team clearly was operating at the lowest level of trust (calculus) seeking team benefit before project success.

At the end of the run 6 the teams suggested that one reason for the project failure could be due to the broken agreements, in particular when the culprits were seen to have benefited from their refusal to honour that agreement. The conclusion by the teams of run 6, was that if decisions were vested in representatives, the agreement should be made at the meeting, and not referred back to the teams for further discussion. The players further concluded that project teams needed authority of decision making and must accept responsibility for their decisions. What the teams were suggesting was that some form of controls and sanctions are needed to be in place for projects to be successful. The players were, therefore, suggesting that projects should operate at the lowest level of trust, since calculus trust relies upon sanctions to be used against teams who have not fully co-operated, while the higher level of trust, (i.e. knowledge-based trust), includes forgiveness.

One way to prevent teams from succumbing to temptation of higher personal team benefits is to remove having the dual objectives of the team and the project. Fukuyama (1995) stated that one way to achieve that was to have some sense of 'reciprocal obligation' and to achieve this ability to associate, depended in turn on shared norms and values. The impact for IS projects and project managers seems clear. A project contract that is written as a zero sum will cause conflict for teams by have competing targets. Project Paradox was a non-zero sum game but the teams still had the paradox to overcome due to the performance related element of the game, thus preventing the shared norms and values for co-operation from being automatic.

Dawkins (1989) described a system where all parties work towards a common good as being what he termed reciprocal altruism; this term could however be considered to be an oxymoron because altruistic behaviour is usually associated with those who do not expect any return for their effort. Nevertheless, what Dawkins (1989) was suggesting with the term reciprocal altruism was to consider a system where all sides needed each other to the same degree, and that if either side did not fulfil their obligation then all would be equally penalised. An example Dawkins (1989) gave to demonstrate reciprocal altruism was of birds that feed on the ticks in crocodile mouths, where both creatures needed each other to survive. This example could also be considered to be a symbiotic relationship rather than reciprocal altruistic. However, the parallel for project teams can be made. The ideal system would be one where all stakeholders contribute without thought of personal gain. This is unrealistic in projects where one of the objectives could be the creation of profits for some of those involved. The conclusion that can be drawn from this is to consider how at the time of a project launch a contract could be written that would produce a 'reciprocal obligation' as suggested by Fukuyama (1995) from all stakeholders. One solution to create such an environment would be for all sides to accept a sub-optimum of their overall requirements. This idea was also suggested by the past Head of the London Stock exchange when asked how more IS projects could be successful during an interview with Collins (1994).

7.2.7 Analysis of scenario 1 - run 7

In run 7, the teams decided to negotiate before the first decision. However, the Business team opted to play a none co-operate strategy for decision one. The Technical and User teams played a strategy to co-operate at the beginning of the game, but immediately changed to Tit for Tat following the Business decision not to co-operate.

Teams	Decisions						
	1	2	3	4	5	6	7
Business	N	Y	N	N	Y	N	N
Technical	Y	N	Y	N	N	N	N
User	Y	N	Y	N	N	N	N

Table 7.7 Decisions taken in scenario 1: run 7

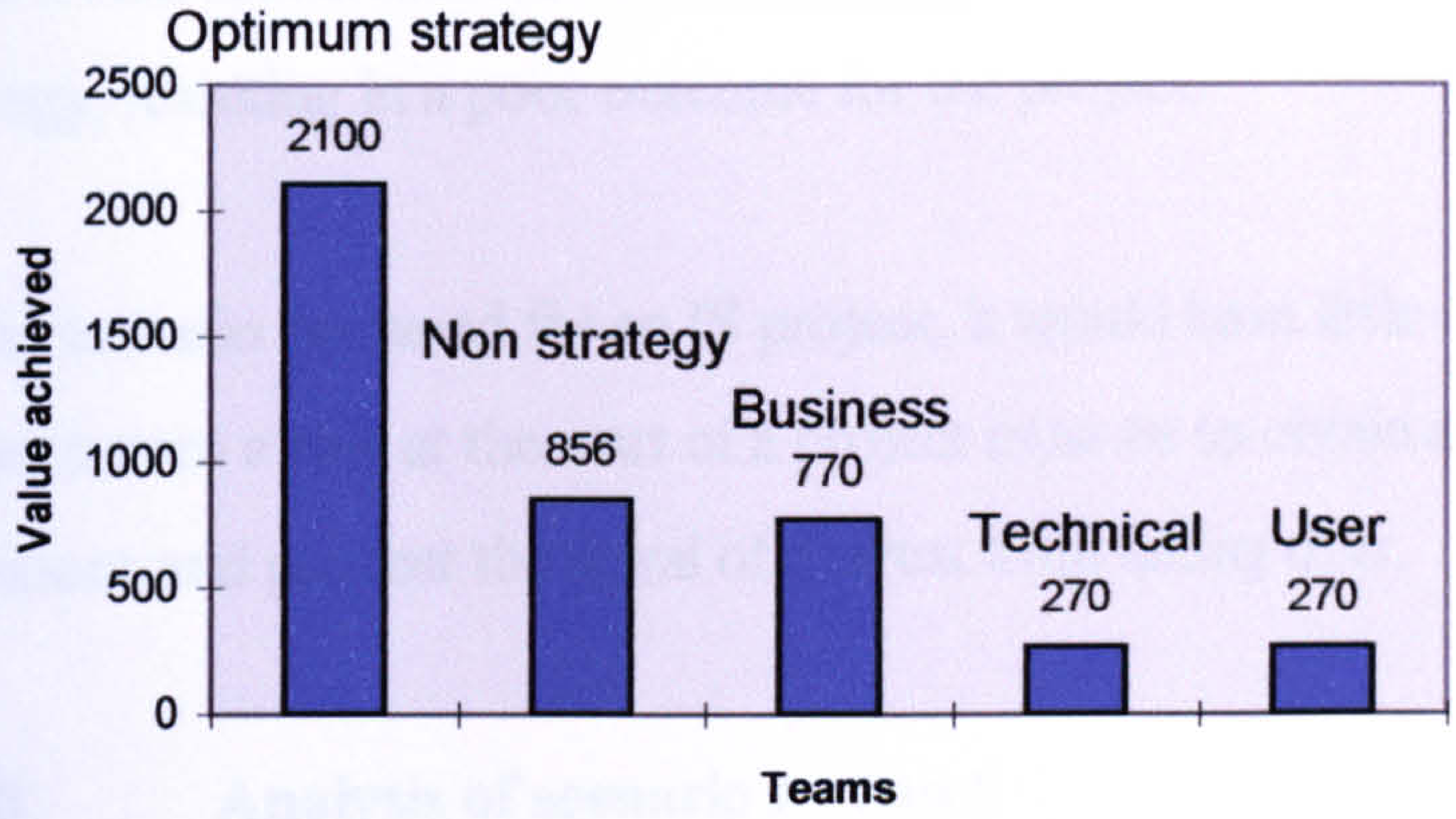


Figure 7.7 Payoffs from scenario 1: run 7

Following further talks before decision 3, agreement to co-operate seemed to have taken place. However, the Business team decided not to co-operate, a decision worth 500 points to them. Following that decision, further talks took place before decision 5. The Technical and User teams entered into a spiral of distrust, playing a 'Grudger' strategy to never forgive the Business team for their two earlier promises to co-operate, which were not honoured.

Prior to that both the Technical and User teams played what is termed a 'Benevolent Prober' strategy, as identified by Axelrod (1984). With this type of strategy a team may not co-operate for one decision as a form of punishment against another team which had not co-operated. But a Benevolent Prober strategy quickly reverts to co-operate rather than immediately entering into a 'Grudger' strategy. As can be seen from Table 7.7, the Technical and User teams both played a 'Nice' strategy at the start by co-operating. At the second decision they both played Tit for Tat due to the Business team not co-operating at decision one. However both the Technical and User teams reverted to co-operate for decision 3, demonstrating they had only played a Benevolent prober strategy at decision 2. Finally, since the Business team continued not to co-operate the Technical and User teams both spiralled into the Grudger strategy for the remaining decisions.

From this game, it can be seen that the Technical and User teams were both attempting to operate for the good of the project with a high level of trust. First because they started with the intentions of co-operating, followed by forgiving the Business team who had not co-operated, but finally deciding trust was broken beyond repair.

None of the teams achieved a value at the end of the run that was achievable using a Non-strategy, resulting in a poor outcome for the project.

If this scenario occurred for an IS project, it would have little chance of success. The aim or perhaps even a rule at the start of a project must be to obtain agreement about future intentions and prevent the spiral of distrust from taking over.

7.2.8 Analysis of scenario 1 - run 8

The start of run 8 was unique when compared to the other 13 runs, because it was the only run to begin with all three teams voting not to co-operate. They all received the punishment Payoff of -10 points for that first decision. Negotiations took place before the second decision, however, despite those the Business team decided for the second time, not to co-operate. That decision produced another unique feature. The Technical team at this point decided to hand in a sheet stating that the next 5 decisions would all be not to co-operate. They left the room and took no further interactive part in the run. The decisions that the Technical team had made, were used to calculate the later Payoff values. In this run it was not possible to keep the decision of the Technical team not to ever co-operate for the remainder of the game from the other two teams, as was possible in run 4.

Teams	Decisions						
	1	2	3	4	5	6	7
Business	N	N	N	N	N	Y	Y
Technical	N	Y	N	N	N	N	N
User	N	Y	N	N	N	N	N

Table 7.8 Decisions taken in scenario 1: run 8

The reason given by the Technical team for leaving the room was that the Business team had twice voted not to co-operate and the Technical team could not 'trust' the Business team any further. With 21 decisions to be made, these three teams had a combined total of only 4 decisions to co-operate. The remaining 2 teams continued with the game without the Business team in the room. If some stakeholders leave a project, the work still has to be done either by those already involved or by others.

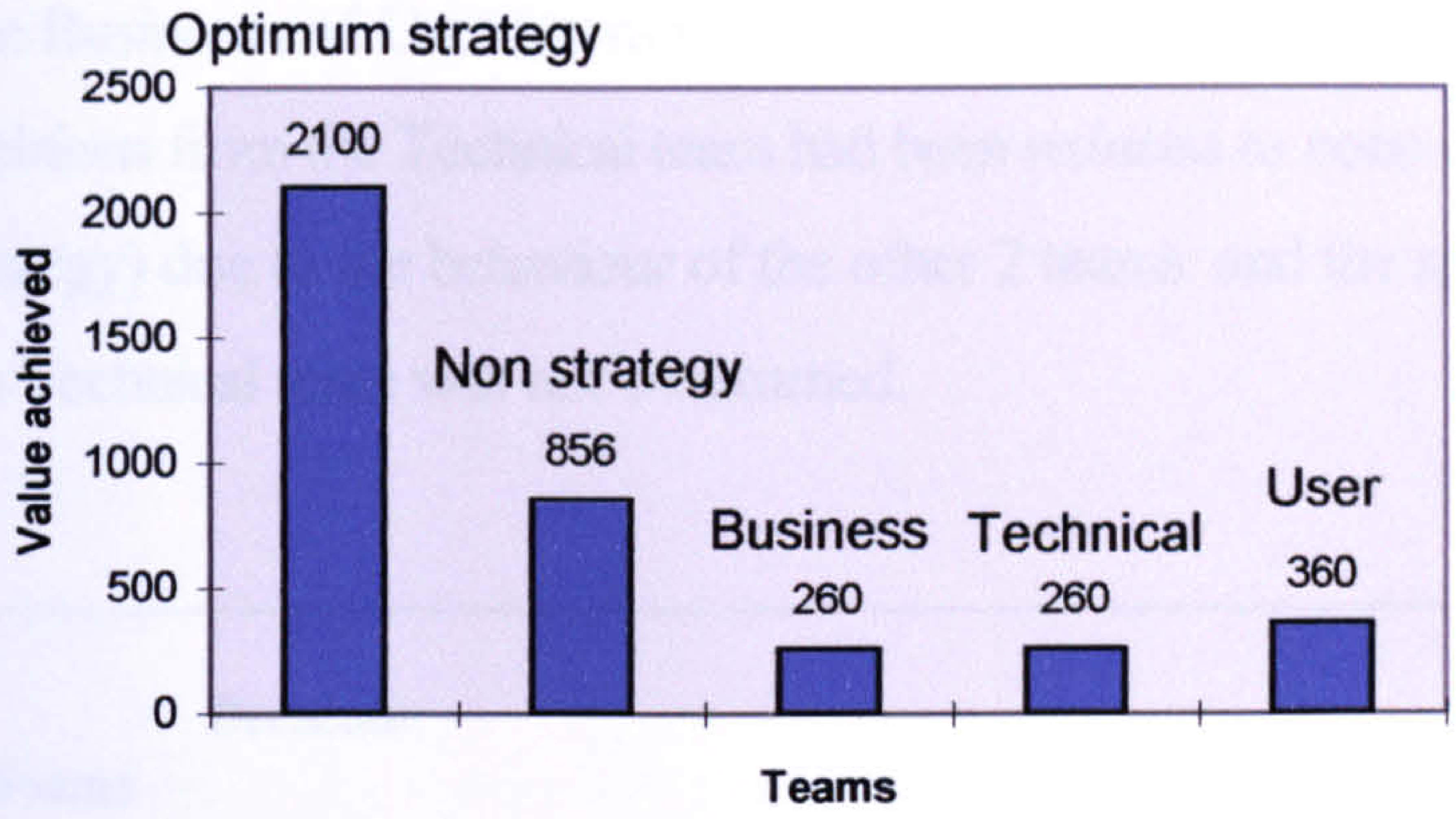


Figure 7.8 Payoffs from scenario 1: run 8

All the Payoffs achieved by the 3 teams were well below the value of 856, the Payoff achieved in the simulation of a Non-strategy. The Payoff to the project was 980, a poor result, when compared with a Non-strategy Payoff value of 2568. The Technical team as with other teams had entered into a spiral of distrust and decided to play the 'Grudger' strategy to the point of publishing their remaining decisions before leaving the room. The User team also played a 'Grudger' strategy following the second decision by the Business team not to co-operate. What seems an almost perverse decision by the Business team was to co-operate for the last two decisions when they could have defected and received a better Payoff, a strategy earlier termed a Remorseful Finisher. The action by the Technical team to leave the room changed the game from one where decisions were taken simultaneously and independently (Hollocks 2000), in keeping with the Prisoner's Dilemma rules, to a game when the decisions were taken sequentially as in a Trust-honour game (Yamagishi 2001). Although the orientation for the games had been set at the beginning of the runs, the players in run 8 changed the way game was played. It is interesting to note that the value for the project in run 8 (see Table 7.16) was the lowest for all 14 runs. Stakeholders in an IS project could behave in the same way that the Technical team did in run 8, when trust between team members was broken. A role for the project manager is to decide how to create a high trust project environment that can prevent actions such as those from the Technical team in run 8 from taking place.

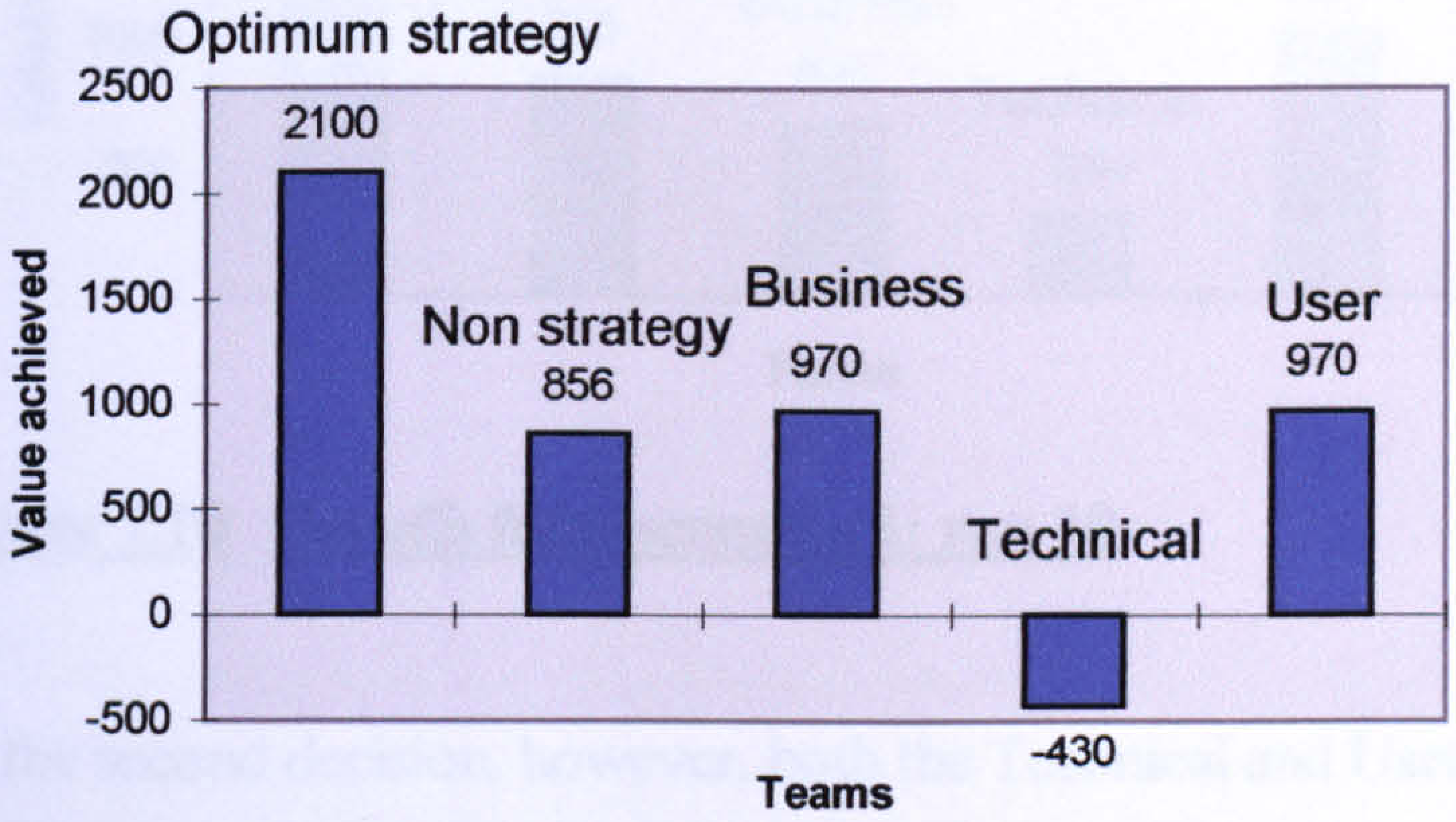
7.2.9 Analysis of scenario 1 - run 9

In run 9, the teams did not discuss their decision strategies before the first decision. Run 9 resulted with two teams adopting a Simple strategy, not to co-operate for all 7 decisions.

The Business and User teams were not at any time prepared to co-operate. The last 3 decisions from the Technical team had been reduced to none co-operation, (a Grudger strategy) due to the behaviour of the other 2 teams and the spiral of distrust once started for the Technical team was not overturned.

Teams / Decisions	1	2	3	4	5	6	7
Business	N	N	N	N	N	N	N
Technical	Y	Y	Y	Y	N	N	N
Users	N	N	N	N	N	N	N

<u>Table 7.9</u> **<u>Decisions taken in scenario 1: run 9</u>**



<u>Figure 7.9</u> **<u>Payoffs from scenario 1: run 9</u>**

The strategy for the Business and User teams had beaten the Payoff value for the simulated Non-strategy (856), but these decisions had produced a Project Payoff with a value of only 1510, well below the value of 2568 which could have been achieved using a Non-strategy.

7.2.10 Analysis of scenario 1 - run 10

In run number 10, there was complete agreement to co-operate, a 'Nice strategy', for the first decision, giving each team 300 points and the project 900 points.

Teams / Decisions	1	2	3	4	5	6	7
Business	Y	Y	N	N	N	N	N
Technical	Y	N	N	N	N	Y	Y
User	Y	N	N	N	N	N	N

Table 7.10 Decisions taken in scenario 1: run 10

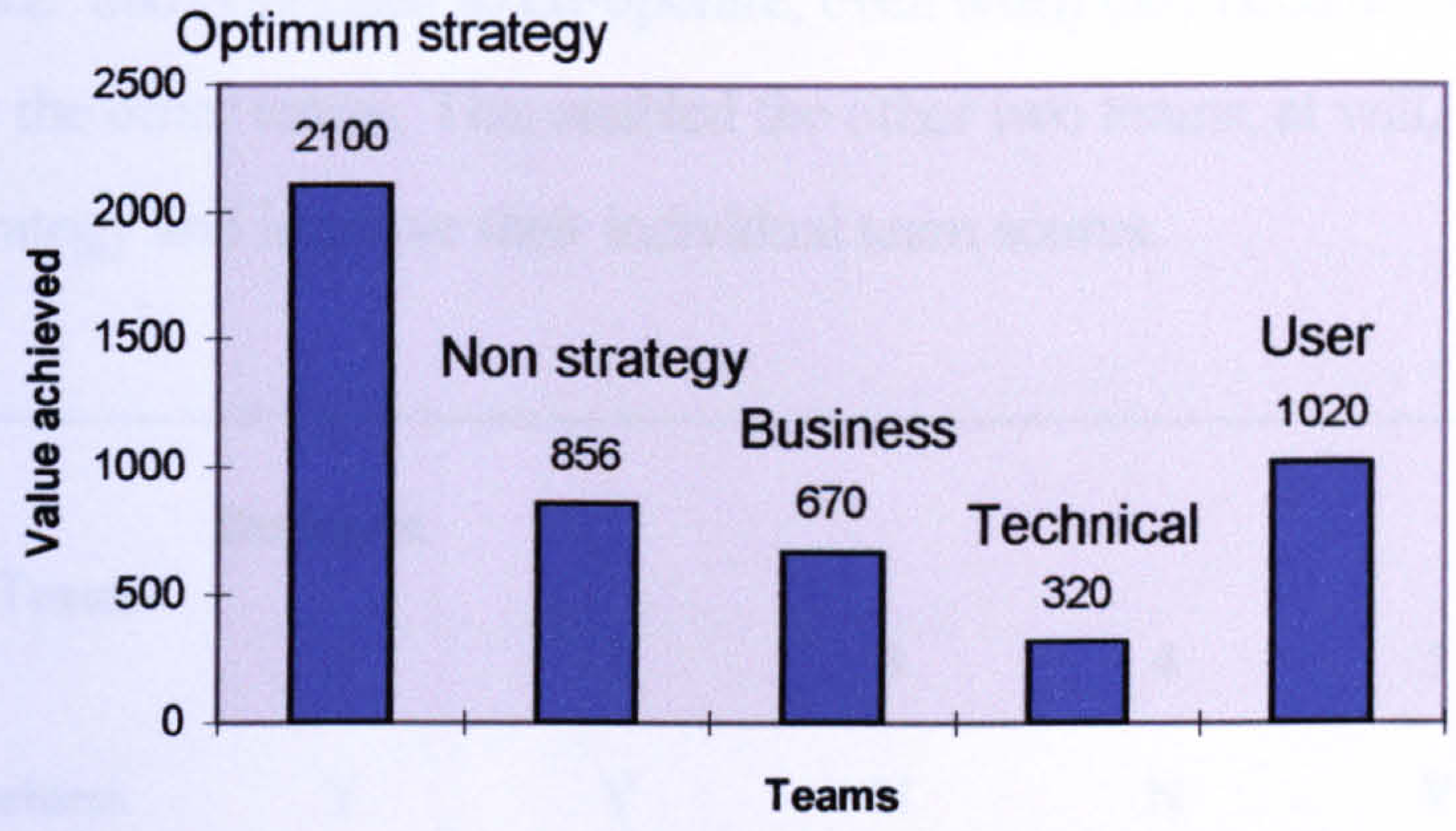


Figure 7.10 Payoffs from scenario 1: run 10

At the second decision, however, both the Technical and User teams decided to vote not to co-operate. If this run had been a live IS project, the result would have been a failure. Only 2010 points were generated for the project, when a Non-strategy had been simulated to produce a Payoff value worth 2568. The result was a 'poor' for the project.

Before decision 3 was made, the teams decided to have some further discussions. An agreement was made that all three teams would co-operate. However the results show that all the teams voted not to co-operate resulting in a 'penalty' Payoff of -10 points to each team. The Business team and the User team both entered into a spiral of distrust, playing a Grudger strategy for the remainder of the game. The Technical team finished with a strategy identified earlier, a 'Remorseful Finisher'. The strategy played by the Technical team again is difficult to rationalise. The Technical team obtained the lowest of the three Payoffs, but their action to co-operate produced a Payoff value for the project that came close to the value achieved if they had adopted a Non-strategy. The Payoff to the project was still a 'poor' result when compared with the optimum value of 6300.

This decision is difficult to understand, especially since the previous decisions of the Business and User teams indicated that they would vote not to co-operate.

7.2.11 Analysis of scenario 1 - run 11

The unique feature of run 11 was that the Technical team were prepared to co-operate until the last decision, even though, the Business and User teams had voted not to co-operate on 6 earlier decisions. Yet again, a team had unexplainably, adopted the strategy, termed, 'Too Nice' and continued to co-operate, even when they became aware of the strategy adopted by the other teams. This enabled the other two teams, at will, to 'invade' the Too Nice strategy and improve their individual team scores.

Teams	Decisions 1	2	3	4	5	6	7
Business	Y	Y	N	N	Y	N	N
Technical	Y	Y	Y	Y	Y	Y	N
User	N	N	Y	N	Y	N	N

Table 7.11 Decisions taken in scenario 1: run 11

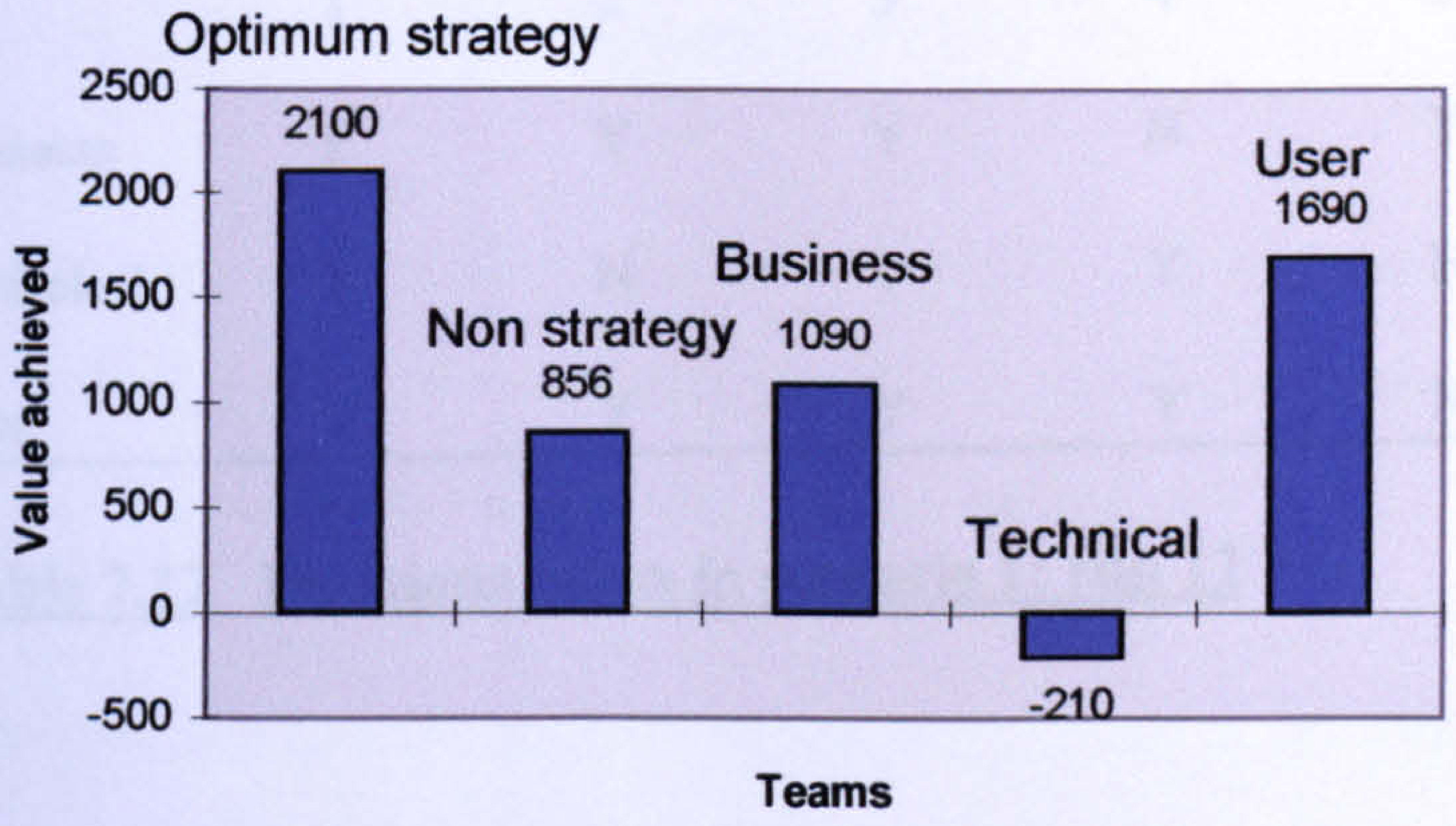


Figure 7.11 Payoffs from scenario 1: run 11

To prevent a Too Nice strategy from being played, Dawkins (1989) recommended that teams should adopt a strategy which could not be invaded by other strategies, and called these, Evolutionarily Stable Strategies (ESS). Naturally, even a Non-strategy or Tit for Tat strategy can invade teams who choose always to co-operate. A Tit for Tat strategy, remember, always co-operates at the first decision but whose next decision is a mirror of the other player's, last decision. However, when playing Project Paradox, a Tit for Tat strategy would need to mirror the worst decision of either the other 2 teams, because it was designed as an N-person game. A team playing Tit for Tat are themselves therefore unable to be invaded as they indicate they are not 'Too Nice' and will withdraw co-operation temporarily if other teams do not co-operate.

The Technical team have almost played a 'Too Nice' strategy by co-operating despite having received 5 'Suckers Payoffs', each with a value of -100. The Payoff for the project was 2570, just beating a Non-strategy Payoff of 2568. Neither the User team nor the Business team was able to equal or better the optimum Payoff value of 2100.

7.2.12 Analysis of scenario 1 - run 12

Run 12 started with full agreement of the 3 teams to work together, one of only 2 runs with all 3 teams co-operating and started playing a Nice strategy. As the run developed, 2 different strategies were observed.

Teams	Decisions 1	2	3	4	5	6	7
Business	Y	Y	Y	N	Y	Y	N
Technical	Y	N	Y	Y	N	Y	Y
User	Y	Y	Y	Y	N	N	N

Table 7.12 Decisions taken in scenario 1: run 12

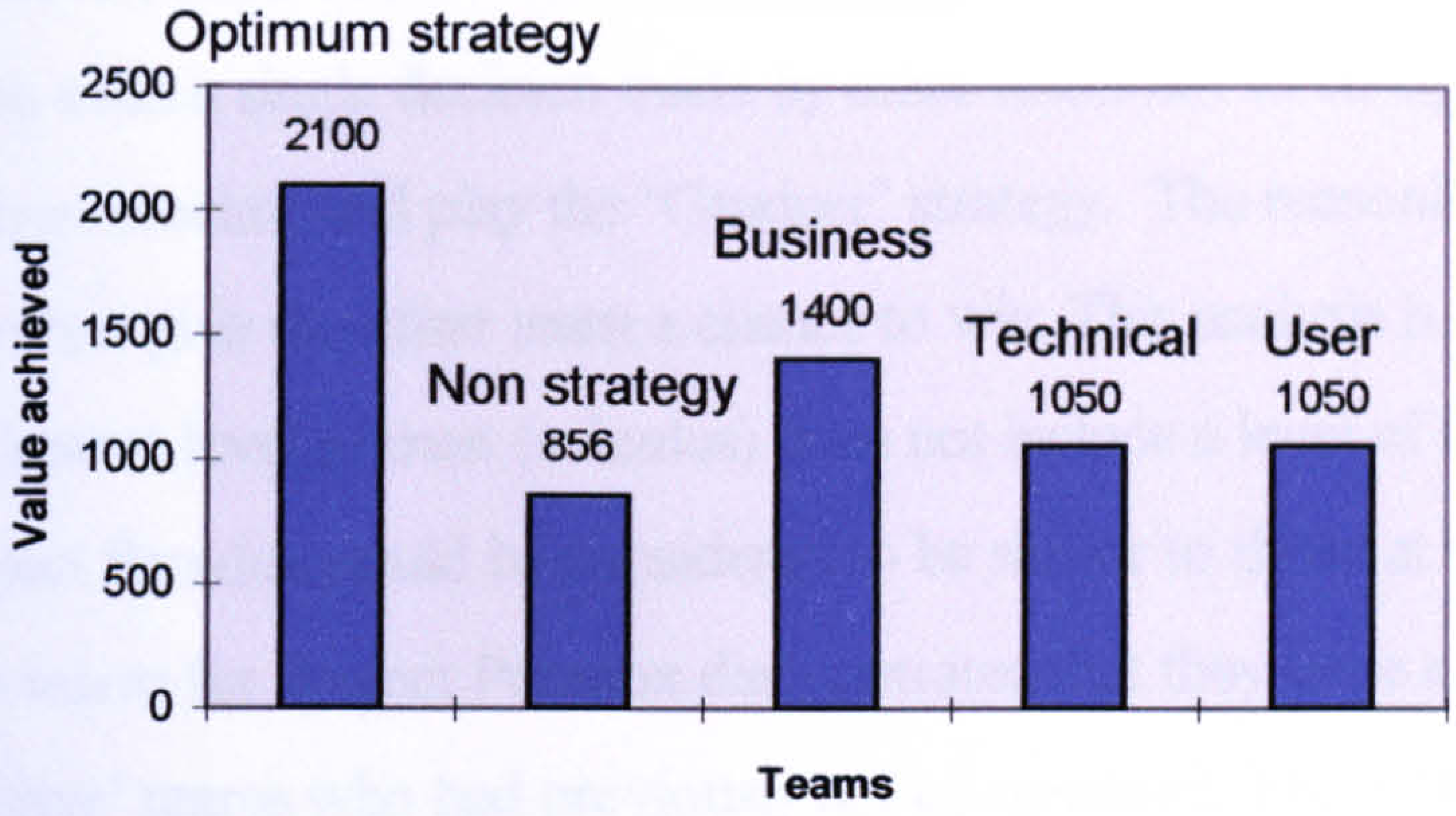


Figure 7.12 Payoffs from scenario 1: run 12

Firstly, the Technical team appeared to have played a 'Naïve Prober' strategy. Twice the Technical team struck against the other two teams. The Business and User teams appeared to ignore, or forgive the decision of the Technical team that was not to co-operate for decisions 2 and 5. When the Business team, played a 'Naïve prober' strategy for decision 4, the Technical team struck back in decision 5, but then continued to co-operate in the remaining 2 decisions.

Secondly, following the 5th decision, the Technical team behaved with a 'short term memory' and forgiveness. Having played a Tit for Tat strategy against the Business team who had not co-operated for decision 4, the Technical team reverted to co-operating. On the other hand, for decision 2, the User team allowed the Technical team not to co-operate without retaliating. But when the Business team decided not to co-operate at decision 4, the User team entered into a spiral of distrust and played the 'Grudger' strategy, never forgiving and not co-operating for the remainder of the run.

In a strategy such as Tit for Tat, teams quickly forget the past behaviour of other teams, but in other strategies, at some point, the team lose all confidence in what is happening and refuse to co-operate for the remainder of the run.

The point, for IS projects from this analysis, is that some staff will have short memories and forgive a 'Naïve Prober' strategy; that is, one who decides not to co-operate for one decision and then returns to co-operate for the next decision.

However, some teams have demonstrated that they were not prepared to, or able to recover from, even a single decision made by other teams not to co-operate. These teams have 'long term memories' and play the 'Grudger' strategy. The reasoning being that they would rather lose than give the other team a chance to win. This analysis is consistent with the view that the lowest level of trust (calculus) does not include a level of forgiveness. The players of the Project Paradox could be considered to be similar to those at the beginning of an IS project. The teams for Project Paradox demonstrated that they were at times not prepared to 'forgive' teams who had previously not co-operated. These players of Project Paradox could have moved through the team forming stage to a point where they trusted each other.

However, it has earlier been discussed that staff who have some knowledge of each other, possibly obtained during team building activities, are still not able to fully trust each other in a business environment. The 'Grudger' strategy operated by some of the teams is an example of where the lowest level of trust (calculus) is in operation. Team members who played a 'Grudger' strategy have not forgiven other team's who have not co-operated.

The issue raised by this for project managers is first how to prevent teams from not co-operating and what action could be taken if they are identified to be in such as a Grudger state? Writing rules and setting controls are two possibilities to achieve this but do not reflect the stronger and self regulating option of creating an Evolutionary and Stable strategy combined with reciprocal obligations.

One option is naturally to use a team who has a history of working successfully in a trusting environment. These could be found in organisations that use a 'strong', rather than a 'weak' matrix structure; when teams move from project to project rather than returning to their functional roles after a project is complete. The answer certainly must include creating a trusting environment in which staff can operate.

7.2.13 Analysis of scenario 1 - run 13

The highest project Payoff was achieved for run number 13. It is significant that 17 decisions were made to co-operate, the most for any run of Project Paradox. The strategies from these three teams show that the teams used a 'short term memory' strategy and did not harbour Grudges when a 'Naïve Prober' attempted to invade the run.

Teams	Decisions 1	2	3	4	5	6	7
Business	Y	Y	Y	N	Y	Y	Y
Technical	N	Y	Y	Y	N	Y	Y
User	Y	Y	Y	N	Y	Y	Y

Table 7.13 Decisions taken in scenario 1: run 13

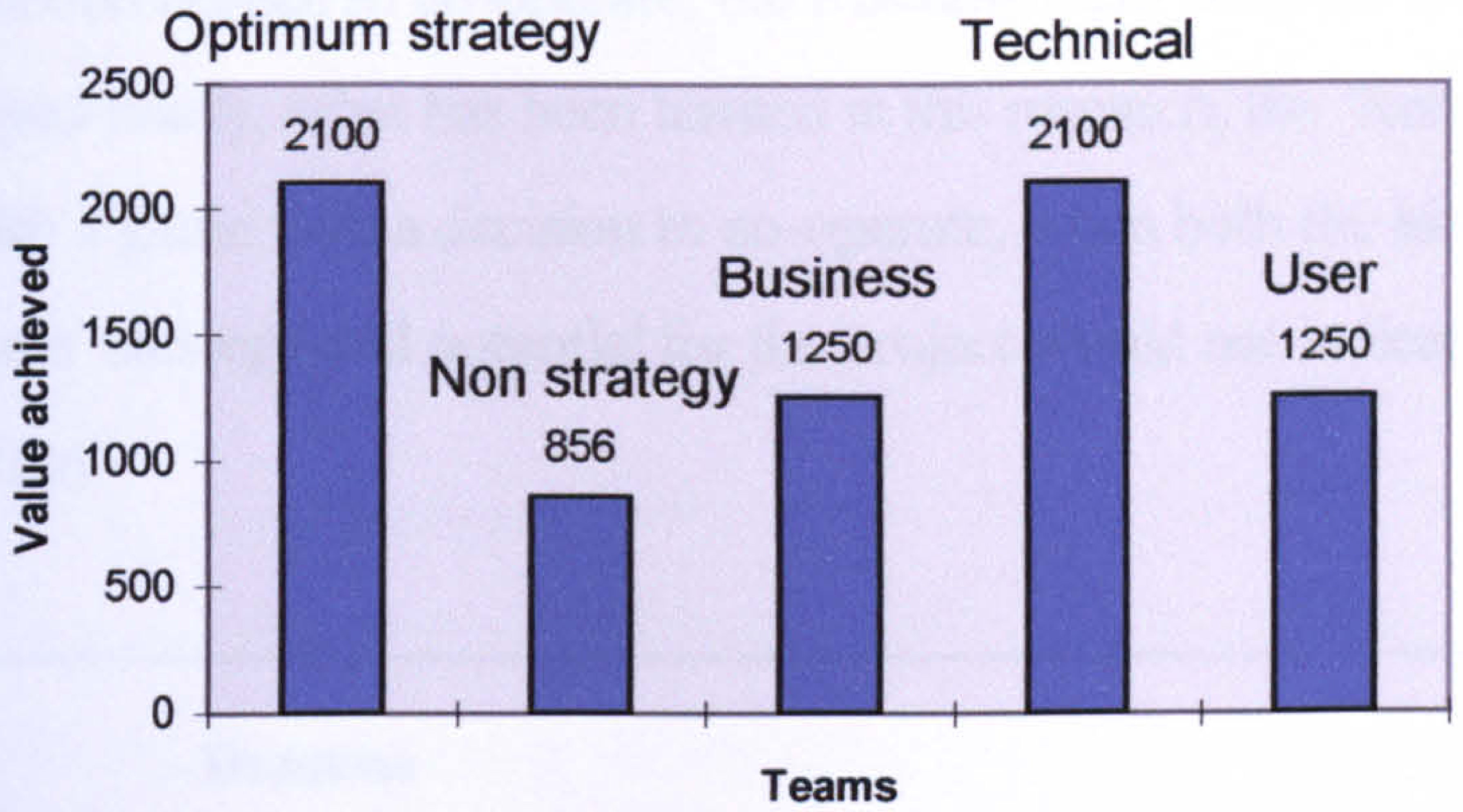


Figure 7.13 Payoffs from scenario 1: run 13

At decision one, the Technical team decided not to co-operate, but both the Business and User teams continued to co-operate at the second decision. When the Business and User teams decided not to co-operate in decision 4, the Technical team played Tit for Tat in decision 5, but returned to co-operation in the following decisions. No team played a 'Grudger' strategy and all teams played using the 'short term memory' strategy.

The Payoff results for this run supported the view that a good strategy for the project is not to automatically react or punish a team who makes a decision not to co-operate. Also the strategy of playing Tit for Tat, together with a short memory strategy, enables a return to co-operation. This strategy can also be seen to be operating at least at the second level of trust, called knowledge-based, or norm-based trust, the level of trust that does not produce a 'Grudger' strategy but is able to forgive a team who do not always co-operate. These could support an Evolutionary Stable Strategy that was discussed earlier would be a strategy conducive to achieving a positive working environment.

With live IS projects, an invasion from other teams is almost inevitable, when stakeholders at times attempt to obtain the best result for their teams, rather than focus on a project or business objective. It is possible to argue that without a single criterion focus, the 'reciprocal obligation' teams should have for each other, believed to be required to build trust, would be missing.

7.2.14 Analysis of scenario 1 - run 14

In run 14, both the Business and Technical teams started by co-operating. Without allowing a second chance to co-operate, the Business team defected for the next 4 decisions and played finally, what has been termed in this research, the 'Remorseful Finisher'. That is to finish a game with a decision to co-operate, when both the historical evidence of the other teams' strategy and potential for the project would not indicate co-operating was the best option.

Teams / Decisions	1	2	3	4	5	6	7
Business	Y	N	N	N	N	Y	Y
Technical	Y	Y	Y	Y	Y	Y	Y
User	N	N	N	N	N	N	N

Table 7.14 Decisions taken in scenario 1: run 14

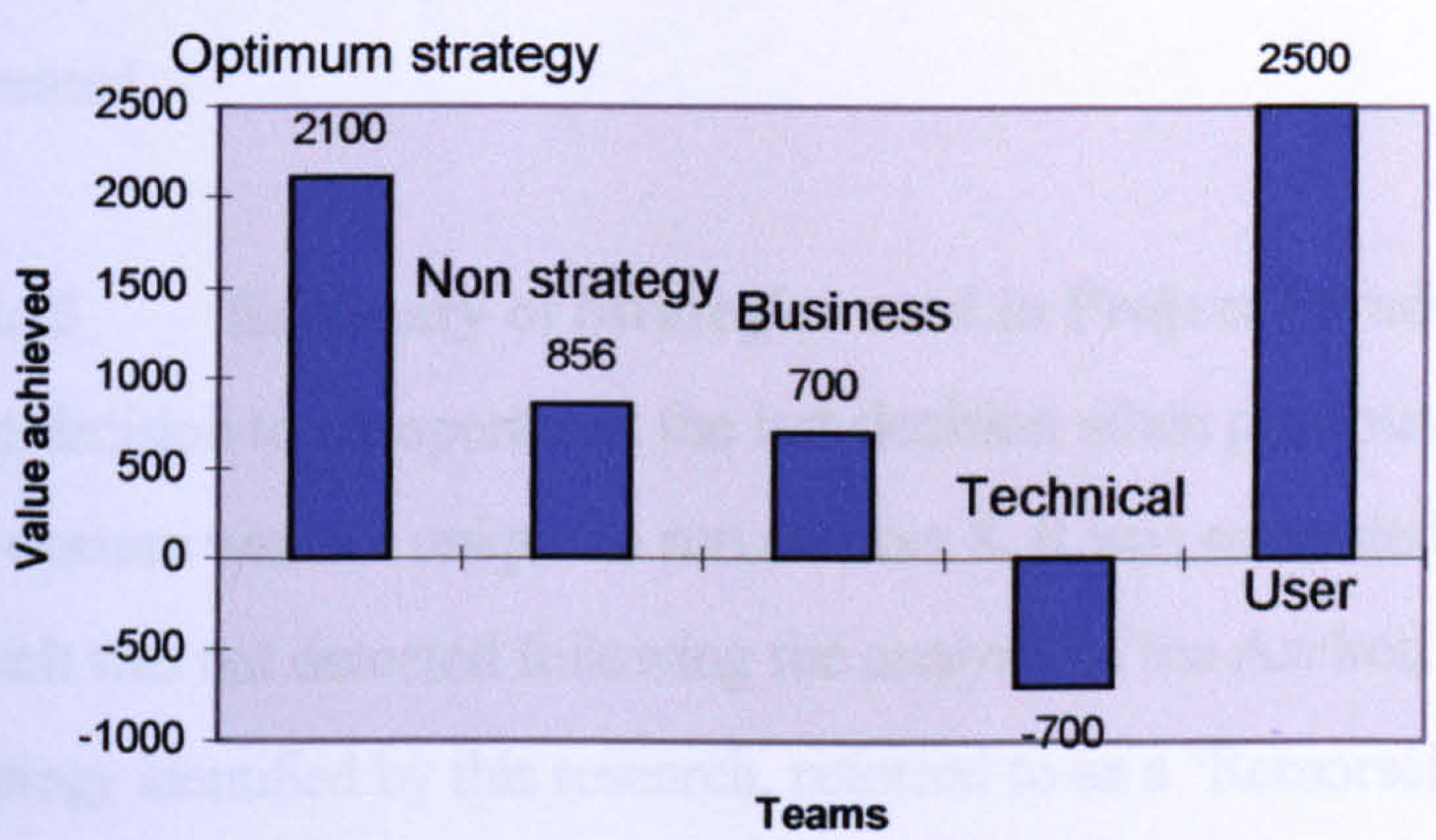


Figure 7.14 Payoffs from scenario 1: run 14

Within game 14, the Technical team played a 'Too Nice' strategy by co-operating every time, regardless of the information available from the other teams. Having played the 'Too Nice' strategy, the Technical team received the lowest value for the team, which in turn reduced the total Payoff value to the project to 2500. Ironically, a 'Too Nice' strategy has, therefore, been demonstrated to be one which teams should avoid playing. The User team on the other hand decided upon a strategy never to co-operate at any decision stage. This produced a better Payoff to the User team than a Non-strategy or the optimum strategy of total co-operation.

Clearly, the User team was able to invade the good will of the Technical team. Had the Technical team changed from their Simple strategy to a Mixed strategy or at times played a Tit for Tat strategy, the User team would have received a lower Payoff and would have had to reconsider their own strategy. The Business team started with a 'Nice' strategy to co-operate at the first decision, but changed to none co-operate for the subsequent four decisions. The Business team also played the 'Remorseful Finisher' strategy, a strategy which has earlier been argued to have no logical underpinning, other than possible regret for not co-operating earlier in the run and a wish to finish on good terms.

The unselfish 'Too Nice' strategy in run number 14 produced a project Payoff of 2500, but at a team Payoff value of -700, the lowest team result in all 14 runs. This same scenario was demonstrated in the second simulation of Project Paradox, that used 2100 randomly generated decisions to co-operate or not. If a team was prepared to play a Simple strategy and always co-operated, the result would be a reduced Payoff for the team concerned, while the Payoff to the project would be improved, but still not to the value had all teams co-operated.

7.2.15 Summary of Strategies used in Project Paradox

The decision to co-operate at the last decision when previously a team had decided not to co-operate was not unique to run number 8. It was suggested that a new strategy existed which was not detected following the analysis of the Axelrod (1984) experiment. The new strategy identified by this research, referred to as a 'Remorseful Finisher'. This type of strategy seems to have a final guilt complex, and decides to co-operate, when it is too late and often of no benefit to a project. Other teams who finished a run of Project Paradox with a Remorseful Finisher decision to co-operate having previously not co-operated were:

Business: run 2,
Technical and Business: run 4,
Business: run 5,
Technical: run 6,
Technical: run 10,
Technical: run 12
and
Business: run 14.

In 50% of the runs of Project Paradox, the teams played a Remorseful Finisher strategy. The reasons why these decisions took place are not clear and there may not have been only one reason why such a strategy was used. It is interesting to note that as the final decisions of Project Paradox approached, 50% of the teams appeared to finish with a 'positive' decision to co-operate, even though that decision was not taken from a rational economic standpoint, despite some previous decisions having been taken for that reason.

In Chapter 5 the strategies were identified from the analysis of the Axelrod (1984) experiment which were used in the decision making for a Prisoner's Dilemma game. During this Chapter, the different strategies used in the 14 runs of Project Paradox were discussed. Table 7.15 provides a summary of the strategies used in the 14 runs of scenario one of Project Paradox which, other than the Remorseful Finisher were also used in the Axelrod (1984) experiment.

Too Nice:	This strategy will be to co-operate, irrespective of the strategy of other teams and consequently is an easy strategy to invade.
Tit for Tat:	The first decision of this strategy is to co-operate, demonstrating that they were not intending to achieve self interest, and that they trusted the other teams started from the same position. However, the Tit for Tat strategy mirrors the previous decision taken by the other teams making it a difficult strategy to invade.
Tit for 2 Tats:	This strategy also starts by co-operating, but will allow the other teams to not co-operate twice, before they begin to mirror the actions of the other teams. It is a tolerant and forgiving strategy and the one identified by Axelrod (1984) as the strongest.
Prober:	A team playing the Prober strategy elect not to co-operate for a single decision, in an attempt to obtain a higher Payoff, but immediately return to co-operate.
Short term:	This strategy includes the ability to forgive, if another team, such as Prober have not co-operated. This strategy indicates a teams members operating at the second level of trust, (knowledge or norm based trust).
Grudger:	With this strategy, when trust is broken by a team by not co-operating, a Grudger strategy will not co-operate any further within a game. This demonstrates there is no forgiveness with this strategy indicating the lowest level of trust (calculus) is in operation. If two teams played a Grudger strategy, it would result in mutual none co-operation, which Munns (1995) described would develop a spiral of distrust.
Remorseful Finisher:	This is the strategy identified within this research. It was observed to be taking place after a teams' had secured a victory by first of all operating a strategy of none co-operation, but then changing to a co-operate strategy for the final decision of Project Paradox. The comments from the participants indicated that they were embarrassed or ashamed of their selfish actions of winning by not co-operating and wanted the game to end on a friendly basis.

Table 7.15 Strategies used during scenario 1

7.3 Analysis of the Overall Results for Scenario 1

The results of the fourteen runs from scenario one are consolidated in Table 7.16. Using the results from run number one as an example. The value in column 2 represents the total number of decisions made to co-operate, eleven in all. Similarly the values in column 3 gives the total number of decisions not to co-operate. There were ten decisions made by the players not to co-operate, which indicated that they either did not trust the other teams or had acted selfishly indicating the lowest (calculus) level of trust was in operation.

Columns four, five and six, each present the total Payoff values for the three teams, based upon the value of decisions taken during the runs. Column seven shows the Payoff the project received based upon the decisions the teams made. The players of Project Paradox were told that the value to be attributed to the 'project' would be the combined totals of the scores or Payoffs that the three teams obtained. The value to the Project being the result obtained after all the 294 decisions were taken.

Run	Decision to co-operate (total)	Decision to not co-operate (total)	Business value	Technical value	User value	Value to the project
1	11	10	1750	-500	1750	3000
2	12	9	2200	750	50	3000
3	5	16	60	760	760	1580
4	9	12	-520	-170	2230	1540
5	4	17	-80	970	620	1510
6	11	10	850	600	950	2400
7	6	15	770	270	270	1310
8	4	17	260	360	360	980
9	4	17	970	-430	970	1510
10	6	15	670	320	1020	2010
11	11	10	1090	-210	1690	2570
12	14	7	1400	1050	1050	3400
13	17	4	1250	2100	1250	4600
14	10	11	700	-700	2500	2500
	124	170				

Table 7.16 Results from scenario 1

7.3.1 Payoff Value of Project Paradox from the Project Perspective

The key results from scenario 1 indicate some differences in the results compared to those obtained from the Axelrod (1984) experiment. For example, in the Axelrod (1984) experiment, the lowest score was achieved when using a Non-strategy, i.e. every other strategy beat the None strategy. However, from the runs within scenario 1, it can be seen in Figure 7.15 that only 19 from 42 individual teams, (45%), beat the score of 856 created when the Non-strategy was simulated. In addition, only 4 teams (9.5%) achieved a value equal to or better than the optimum value for the teams (2100). Figure 7.15 presents the results of 42 team decisions, obtained from 14 (runs) x 3 (teams).

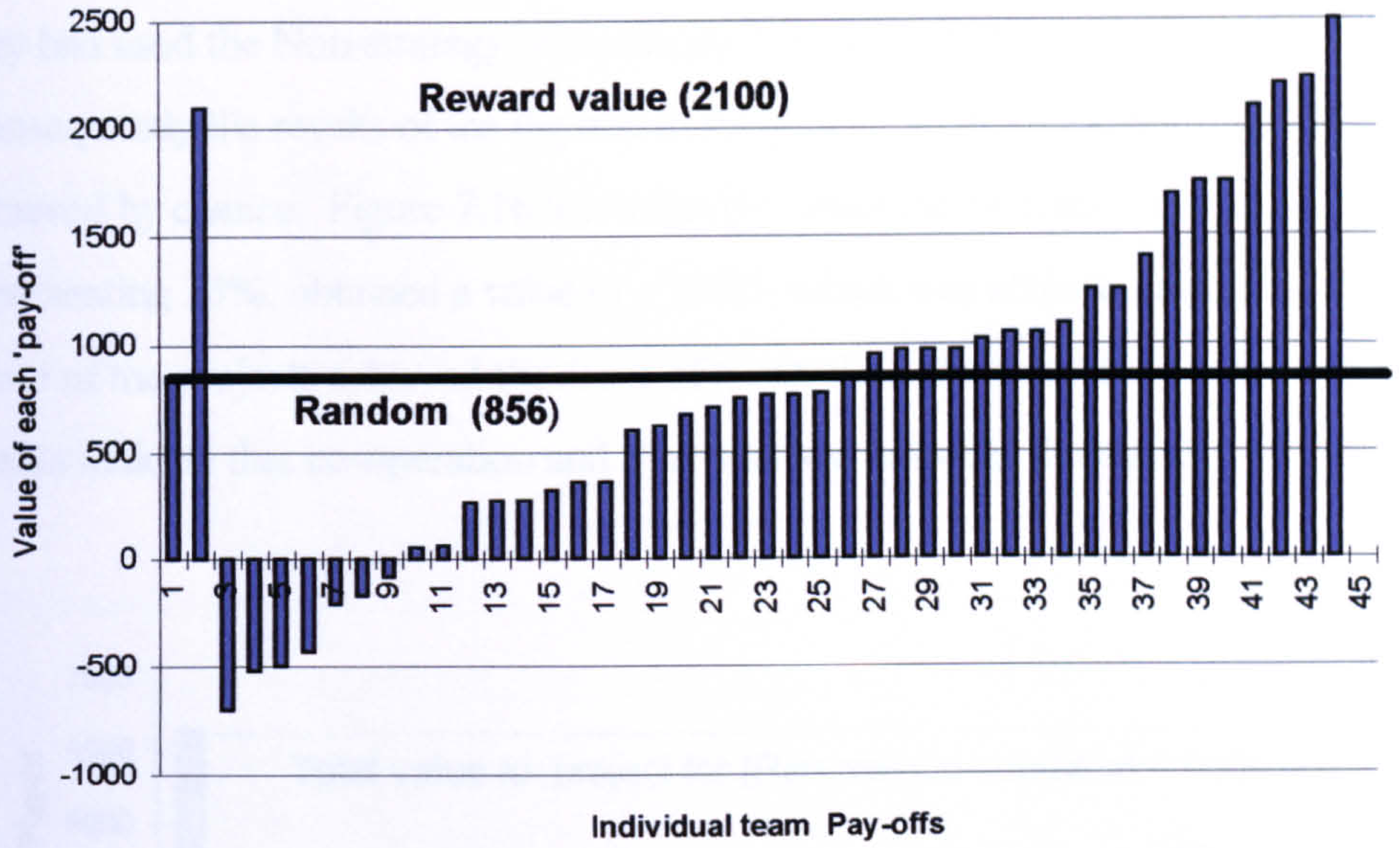


Figure 7.15 Payoff for the Teams compared with a Non-strategy

The Payoffs to the project if the teams randomly decided to co-operate or not co-operate were presented in Chapter 6. These are brought forward to facilitate the discussions of the runs:

3 (number of teams) x 856 (random Payoff) = 2568.

This is the Payoff to a project when teams used a Non-strategy. Only 5 runs had a Payoff equal to or greater than 2568. This indicates that 68% of the Payoffs to the project was worse than if decisions were taken randomly. This again is a concern. Project teams could be argued to be either not trusting other teams which leads them not to co-operate, or teams may have decided from a point of self interest, not to co-operate. Had the teams played a Simple strategy of full co-operation they would have received a Payoff of 300 for each decision. For more than 50% of the decisions taken, the teams were not prepared to trust the teams in the same project or were operating out of self-interest which indicates that they were operating at the lowest level of trust, calculus. As mentioned earlier, some of the reasons why teams did not co-operate and trust each other were collected as comments and statements from the teams as they played Project Paradox, these are presented and discussed in Table 7.17.

In an attempt to behave in an opportunistic way, the teams achieved scores lower than if they had used the Non-strategy of randomly deciding whether to co-operate or not. Consequently the results of the Payoffs to the project were also lower than the value achieved by chance. Figure 7.16 illustrates that from the 14 runs in scenario 1, only 5 runs, representing 35%, obtained a value of (2568), which was achieved using the Non-strategy. None of the projects achieved the score of 6300, the optimum value for the project. These results indicate that co-operation and trust was low between the teams.

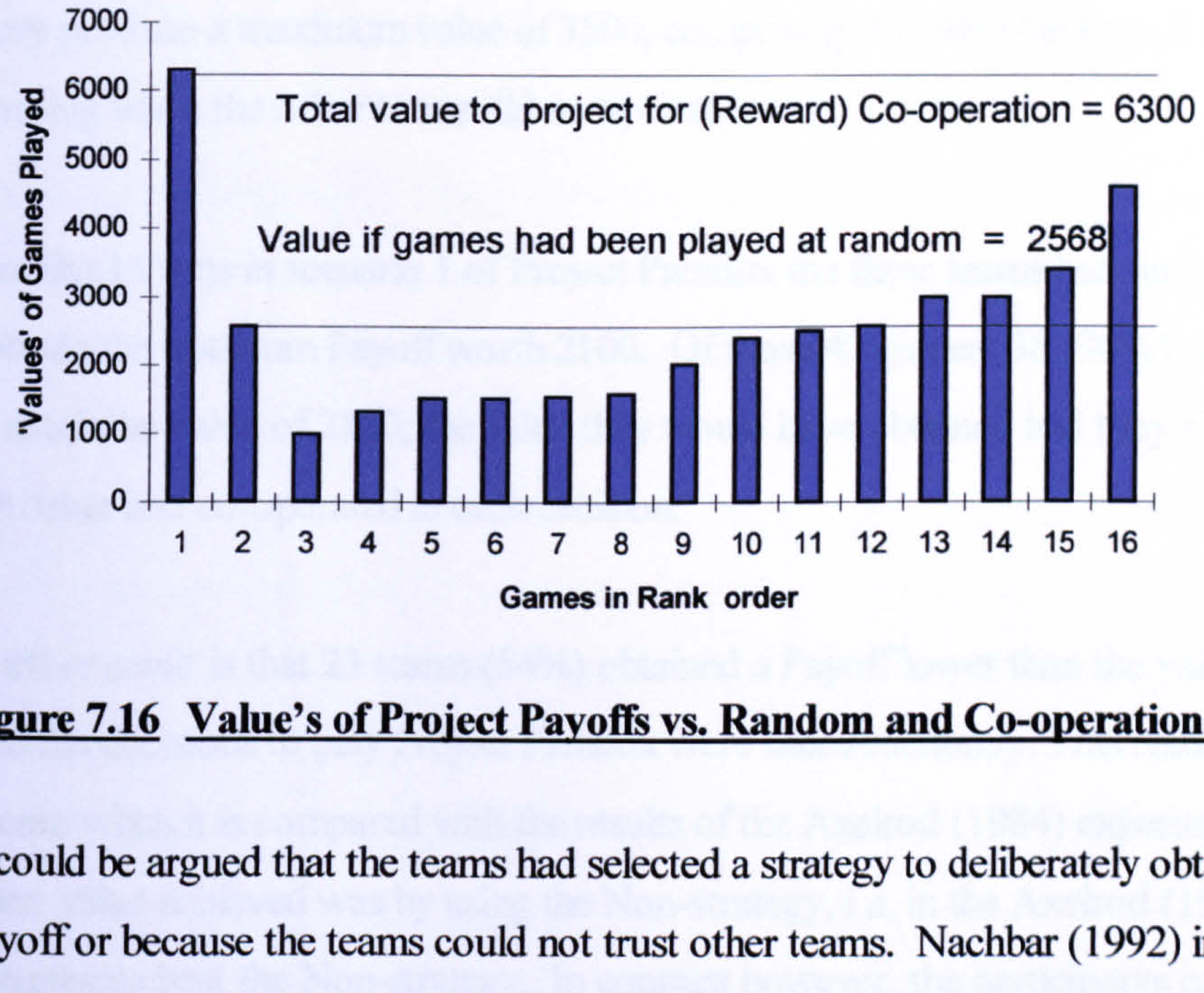


Figure 7.16 Value's of Project Payoffs vs. Random and Co-operation Strategies

It could be argued that the teams had selected a strategy to deliberately obtain a higher Payoff or because the teams could not trust other teams. Nachbar (1992) indicated that the results for a game such as Project Paradox could be expected to be lower than those achieved for a 'true' Prisoner's Dilemma. This was because Project Paradox is an example of a non-zero sum, finitely repeated adaptation of the Prisoner's Dilemma. Teams knew they had more than one but not an infinite number of decisions that they could use to catch up later in the game if needed. Alternatively, the teams could have used the Backward Induction Argument (Hardin 2002) and decided that although there were 7 decisions to be made, the logic for the first decision would the same as for the last, i.e. to not co-operate. This is a possible reason why the User team in the 14th run and the Technical team in the 8th run never co-operated.

A collective decision not to co-operate would have resulted in a Payoff value of -10. Teams could predict that, should they not co-operate, the other team may decide to play a Tit for Tat strategy at the next decision and not co-operate. The long term potential for a team using a strategy to not to co-operate would be likely to result in a spiral of distrust where the final Payoff value was low. When the players decided to attempt to obtain a higher Payoff they did so knowing that the other players were likely to lose trust at the next decision. It could be further argued that most teams were at some point trying to beat the other teams and obtain a higher final Payoff. Once again the long term options should have prevented this strategy from taking place.

Each complete run of Project Paradox required that 7 decisions were taken. A team could in theory produce a maximum value of 3500, comprising 7 x 500 (the Payoff for not co-operating when the other teams did co-operate).

From the 14 runs in scenario 1 of Project Paradox the three teams had, in total, 42 attempts to obtain the optimum Payoff worth 2100. Of those 42 games, 38 (90%) of the teams did not reach the value of 2100, the value they would have obtained had they simply trusted each other and co-operated in each decision.

A further result is that 23 teams (54%) obtained a Payoff lower than the value obtained when the decisions to play Project Paradox were taken randomly. This result is also a concern when it is compared with the results of the Axelrod (1984) experiment where the lowest value achieved was by using the Non-strategy, i.e. in the Axelrod (1984) experiment all strategies beat the Non-strategy. In contrast however, the participants of Project Paradox had produced a result where 54% of the Payoff values were lower than if the members of the teams had played a Non-strategy.

The question is why did the teams produce such poor results, with 55% using a strategy that did not even produce a result achievable had they taken their decisions to co-operate randomly? The indications from the analysis point to the teams using a range of strategies that demonstrated they did not trust each other and were operating at the lowest level of trust (calculus). For example, by starting with a Nasty strategy of none co-operation, or by playing the Prober strategy to increase their points, or the Grudger strategy that indicated all hope of co-operation from at least one team was lost and irretrievable.

7.3.2 Comments from Team Members

During the running of scenario 1, comments made by the teams were recorded from each of the 14 runs. The author collected the comments at random. No decision was made to record any particular team. The data could, therefore, be argued to be a random sample of what was being discussed by the teams. In addition, the teams were not aware their comments were being recorded. Alternative data analysis methods could have been adopted to interpret the meaning of those statements. For example, Easterby-Smith et al (1994) discussed some differences between 'Content analysis' and 'Grounded theory'. Content analysis was considered to be more appropriate for deductive and object research data. However, Easterby-Smith et al (1994) explained that a weakness of content analysis was assumed that if '... something had been mentioned, it had happened, if it was not mentioned then it had not happened'. This assumption could produce some bias in the interpretation between what had happened and what had been recorded as having happened. On the other hand, grounded theory was considered to operate best with '... large amounts of none standard data'. The 150 comments recorded during scenario 1, although collected at random, were not a 'large amount'. It was clear that both analysis methods had their benefits and weaknesses but that the most appropriate method to analyse the comments recorded from the teams was via content analysis, while accepting a limitation of the method as discussed above. Table 7.17 contains 14 of the comments from the total of 150, one example being taken from each of the 14 runs.

When these were analysed, it was found that every team, in all 14 runs, at some time had discussed the subject of trust and how it was influencing the decisions being taken. Recall that Project Paradox was designed as a covert placebo simulation, where the teams were taking decisions about whether to co-operate. The rubric had no mention of trust, neither was trust discussed before the runs took place, yet every team mentioned trust in their unsolicited comments. These identify that at some point the teams considered that trust was an influencing factor during all 14 runs in scenario 1.

Run.	Comment.
1.	There is stabbing in the back going on.
2.	We don't trust you anymore.
3.	You can't trust people.
4.	Are we trusting each other?
5.	You were too trusting.
6.	Dog eat dog world.
7.	I knew something was wrong when you would not complete the sheet.
8.	What we will do is lead them to believe we will co-operate and then stitch them up in the last phase.
9.	Imagine that lot, we came to a business decision but you let us down, we tried trust, it did not work.
10.	When trust is broken, move staff.
11.	We don't believe them.
12.	Why is there no trust?
13.	It was not a mistake not to co-operate.
14.	At the last decision the Business and Users went against me, so I have changed because you changed your mind.

Table 7.17 Comments recorded during scenario 1

7.3.3 Tests of Significance for Scenario 1

The aim of scenario 1 was to test whether the teams would have a propensity to co-operate no worse than had been achieved with a Non-strategy. To test this, the results were entered into chi squared. The null hypothesis was:

Ho = There is no difference between the co-operation in scenario 1 and the figures obtained using a Non-strategy (random decisions).

Ha = That Ho is incorrect

The formula for Chi-squared = E $(Fo-Fe)^2$ /Fe

The expected results Fe when teams co-operated would be for 50% i.e. 10.5 decisions would be to co-operate i.e. Fe = 10.5

With 14 classes of data giving 13 degrees of freedom at a 5% confidence level, chi-squared must be less than or equal to 22.36 to accept Ho. The calculation is given in Table 7.18

Fo	Fe	Fo-Fe	$(Fo-Fe)^2$	$(Fo-Fe)^2/Fe$
10	10.5	-0.5	0.25	0.02
9	10.5	-1.5	2.25	0.21
16	10.5	5.5	30.25	2.88
12	10.5	1.5	2.25	0.21
17	10.5	6.5	42.25	4.02
10	10.5	-0.5	0.25	0.02
15	10.5	4.5	20.25	1.92
17	10.5	6.5	42.25	4.02
17	10.5	6.5	42.25	4.02
15	10.5	4.5	20.25	1.92
10	10.5	0.5	0.25	0.02
7	10.5	-2.5	6.25	0.59
4	10.5	-5.5	30.25	2.88
11	10.5	0.5	0.25	0.02
			Total	22.75

Table 7.18 Scenario 1 vs. Non-Strategy

The value required to accept Ho was 22.36 or less. The result was therefore, to reject the Ho. The statistical test has identified that with Fo = 50% it was with more than 95% probability that the difference in the results were not achieved by chance. Rejecting the null hypothesis means that something else other than chance had caused the difference between the two results. The variables were minimised during the running of the games. The conclusion that can be drawn is that the players of Project Paradox had decided not to co-operate with the other teams. Had they done so they would at least have achieved the value that had been obtained by chance. The results from the Axelrod (1984) experiments indicated that the Prisoner's Dilemma was a non-zero sum game and the players could trust each other and co-operate. Alternatively they could use the rational choice model and attempt to benefit more than the other teams by taking advantage of them when they were vulnerable.

7.4 Analysis of the Overall Results from Scenario 2

In scenario 2, the 14 additional runs were operated as within scenario 1 with one exception; the orientation of the runs in scenario 2 allowed the teams access to unrestricted communications and negotiations before and during all of their decisions. The questions are, would the teams in scenario 2 co-operate more than in scenario 1? and would the possibility of self interest still limit the amount of trust displayed by the teams? The results of scenario 2 are presented next in Table 7.19.

Game	Decision to co-operate (total)	Decision to not co-operate (total)	Business	Technical	User	Game
1	9	12	-120	58	1780	1718
2	17	4	1100	1700	1100	3900
3	18	3	2700	900	700	4500
4	10	11	400	1450	1350	4200
5	11	10	490	1340	740	2570
6	7	14	320	670	920	1910
7	20	1	1700	1700	2300	5700
8	3	18	-250	700	100	550
9	9	12	840	1440	490	2770
10	6	15	1130	180	430	1740
11	10	11	830	480	830	2140
12	9	12	580	820	830	2240
13	5	16	620	170	620	1410
14	10	11	1290	940	-260	1970
	144	150				

Table 7.19 Project Paradox Results scenario 2

Scenario 2, used a further 14 runs of Project Paradox, which simulated a distributed project team. The teams could talk to each other or pass written notes, but the teams were not face to face, reflecting the environment of a distributed project team. Having provided a detailed summary of each strategy for the 14 runs in scenario 1, to avoid repetition, only the overall results will be presented from scenario 2. In scenario 2, the number of decisions to co-operate increased compared to scenario 1, as can be seen in Figures 7.17 and 7.18. Also there was a slight improvement from 35% to 42% in the number of runs that achieved the value compared to using the Non-strategy.

For scenario 1 more than half the decisions (58%) made by the project teams were not to co-operate, 170 decisions from a total of 294. The co-operation level between teams improved in scenario 2 as can be seen Figure 7.18.

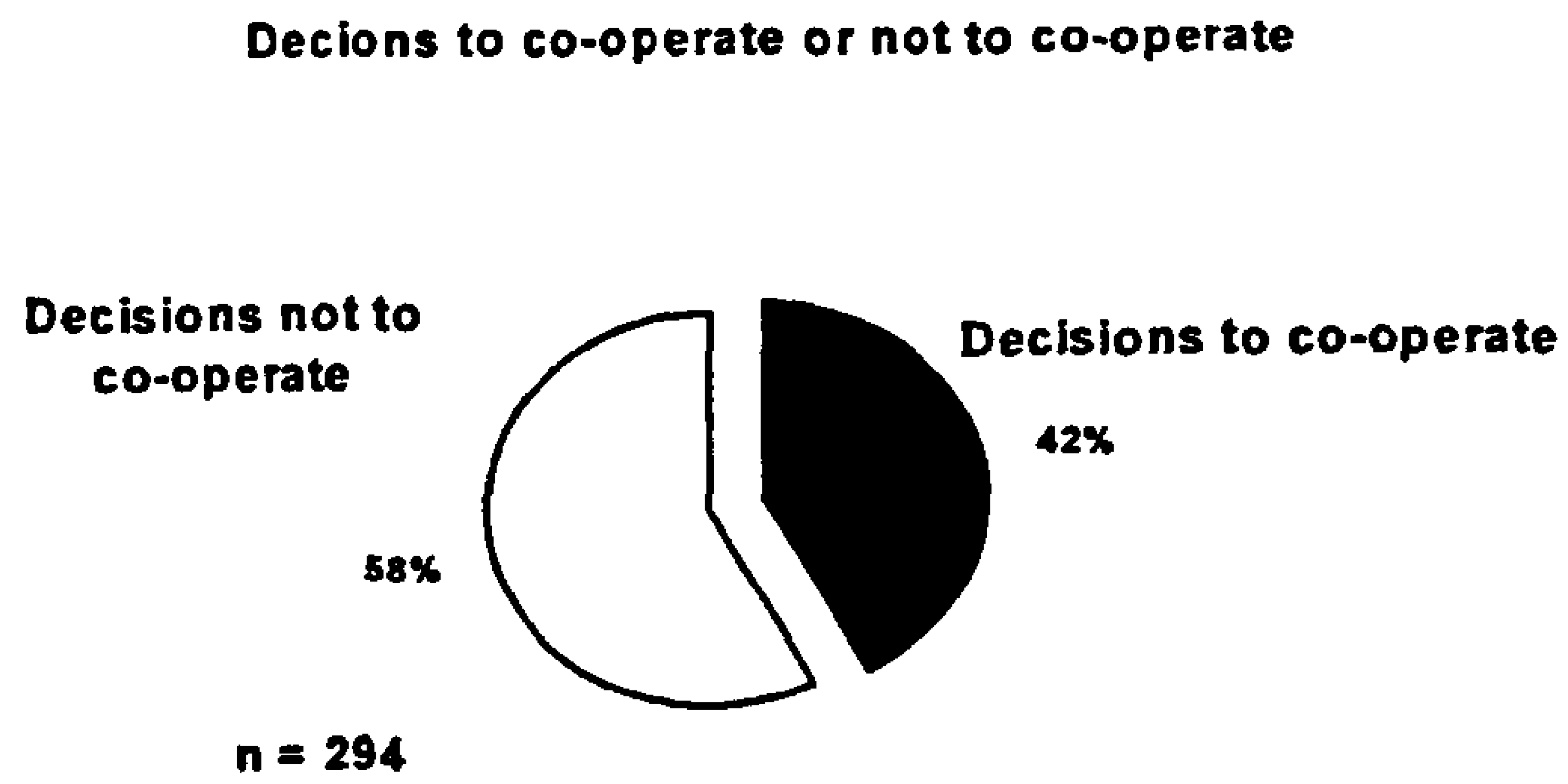


Figure 7.17 Decisions to Co-operate or not Co-operate for scenario 1

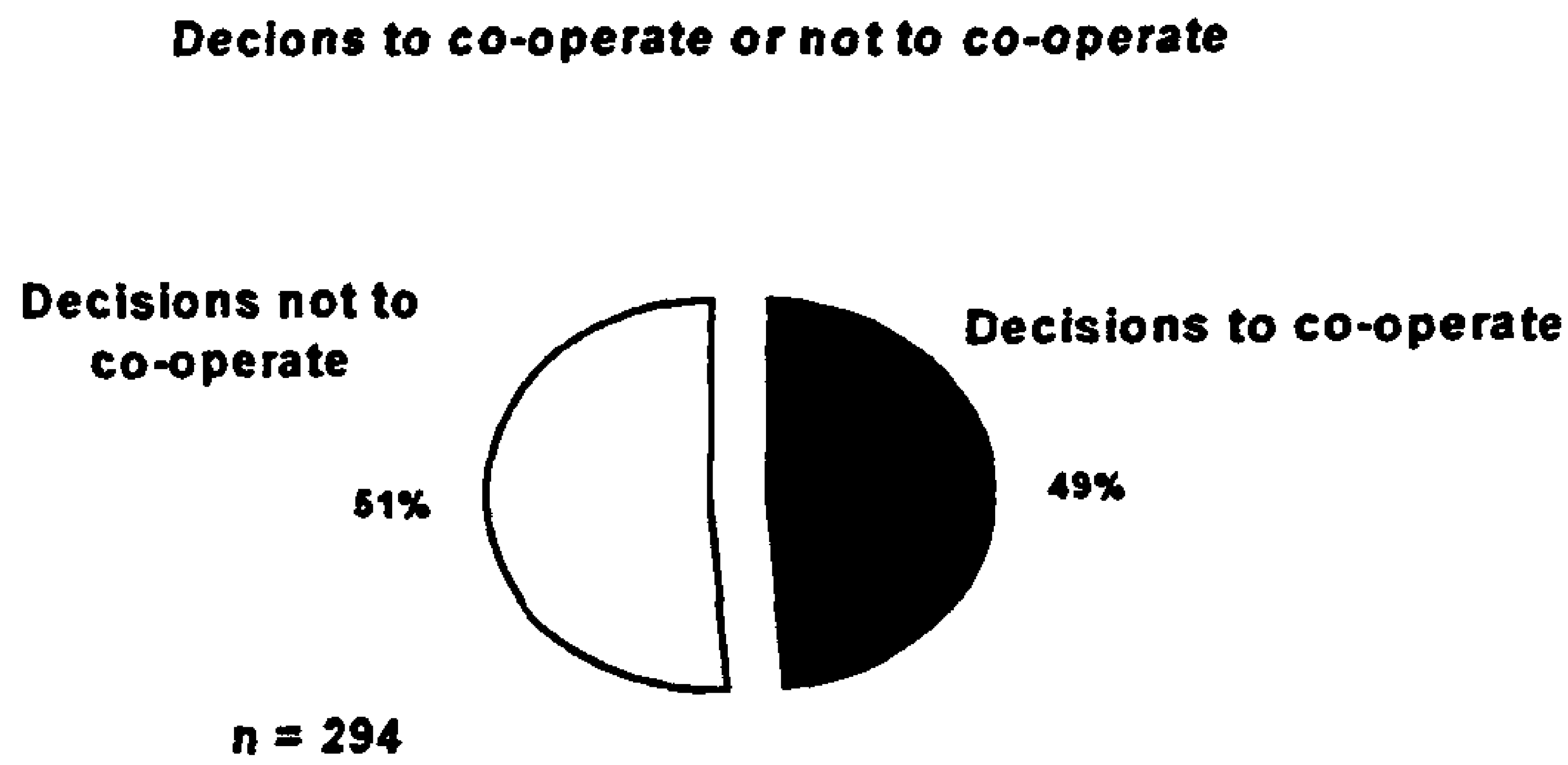


Figure 7.18 Decisions to Co-operate or not Co-operate for scenario 2

As with scenario 1, a test was conducted to the results from scenario 2 to identify whether they were significantly different to those obtained using the Non-strategy. Table 7.20 presents the statistical test of the data obtained from scenario 2. The hypothesis was the same as for scenario 1, that:

Ho = There is no difference between the co-operation in scenario 2 and the figures obtained using a Non-strategy (random decisions). In these figures the expected results are again He = 50% of the decisions were to co-operate = 10.5.

Fo	Fe	Fo-Fe	$(Fo-Fe)^2$	$(Fo-Fe)^2/Fe$
12	10.5	1.5	2.25	0.21
4	10.5	-6.5	42.25	4.02
3	10.5	-7.5	56.25	5.35
11	10.5	0.5	0.25	0.02
10	10.5	-0.5	0.25	0.02
14	10.5	3.5	12.25	1.16
1	10.5	-9.5	90.25	8.59
18	10.5	7.5	56.25	5.35
12	10.5	1.5	2.25	0.21
15	10.5	4.5	20.25	1.02
11	10.5	0.5	0.25	0.02
12	10.5	1.5	2.25	0.21
16	10.5	5.5	20.25	2.88
11	10.5	0.5	0.25	0.02
			Total	29.98

Table 7.20 Results from scenario 2

The value required to accept Ho was 22.36 or less. The result therefore was to reject the Ho. With the second set of results, the value of chi-squared indicated with 99% probability that the results were significantly different from those achieved by chance. Communication between the players in scenario 2 had produced more co-operation than in the first scenario. The second scenario provided the validation for the first, and at the same time indicated that the teams did not trust the players from other teams. The teams were using opportunistic decision making to improve their personal gain rather than co-operating to achieve a successful project. The level of trust that was under test was 'calculus' a lower level than 'knowledge-based' or 'identification-based' trust.

A third test of significance was undertaken to see if the results from in scenario 1 were significantly different from those for scenario 2, or whether chance could have produce the differences

Chi-squared was used with the hypothesis: there would be no difference in the results from scenario 1 and scenario 2. For this test the expected results (He) were taken from the scenario 1 results. Table 7.21 presents the results of the comparison between scenario 1 and scenario 2.

Fo	Fe	Fo-Fe	$(Fo-Fe)^2$	$(Fo-Fe)^2/Fe$
12	10	2	4	0.4
4	9	-5	25	2.77
3	16	-13	169	10.56
11	12	-1	1	0.08
10	17	-7	49	2.88
14	10	4	16	1.6
1	15	-14	196	13.06
18	17	1	1	0.05
12	17	-5	25	1.47
15	15	0	0	0
11	10	1	1	0.1
12	7	5	25	3.57
16	4	12	144	36
11	11	0	0	0
			Total	72.54

Table 7.21 Scenario 1 vs. scenario 2

The value required to accept Ho was 22.36 or less. The result obtained was 72.54 and the decision was to reject the Ho. The result indicated that with more than 99% probability that something other than chance had created a difference between the outputs from scenarios 1 and 2. The rubric was held constant for scenarios 1 and scenario 2. However, in scenario1 communication was limited between the teams while in scenario 2, teams had the opportunity of unlimited communications.

The use of communication had been identified as a success factor for IS projects in stage 1 of this research and by other researchers such as Gallagher (1995) and Wateridge (1996). These results support the claim that communication can improve co-operation and trust between teams and by implication improving the success chances of projects. However, there is an overriding proviso that communication will not always prevent teams from acting in an opportunistic way and using self interest when they could personally benefit from using such a strategy. In addition to improved communications, it is also suggested that a non-zero sum project environment would enable a more focused team approach. This would prevent conflicting targets being used that encourage teams to act in a way to benefit them personally, rather than the project.

Another approach used to analyse the results was to investigate whether the teams were more likely to trust other teams and co-operate, over time. That is to say, did the teams tend to co-operate more at the start of a run of Project Paradox, just after the run had started, or as the end of the run approached? In addition to the tests of significance, it was possible to observe how the levels of co-operation, over time, from scenario 1 and scenario 2 differed. Figures 7.19 and 7.20 demonstrate the levels of co-operation over the seven decision points for the 14 runs of scenarios 1 and 2. The total number of decisions for each scenario was: 3 (number of teams) x 7 (number of decisions) x 14 (number of iterations) = 294.

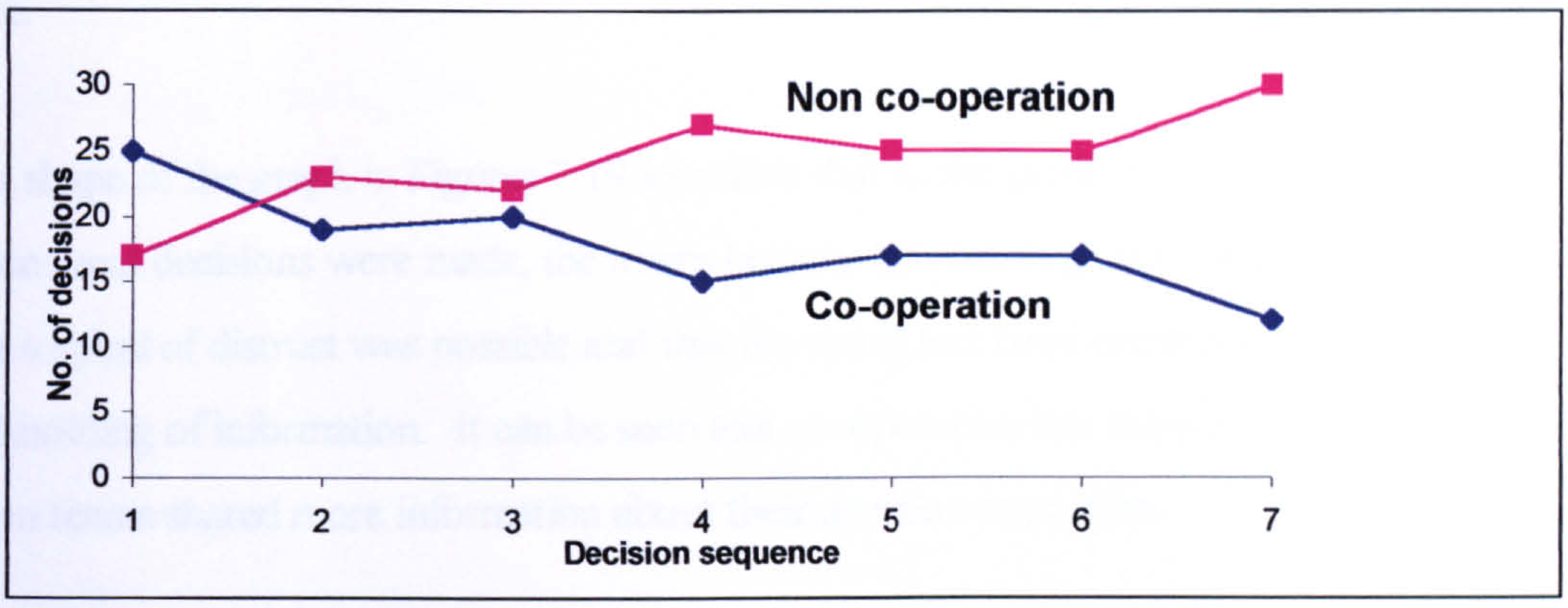


Figure 7.19 Scenario 1: Decisions to Trust and Co-operate over Time

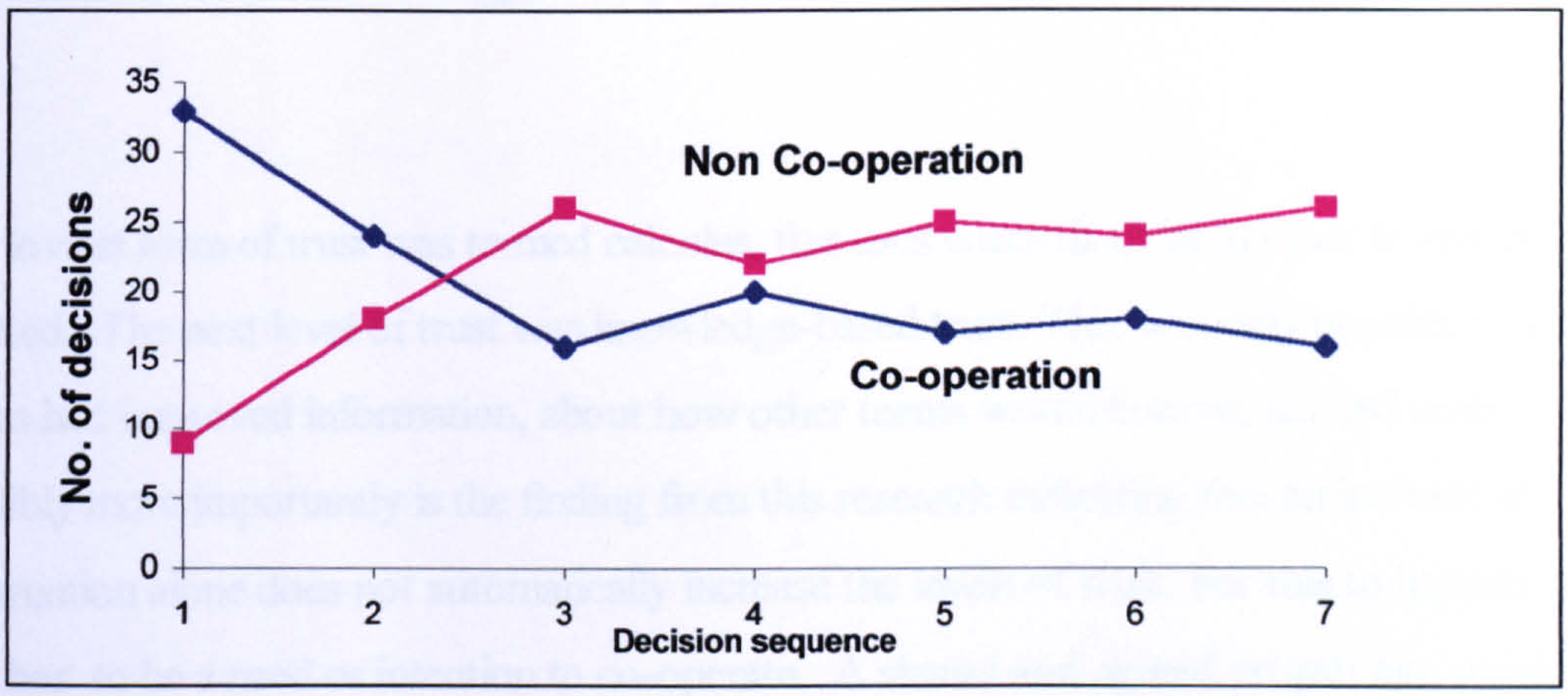


Figure 7.20 Scenario 2: Decisions to Trust and Co-operate over Time

It can be seen from Figure 7.19 that as Project Paradox progressed through the decision stages, the teams made decisions to co-operate less. In both scenarios, co-operation was higher at the first decision. However, as can be seen from the shape of the graphs, the level of decay in scenario 1 was significantly greater than in scenario 2. The amount of information obtained through communication was the controlled difference between the two scenarios. The limited information in scenario 1 required a greater dependency on teams to trust other teams, which they demonstrated they were not prepared to do. This may be because the teams had no time to build trusting relationships. Scenario 2 resulted with a higher exit level of co-operation and in total, more decisions to co-operate than in scenario 1.

However, even when there was unrestricted information to enable co-operation to take place, the results demonstrated that the teams were not operating at the higher levels of trust.

The shape of the graph in Figures 7.19 identifies that as the project stages progressed and subsequent decisions were made, the teams became less trusting. In Figure 5.2 it was shown that a spiral of distrust was possible and that the spiral had been created due to the withholding of information. It can be seen that co-operation has improved in scenario 2 when teams shared more information about their decision strategies.

These results can be compared with the three types of trust; calculus, knowledge-based and identification-based trust as suggested by Tyler and Kramer (1996) as described in Chapter 5.

The lowest form of trust was termed calculus, this uses controls to be in place to ensure it worked. The next level of trust was knowledge-based trust. This was only possible when teams had improved information, about how other teams would behave, act and react. Possibly more importantly is the finding from this research indicating that an increase in information alone does not automatically increase the levels of trust. For this to happen there also has to be a need or intention to co-operate. A shared and agreed project aim would facilitate the development of an IS project organisation that operates at a higher level of trust. Knowledge-based trust also contained a degree of forgiveness.

Identification-based trust is the highest level of trust. At this level of trust, teams could become the agents for other teams, again through a shared understanding and vision of objectives.

7.5 Discussion and Summary

If the teams do not trust each other, or the level of trust is at the lowest level (calculus), communication may be dysfunctional, with dis-information being used. But improved communications, it could be argued, is a vehicle that can help move trust from the lowest level to the next level where there is a degree of forgiveness.

A lack of trust could therefore be considered to be a critical failure factor. One that (it was argued in Chapter 4) must be in place to produce an environment where the critical success factors, such as Planning, Commitment and Communications were able to have a better chance of supporting a project, to become successful.

When Project Paradox was played, the teams could have adopted a strategy to co-operate. This would have required a high level of social trust, because the teams were vulnerable to the actions of other teams. Alternatively, the teams could have used a strategy to represent self interest for the teams, not the project. This was achieved by not co-operating and attempted to obtain an improved Payoff for the teams. If the teams decided upon this strategy they were signalling they were operating at the lowest level of trust, called calculus.

The Payoffs of the 14 runs from the first scenario were presented in Table 7.16 indicating low levels of trust and high levels of team decisions not co-operating as they used a strategy of self interest. The 14 runs from scenario 1 were discussed and analysed in relation to the strategies they had used. Some of the strategies identified in the (Axelrod 1984) experiment were found to have taken place in scenario 1, indicating low levels of trust were in operation.

In addition to these strategies being used a new strategy was identified in this research; this was termed the 'Remorseful Finisher' and was found to be used by teams who had beaten other teams but then decided to co-operate, appearing to be concerned for having not co-operated earlier. The analysis of the random comments recorded from the teams in scenario 1 demonstrate that at some point during all 14 runs the teams believed the lack of trust between the teams prevented higher scores from being achieved.

The results obtained from the first scenario were compared with the results of a Non-strategy. A test of statistical significance was undertaken, this identified with 95% confidence that the population for the Non-strategy was different from that used in scenario 1. Similar tests were conducted using the output obtained from scenario 2. Those tests identified that the results obtained from scenario 2 were from a different population than both the simulated Non-strategy and those from scenario 1.

Figure 7.19 demonstrated that in 14 runs of scenario 1, co-operation reduced over the life of the 7 decisions indicating a decay of trust had taken place. Figure 7.20 identified that for scenario 2, there had also been a decay of trust over the 7 decisions, but at a lower rate than that for scenario 1. An argument was developed that the difference in the running of scenarios 1 and 2 had produced a shift in trust. Scenario 1 represented a co-located project team using limited information obtained using face to face communications. Scenario 2 on the other hand represented distributed project teams who had unrestricted communications to build improved information, but not through face to face contact.

The results from both scenarios 1 and 2 indicated that when teams were placed in a position where rational choice could be used, they were not able to trust the other teams. The overall results demonstrating that the majority of the teams would have achieved a better score had they simply played a Non-strategy, and decided to co-operate at random.

In the Axelrod (1984) study, the summary advice to those in a Prisoner's Dilemma environment was as give in italics, the ramifications to the Project Paradox results are presented next to these:

1. *Don't be envious.* In a non-zero sum game, such as Project Paradox the ideal advice for players is not to use the relative gains of the others players as a point of reference to judge how well they are doing. Axelrod (1984) also played his experiment with student teams. He found that the students at some point would compare their current winnings with those of the other teams. This invariably led to one or other team to be envious of the higher points the other team had achieved. This was followed by a team not co-operating and trying to beat the other team. In the Project Paradox runs, although it is a non-zero sum game, extra conflict was introduced where the team with the highest points

would receive the performance pay, subject to the project having achieved the target points. So by the very nature of the performance pay, the teams would want to know where they stood in relation to the other teams and possibly wish to increase their points. This was the very condition (and paradox) under test within this research i.e. would the teams attempt to achieve personal benefit, that is, to make a rational economic choice and demonstrate the lowest level of trust. Or, would teams act on behalf of the project and demonstrate that a higher order of social or fiduciary trust was driving the project teams decision making? The results indicate teams playing Project Paradox were using calculus, the lowest level of trust. Teams who reproduce this level of trust in live projects and fail to co-operate with each other could be responsible for some of the failures in IS projects because this behaviour will overarch all other success factors. The accuracy of estimates or the precision of the planning and schedules will be negated if teams simply cannot co-operate. It is suggested that the risk induced by none co-operative project teams caused by a lack of trust is a primary critical success factor for project managers to consider.

Other recommendations were:

2. *Don't be the first to defect.* By this, what is being recommended is to play a 'Nice' strategy by co-operating at the first stage. Teams should be encouraged to do this by having a project environment that encourages and supports higher levels of trust.

3. *Reciprocate both co-operation and defection.* In other words, the best strategy is full co-operation. However, if this does not happen, it is better play a Tit for Tat strategy in IS projects, which it has been argued is a strategy which cannot be invaded by any other strategy and prevents a team from taking advantage of a Too Nice strategy.

4. *Don't be too clever.* The message for IS project managers is that the fundamental model of rational self interest is a temptation that is likely to be used by project teams. In particular when they are faced with a joint option of either increasing self interest or working for the benefit of a larger project. In particular this is likely when the teams have little or no trust in the future actions or behaviour of the other teams.

sin of omission, by not trusting, or have committed a sin of commission by attempting to obtain a higher Payoff than chance could have produced. If these decisions had been made in an IS project environment, none of the projects would have been successful.

It would appear reasonable to suggest that a challenge for those involved in IS project management would be to create a project environment that adhered to the rules of a non-zero sum game and select teams who would operate at the fiduciary higher levels of trust. In such an environment the decision making strategy of those involved would be created without the temptation to beat other team. This would prevent dysfunctional project members who preferred to increase self interest. It is also important to consider that trust in an IS project may not reach the levels of a Prisoner's Dilemma. This is because IS projects are an example of an N-person finitely repeated game and the stakeholders may use the Backward Induction Argument and use rational economic reasoning to make their decisions, leading them to not co-operate and instead attempt to achieve an improved personal outcome before team objectives.

The friction required in the implementation of an IS project could become competitive rather than destructive. Excluding conflicting targets could be one measure of reducing the members of one team from wanting to beat members of other teams. If it is not possible to create a non-zero sum environment for project teams, it would be possible to control the benefit teams could achieve.

For example, Project Paradox adopted the essential tension of the Prisoner's Dilemma. However, in Project Paradox the penalty for joint none co-operation was -10. While the ranking for the Payoffs of Project Paradox could be retained, the teams would naturally be more wary of none co-operation if the Payoff was increased to say -100 as discussed by Miller (1996). But this implies that controls, not forgiveness are in operation. Controls in the form of increased penalties for none co-operation are likely to improve co-operation but admit the lowest form of trust is operating.

These findings provide reasons and explanations that extend beyond the existing lists of success and failure factors in the literature for improving the chances of IS projects success. It is also possible to suggest how the Project Paradox experiments could be extended. For example, in run 6 the team changed the decision of their representative who had agreed in writing with other teams that they would all co-operate. It would be interesting to observe when individuals rather than small teams played Project Paradox whether the levels of co-operation increased. Also to increase the level of the punishment from say -10 to -100 and observe whether teams would be less likely to attempt to benefit from not co-operating. These results would help project managers understand probable behaviour patterns given a change of environment and enable the creation of more trusting project environments.

Attempting to influence IS project environments to reflect a non-zero sum game has been suggested as a possible way forward to increase the level of trust in IS project teams. A further approach would be to understand the type and level of trust that existed in a project team and project environment. By knowing these it would be possible to direct specific controls and actions to individuals and organisational systems to counter the negative outcome of low levels of trust.

Currently there is no mechanism available to help those involved with IS projects to identify and control the trust in their projects. An outcome from this research is the proposal of a framework for of a Trust Audit for IS projects. Included in the framework are examples of the:

- stakeholders involved,
- types of trust used,
- typical questions,
- timing of the Trust Audit,
- method of presenting the results.

The framework of a Trust Audit for IS projects is presented in the following Chapter.

Chapter 8

8.0 A Trust Audit for IS Projects

8.1 Introduction

The purpose of this Chapter is to present a framework of Trust Audit for IS projects. There are three reasons that have combined to demonstrate the need for such an audit.

Firstly, the questionnaire used in this research sought to identify the factors for successful IS projects. The results showed that 98% of the respondents in survey 1 and 60% in survey 2 believed trust in respect of IS projects to have some importance, while 76% of the respondents in survey 1 and 100% in survey 2 thought trust was the most important success factor.

Secondly, trust has been identified as a factor likely to impact on the success of IS projects. Chapter 5 contains a discussion of the levels and types of trust and indicated that many generic issues of trust identified in other disciplines have parallels with IS Projects. For example, the environment within which projects operate are susceptible and prone to a lack of trust.

Finally, The results from the Project Paradox runs presented in Chapter 7 identified that it should not be assumed that stakeholders in an IS project would co-operate for the benefit of the project. The results from the Project Paradox games identified that the decisions made by the participants reflected rational economic reasoning rather than fiduciary responsibility. This indicated that for the majority of the players were operating at the lowest level of trust, called calculus. It was, therefore, argued that factors should be identified to enable the level of trust in IS projects to be improved to the higher levels, such as knowledge-based trust. One suggestion was to provide information about the specific types and levels of trust in operation in IS projects; hence the reason to propose a framework of a Trust Audit for IS projects.

8.2 Framework for an IS Project Management Trust Audit

It is proposed that a Trust Audit could be operationalised in three stages.

- The first stage would be conducted prior to the commencement of 'day zero' i.e. during the team forming stage. This would identify potential issues and enable them to be managed as risks.

- For the second stage of the Trust Audit it is proposed that the 'process' would be monitored during the development of the project. This would identify whether the original risks had changed and identify any new issues that had emerged since the project had begun. These on-going trust audits could be carried out prior to the start of subsequent project phases.

- The final stage of the Trust Audit would take place at the completion of a project as an element of a project evaluation review (PER). There would be two objectives from the PER Trust Audit. The first objective would be to learn from the audit. The second objective would be to ensure that issues identified in those findings are implemented for subsequent IS projects, to activate a learning project environment. This would help to ensure the mistakes or problems related to trust that were identified are not repeated in later projects. Having the three stages of a Trust Audit would address the '... necessity for continuous project learning' as suggested by Schindler and Eppler (2003) to '... harvest' project knowledge as a success factor.

To enable an accurate Trust Audit to be compiled, it is further suggested that all stakeholders should have the opportunity to register their contributions anonymously.

The knowledge obtained from projects relating to issues of trust could be embodied as goals or target for subsequent projects. This will take time to develop and mature. It is further envisaged that a practical enhancement from this research would be the development of an open Trust Audit repository, where project managers could (again anonymously) place their IS Trust Audit results from which others can benefit.

It is proposed that the Trust Audit would be undertaken in a manner to ensure that the views of all the project stakeholders are represented. To achieve this, the project stakeholders as identified within the PRINCE 2 structure (Bentley 1998) will inform the framework for the audit. For example, the Project Manager would report upwards to the Project Board through the Quality Team. The Project Manager therefore has to trust the Board will continue to fund and support the project. At the same time the Project Manager also has to trust that the Project Team are technically competent to carry out the development work in conjunction with the support of the Configuration Team. Also, the Project Manager would expect that all the stakeholders would undertake their responsibilities in a professional way and would need to 'trust' that they did not attempt to obtain an advantage over other stakeholders who were vulnerable to their actions.

It can be seen that the success of a project is vulnerable to the trustworthiness of many stakeholders, but for different reasons. At the same time it can be seen that all project stakeholders would be expected to act in a professional and fiduciary way as identified by Baba (1999). It is, therefore, possible to identify that some aspects of trust will be specific to the individual stakeholder, while there will also be elements of trust that are common to all the project stakeholders. To reflect these differences it is proposed that each stakeholder group will have Trust Audit questions that are unique and other questions that are common to all the different stakeholders. For example, the Project Manager would not necessarily be aware of the continual personal development of the staff, but would be aware of their qualifications. Figure 8.1 presents the proposed stakeholders who would be involved in IS projects within the PRINCE 2 structure (Bentley 1998). Naturally, the Trust Audit could expanded through the development of new questions specifically aimed to accept the input from other stakeholders, such as the Project Sponsors.

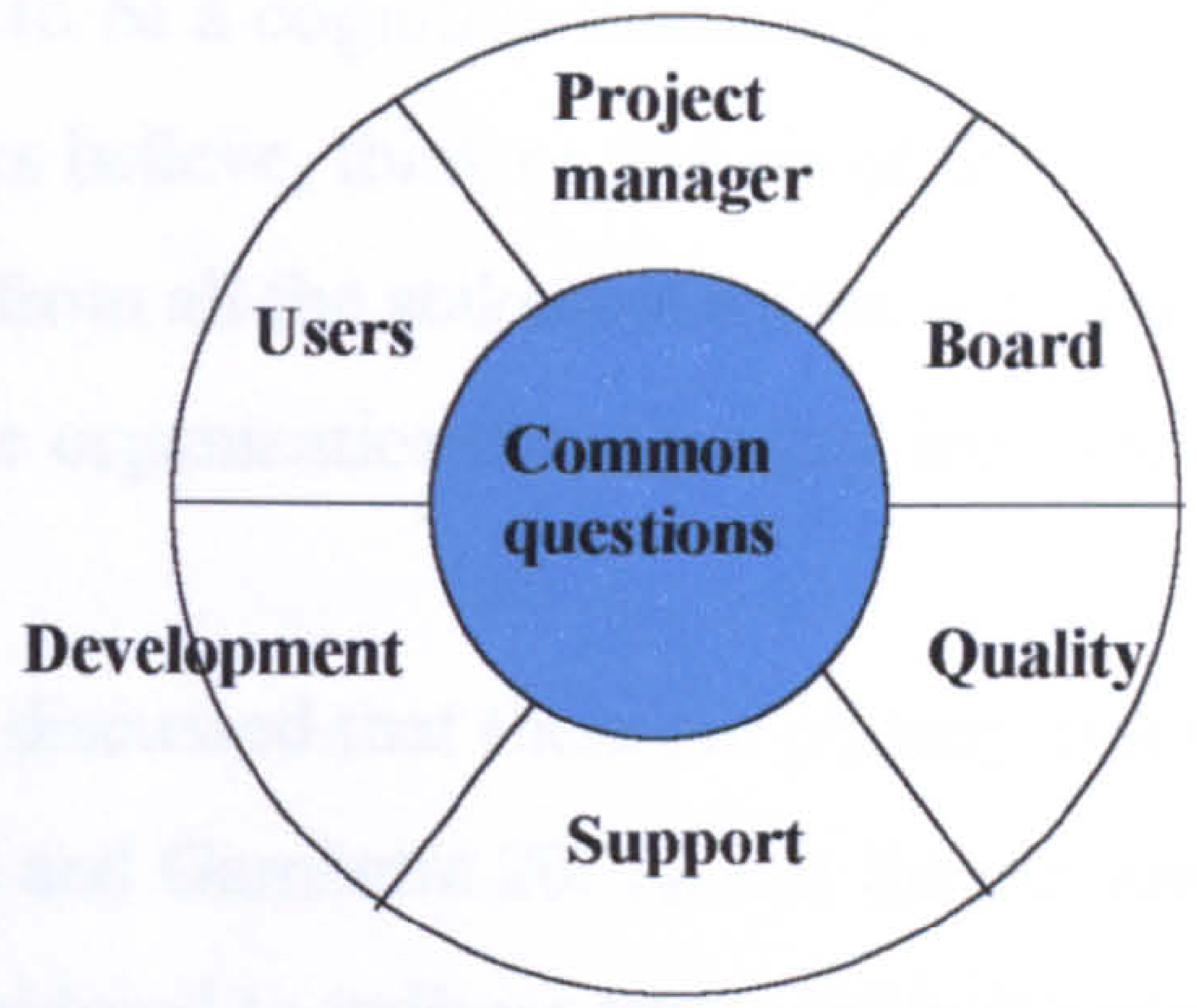


Figure 8.1 Trust Audit Questionnaire Participants

8.3 Contents of the Trust Audit

Trust can be considered to bridge the reality gap that exists between having perfect and imperfect information. Phlips (1988) describes the distinction between '… games with imperfect information and games with incomplete information'. The players of a game are '… said to have imperfect information when there is uncertainty about the actual behavior of the players' while, '… on the contrary, information is incomplete when the players do not know some of the elements which define the rules of the game itself'. Using these definitions, Project Paradox would be defined as a game involving imperfect information, because the players did not know the strategy that the others players were about to adopt, since the decisions were made simultaneously. However, the rules for playing Project Paradox and the Payoffs achievable were known to the players before the runs started. Using the Phlips (1988) definitions, Project Paradox would be defined as a game using imperfect but not incomplete information. The design of the Trust Audit has therefore taken into account the likelihood that the respondents will only have imperfect and incomplete information available to them to complete the questionnaire.

In 'soft' systems with open boundaries it is not possible to achieve perfect information; there will always be a requirement to rely upon trust to some degree. Trust can be considered to be a cognitive function that if measured could be used to gauge what project stakeholders believe, think or feel about the coming project and possibly beyond. When the results from all the stakeholders are combined, a detailed view of the how they consider the organizational and project issues would then be available.

It has been discussed that there are primary and secondary indications to identify trust (Bacharach and Gambette 2001). For the purpose of the Trust Audit, only primary factors will be considered to indicate trust within the team as the stakeholders see it. The secondary factors of trust discussed by Bacharach and Gambette (2001) such as judgments based on personal appearance are considered to be too vague to be included, but they would continue to be considered as the Trust Audit is updated. From the literature, several aspects of trust were found as were discussed in Chapter 5. These include topics such as shown in Table 8.1.

expectations of technical and fiduciary responsibility (Barber1983), all guarantees are incomplete (O'Neill 2002), a need for trust (Handy 1995), expectations of others behavior (Baba 1999), relational and performance trust (Das and Teng 2001), focus on relationships not the individual (Blomqvist 1997), imperfect information, shared aims, rational choice and types of trust (Lane 1998), likelihood of future co-operation and levels of trust (Tyler and Kramer 1996), competence of staff is needed (Cook 2001), manage trust via uncertainty, manage distrust via vulnerability (Heimer 2001), thick trust and overlapping relationships (Hardin 2002), competitive, emotional and integrity trust (Hartman 2000), joint goals common values (Messick and Kramer 2001), trust building in teams (Herzog 2001).

<u>Table 8.1</u> <u>Examples of Trust Topics</u> Source: as given above.

For the purposes of a draft Trust Audit specific to IS projects, it has been possible to identify four main areas that bound and define trust.

The first is being 'Vulnerable' to the action of others. The stakeholders of an IS project are all vulnerable to the actions of each other, and as stated above the success of the project relies on the trust of all the stakeholders. The Project Manager is vulnerable to the actions the Project Board and the Development team, but for different types of trust. An example of an indicator of trust in this category would be staff who have previously worked together (Handy 1995) and have started to build a history of being trustworthy by not having acting from a position of self interest.

The second area is knowing the 'Credibility' of the staff and this itself has two factors. These involve having the knowledge that the stakeholders '*can*' and '*will*' do what is required. Holding a belief such as 'I think the project staff can do the job' is a weak state of trust. What is preferable is knowing that those involved '*can*' do the job. That is to say the stakeholders have the technical skills, academic ability and necessary experience.

The second factor within the 'Credibility' of trust involves knowing, '*will*' the team members do what is expected of them. This is a measure of their past actions and future intent to discharge their professional and fiduciary responsibility. Methods of measurement for the requirements of credibility include obtaining references, checking qualifications, memberships of professional bodies and other indications that they are managing their continual personal and professional development.

The third area involves the 'Culture' of the organization and project itself. A culture of fear, excessive control, frequent disciplinary actions based on finding fault would indicate a low level of trust. In contrast, an organizational culture that encourage risk taking linked to the expectation that some failures would be expected, and then use the outcome of these failures as a learning vehicle indicate an organization operating a high trust culture. Questions that would identify a trusting organization and project culture would include having staff who feel free to speak out without fear of reprisal. Also, if there are low levels of personal control such as only requiring staff to account for project not personal time.

The fourth and final area involves the 'Visibility' and openness of information. It was discussed earlier that project staff need to make informed decisions. In order to do this, they will require accurate and timely information, albeit that information will be 'imperfect'. So, given that there will be a limitation of available information, the question therefore is, do the team members believe that more information is required or some available information is being withheld?

Having good, regular, honest communications between all parties, at all levels in a project have been identified as a key success factor in this research. The Trust Audit would, therefore, include questions to determine whether there are clear and frequent channels to facilitate the 'Visibility' and openness of information. Withholding information was identified as one of the major triggers to begin a spiral of mistrust by Munns (1995). At the start of a project it may not be known if information was being withheld; consequently, one of the questions to measure trust would take place during the development stage of a project, by asking the stakeholders if they were surprised by some of the occurrences which, had taken place after the project had started. A control question would be, are the stakeholders disappointed over some issues? It was argued in Chapter 5 that being disappointed by the outcome of project events is unfortunate. However, being surprised indicates that stakeholders expectations had not been correctly managed, indicating that communication between staff had not been as good as they could have been.

It was argued in Chapter 5 that one criterion for measuring success of a project could be if all the stakeholders achieved only a sub-optimum of their total requirements. This indicates that some level of disappointment from the stakeholders would not automatically be a problem. On the other hand, having stakeholders who experience a feeling of surprise would indicate that there was a problem with managing their expectations and that in turn indicates a lack of communication. An argument has been given to demonstrate how the framework of a draft Trust Audit for IS projects can be represented by four key factors, these are:

- Vulnerability (to the action of others),
- Credibility ('*can*' professional and technical and '*will*' fiduciary),
- Culture (of the organization),
- Visibility (and openness of information).

Some examples of the types of questions that would address the four areas of trust have been given with an explanation for their inclusion. A questionnaire will be designed to have an even number of possible reply options from which respondents could select their answers. The extreme of this being a simple dichotomy of yes/no type answers. An even number of options has been selected to prevent the respondents from 'sitting on the fence' in their replies. An example of typical questions that could be asked in the Trust Audit are given below in Tables 8.2 to 8.5. Also included are the reply options from which, the respondents could select their answer. Reasons why the questions could be included are offered and an indicator shows which of the four areas of trust the questions will address.

Vulnerability	
1. Have you worked with the project team members before?	Answer options: All, Most, Some, None. Reason: to test prior knowledge of others, as evidence suggests this reduces uncertainty which, has been linked to low trust. Remember that an increase in information does not necessarily increase trust, the additional information could produced distrust.
2. Do you believe some project team members would if possible maximize their personal benefit?	Answer options: Definitely, Highly probable, Unlikely, No. Reason: this question is testing the level of future intent of the staff.
3. Are you aware of any team members who do not agree with or dislike the project objectives?	Answer options: All, Most, Some, None. Reason: Indicates either likelihood of encapsulated trust or staff who are possibly detached from the team.

Table 8.2 Examples of Trust Audit Questions: Vulnerability

Credibility	
1. (Individual) Are you an active member of a professional group for example, a Member of the Association for Project Management APM?	Answer options: Yes, No. Reason: to understand the professional credibility of the person, it also indicates positive attention to improving personal development and reduces uncertainty.
2. (Organisational) Do you have any first hand knowledge that records have been retrospectively changed, such as minutes of meetings, project objectives, annual reports accounts?	Answer options: Yes, No. Reason: retrospectively altering information indicates a very low level of trust, with examples of catastrophic failure being linked when it has occurred, such as at the Barings Bank.
3. Do you have links or commitments to project team members through other contacts such as; family, sports clubs, religious groups, education?	Answer options: All, Most, Some, None. Reason: to test for further levels of encapsulated trust, through inquiring whether team members know each other through other contacts.

Table 8.3 Examples of Trust Audit Questions: Credibility

Culture	
1. Do you feel empowered to take risks?	Answer options: Yes, No. Reason: a risk taking culture is associated with a trusting culture.
2. Do you consider the culture to be blameworthy or one that learns from mistakes?	Answer options: Blameworthy, Mostly Blameworthy, Mostly learning culture, Learning culture. Reason: a reply of Blameworthy would indicate that there is little or no forgiveness. That in turn points towards an organization that operates using calculus, the rational economic (lowest level) of trust.
3. Is there a strong or weak culture of consistency within the organization?	Answer options: Strong consistency, Tends towards strong consistent, Tends towards weak consistency. Weak consistency. Reason: to test for uncertainty, supported through social reinforcement. This is achievable via organizational culture. It is reasonable that team members could predict how others will behave.

Table 8.4 Examples of Trust Audit Questions: Culture

Visibility	
1. Is the information that you have for decision making first hand second hand?	Answer options: All first hand, Most firsthand, Most second hand, All second hand. Reason: to identify the quality and credibility of information. Increases in first hand information enables high levels of reliability, hence reducing uncertainty.
2. Are there clear guidelines of expected behavior linked to action if these are not met?	Answer options: Yes, No. Reason: clear guidelines indicating the expected level of behavior and knowledge that action will be taken if these are broken are linked to trust building through controls considered reasonable.
3. During the project have you been surprised by an outcome or event? (This is an example of a trust audit question linked to the development and final stages).	Answer options: Yes, No. Reason: a surprise comes from mismanagement of expectations or withholding of information. Both these increase uncertainty and trust is reduced. Disappointed on the other hand could be accepted to some degree. For example, when a sub-optimum of stakeholders requirements is accepted as success.

Table 8.5 Examples of Trust Audit Questions: Visibility

8.4 Presentation of the Trust Audit Results

It is proposed that the results of the four question topics from the Trust Audit could be represented as a point on a diagram as shown in Figure 8.2. The calibration of Figure 8.2 indicates that the results are worse the closer they are to the center of the diagram. Moving outwards from the center towards the edge represents an increase in trust within each of the four question topics, with a score closer to 100% indicating the desired levels of trust. To provide a guide for the initial calibration of Figure 8.2 the area inside the rectangle has been divided into three equal size sectors, these are:

- Red inner most sector indicates cause for concern,
- Yellow middle sector indicates an acceptable level of trust,
- Green outer sector indicates a high level of trust.

For illustration purposes the three sectors represent a third of the scores obtained from the replies to the Trust Audit questionnaire. A sample of the questions were given in Tables 8.2 - 8.5. It is suggested that further research would ensure that the selection of stakeholders, topics of trust, questions and calibration of the replies used within the Trust Audit are as appropriate as possible.

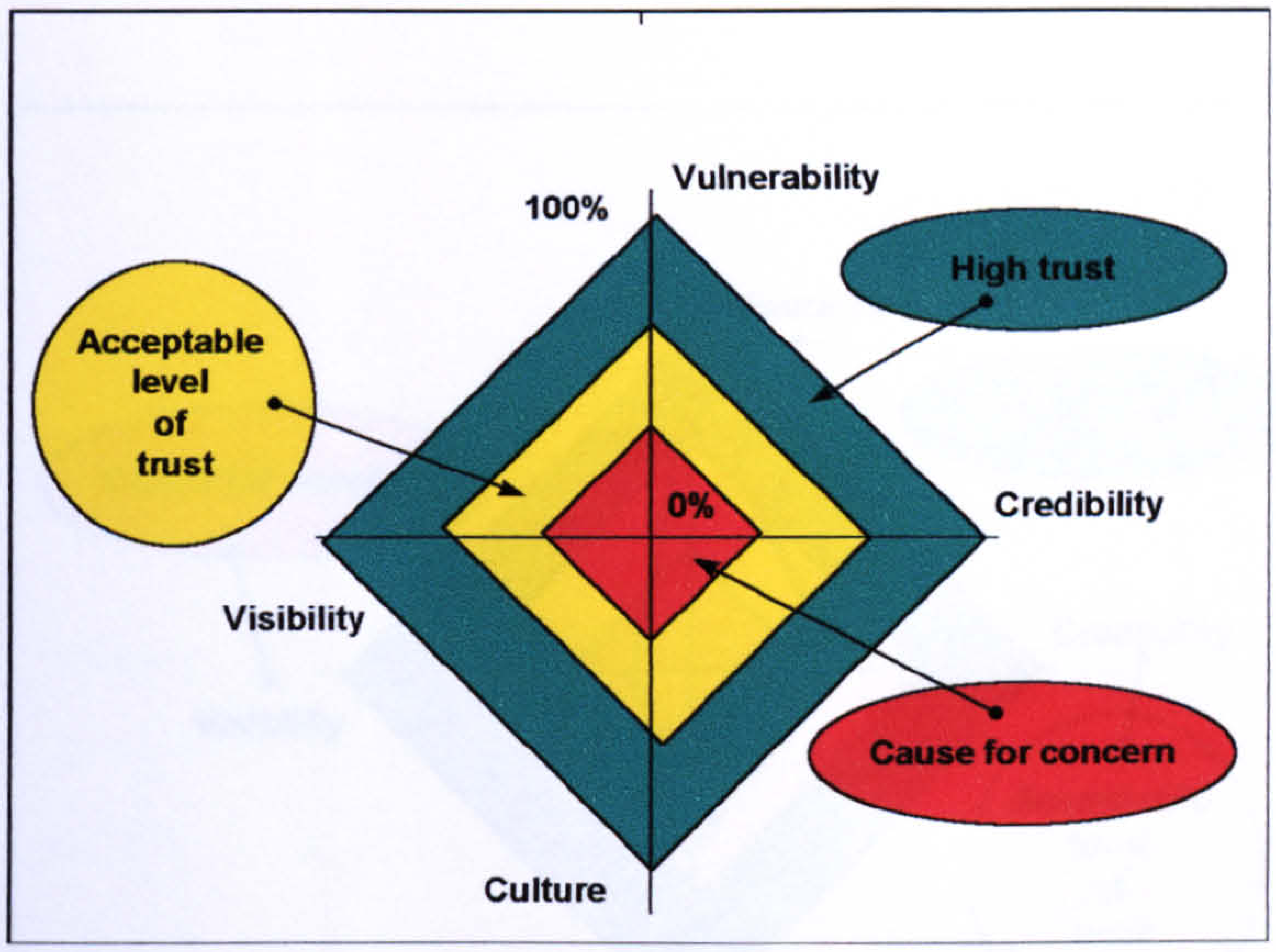


Figure 8.2 Framework of Trust Audit Analysis

Each of the stakeholders identified in Figure 8.1 would, therefore, have an individual output for the Trust Audit. Figure 8.3 provides an illustrative example of the results based on the replies that could be received from a Project Manager's participation in the Trust Audit.

Using Figure 8.3 as an example, the result would indicate that the Project Manager had rated trust in relation to 'Vulnerability' as high. However, the issues of trust relating to 'Credibility' and 'Culture' are at an acceptable level while the results involving the 'Visibility' and openness of information indicate cause for concern. Having now examined these results it would then be possible to focus on these and take action to rectify the specific area where the level of trust is considered to be causing the concern.

Following the analysis of the responses from each of the individual stakeholders scores in the Trust Audit, we can now consolidate all the scores, and consider the overall levels of trust within the fours specific areas of trust used in the Trust Audit. Figure 8.4 provides an example to illustrate how the consolidated results could be presented and how they show the responses of all the Stakeholders in respect of a project.

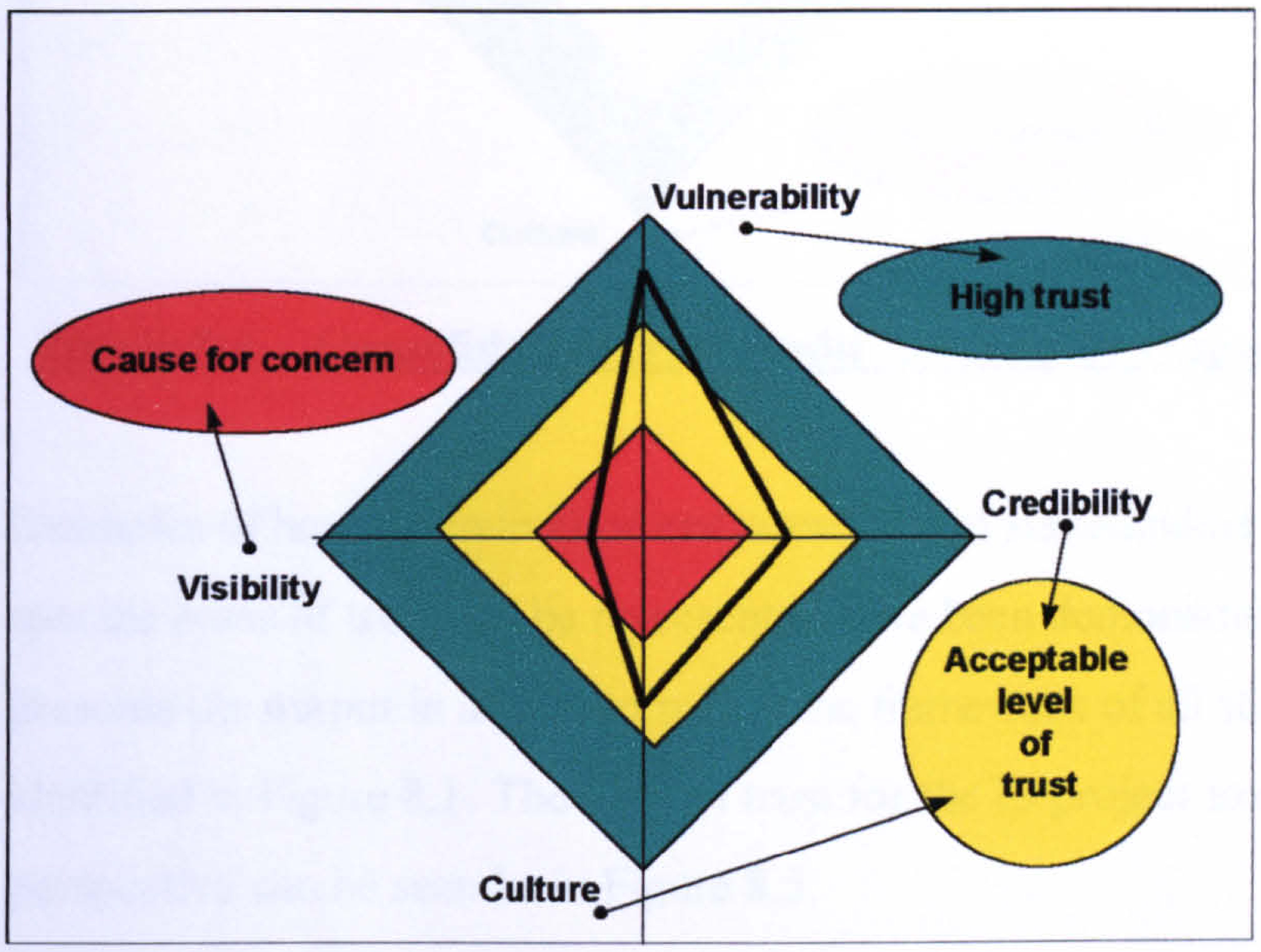


Figure 8.3 Individual Trust Audit Analysis by Question Sectors

Comparing Figure 8.3 with Figure 8.4, they show that at an individual stakeholder level (Figure 8.3 the Project Manager) the 'Visibility' and openness of information was a cause for concern. At the consolidated level (Figure 8.4 the overall results) the area of trust that is now cause for concern i.e. a risk for the project has moved to areas of 'Culture' and 'Credibility'.

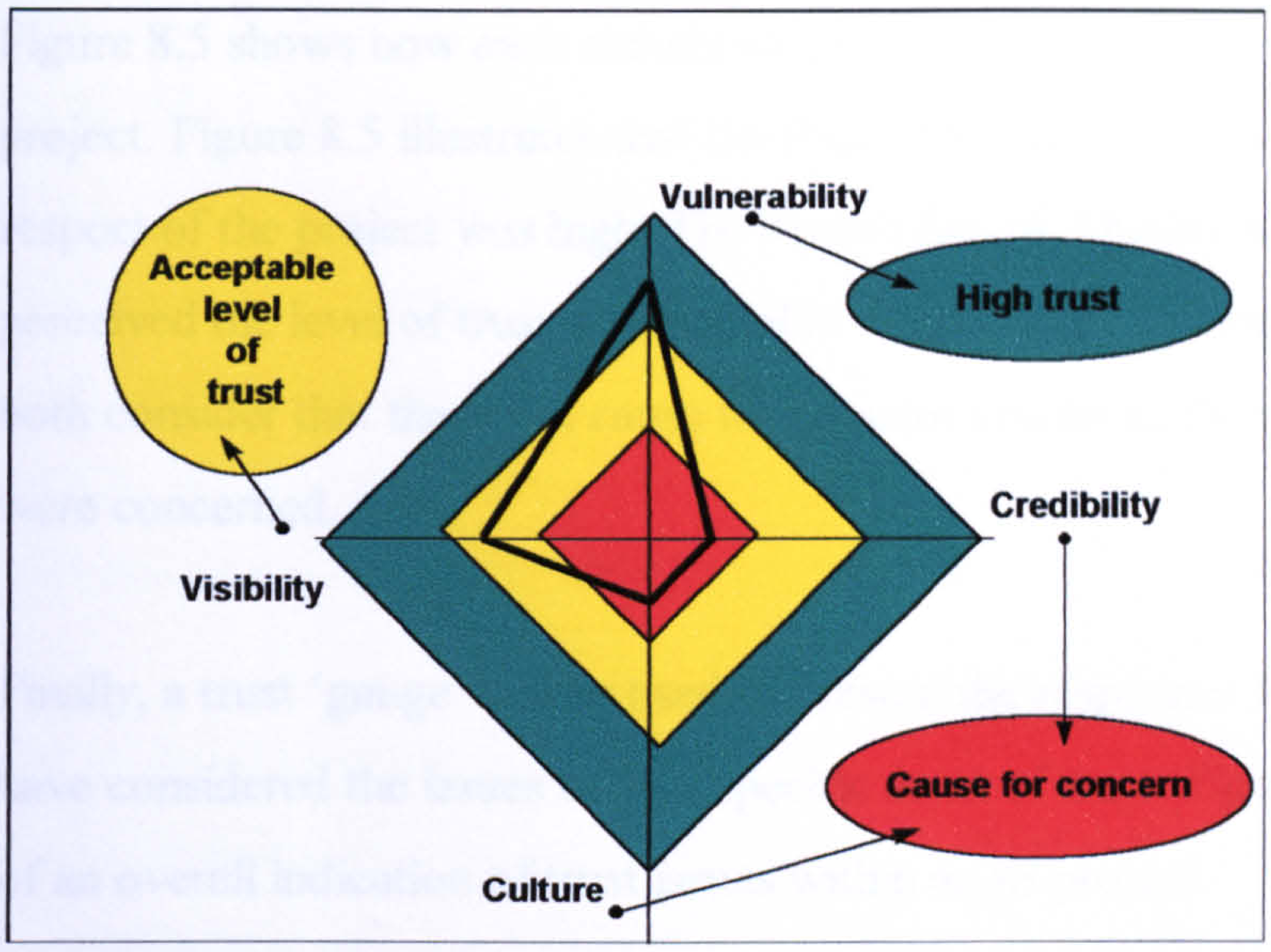


Figure 8.4 Consolidated Trust Audit Analysis by Question Sectors

Examples of how the individual and consolidated stakeholders views within the four specific areas of trust can be represented have been demonstrated. The next stage presents the output in a form to reflect the framework of all stakeholders that were identified in Figure 8.1. The level of trust for the IS project from the stakeholders' perspective can be seen be in Figure 8.5.

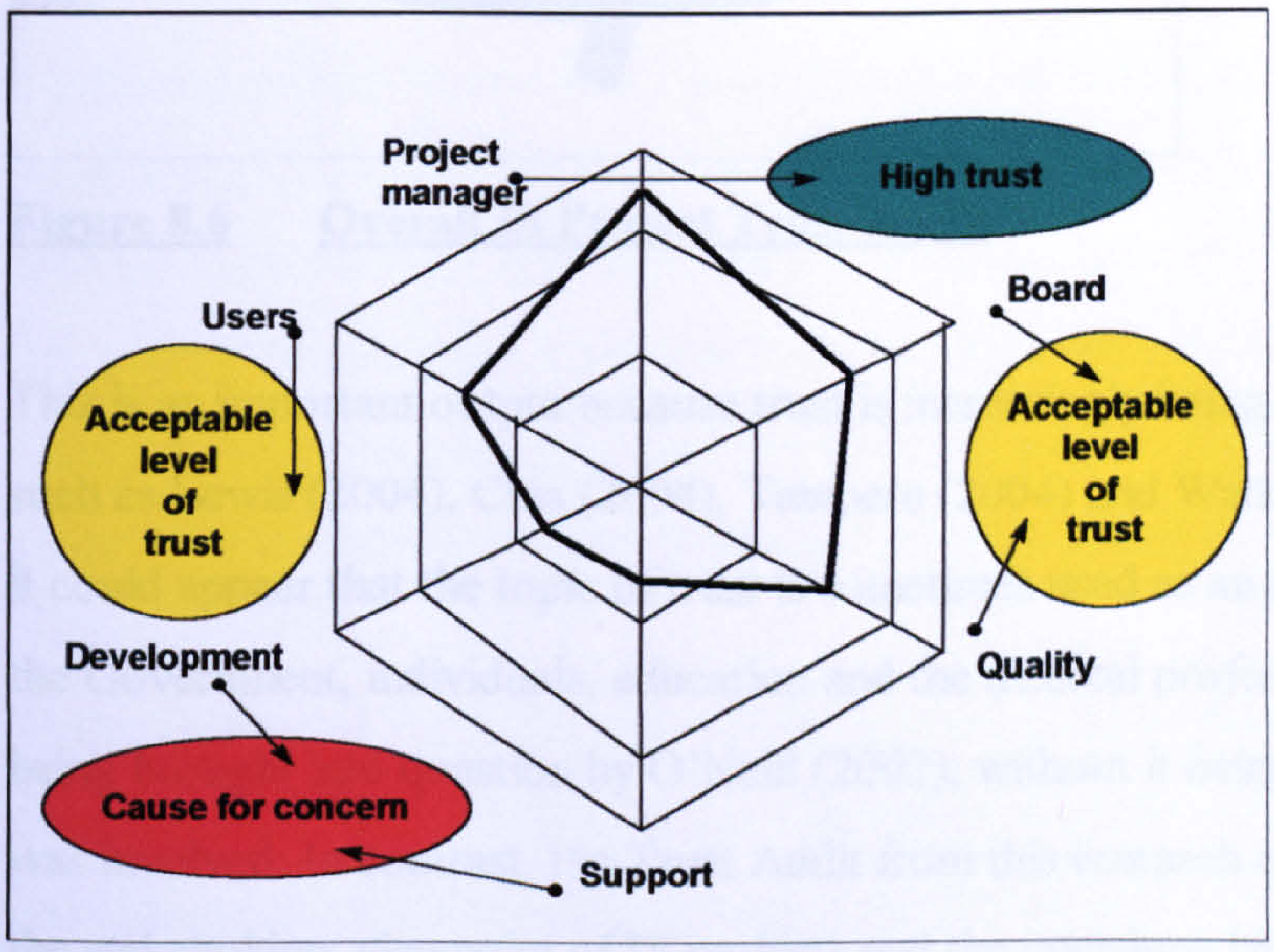
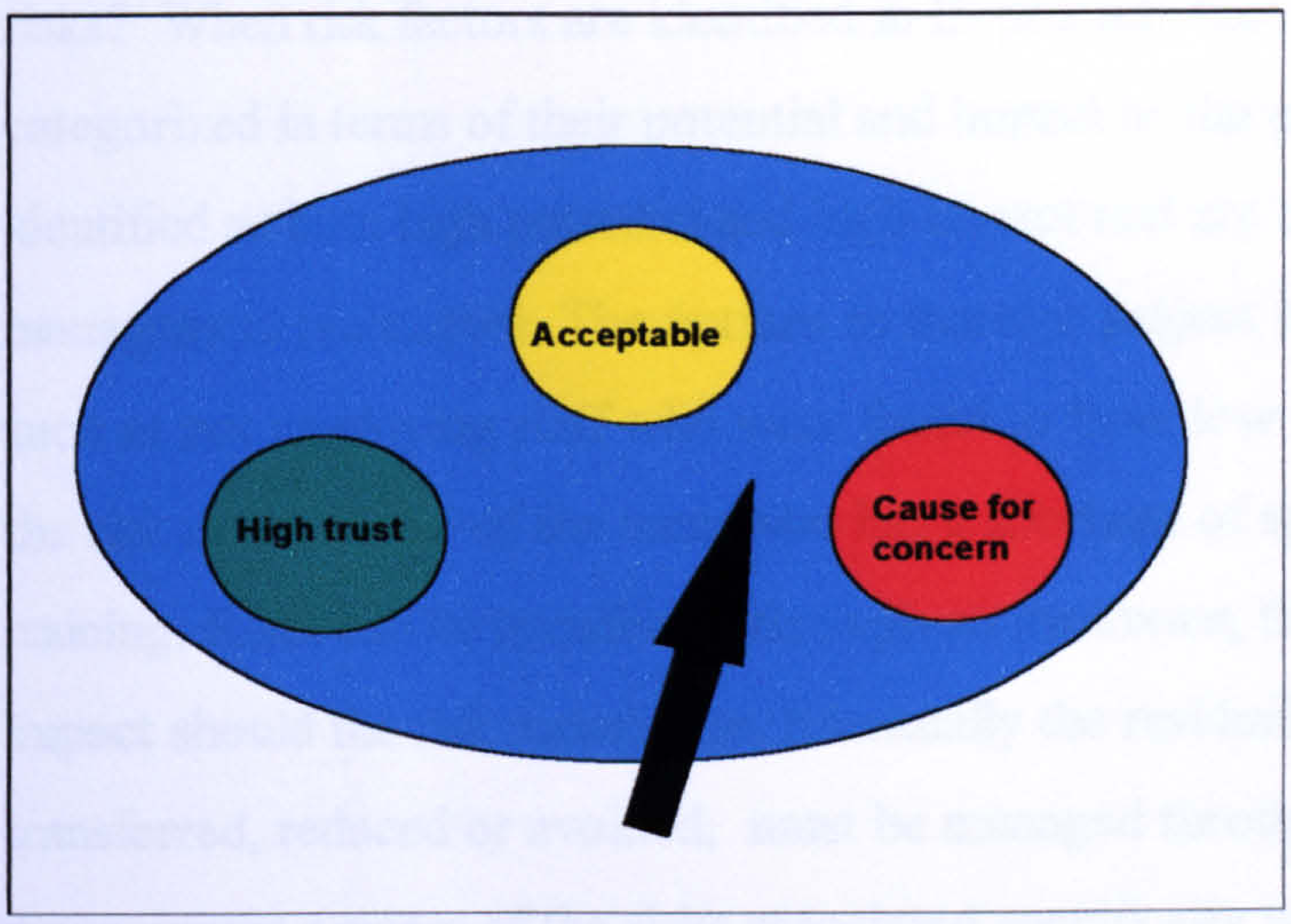


Figure 8.5 Consolidated Project Trust Audit by Stakeholders

Figure 8.5 shows how each stakeholder could perceive the level of trust within an IS project. Figure 8.5 illustrates that the Project Manager's view of the level of trust in respect of the project was high. The Project Board, Quality team and Users however, perceived the level of trust as acceptable. Staff in the Development and Support teams both consider that there is a cause for concern insofar as the risks associated with trust were concerned.

Finally, a trust 'gauge' can be used to present the responses from all the stakeholders who have considered the issues of four specific areas of trust. Figure 8.6 provides an example of an overall indication of trust issues within an IS project.



<u>Figure 8.6</u> **<u>Overall IS Project Trust Audit</u>**

This is an important output because trust is increasingly being reported by researchers such as Lewis (2004), Chia (2004), Tampere (2004) and Watts (2004), who discuss how it could appear that the topic of trust is sometimes used as an emotive term. The trust of the Government, individuals, education and the medical profession were reported to be being brought into question by O'Neill (2002), without it being clear what type of trust was involved. In contrast, the Trust Audit from this research can be seen to be linked to the stakeholders viewpoint of IS projects and the questions have been grounded in the literature to be specific to four areas of trust.

When the results of a Trust Audit indicate that a person may lack 'Credibility' insofar as having a lack of knowledge is concerned, it would be possible to implement corrective action by offering specific training. A Trust Audit that identifies concern with the 'Visibility' and openness of information, could then be followed by research to trace the likely causes to enable corrective action to be taken. In all cases when the word trust is used within the Trust Audit, it could be linked to one or more of the four specific areas of trust and would not simply generate an emotive generic use of the word.

8.5 Operating the Trust Audit

Having demonstrated the approach, structure, output presentation alongside a method to run the Trust Audit, the final issue is, how the output can be consolidated and managed as risks? When risk factors are identified in IS projects they are usually evaluated and categorized in terms of their potential and impact to the project. The factors that are identified as both high potential and high impact and are then targeted with risk management techniques. The options to manage project risks include avoidance action, such as not employing staff who were found to have low professional credibility. Reducing the risk of a member of the team who has a shortage of specific skills can be remedied by training. Risks can be transferred through an insurance, thus financially hedging against the impact should the risk materialize. Eventually the residual risks that are not able to be transferred, reduced or avoided, must be managed through risk absorption. The management process of the risks associated specifically with trust could be undertaken as described in the Project Risk Analysis and Management (PRAM) Guide (SIMON et al eds. 1997). For example, there could be the opportunity to manage risks as identified in a Trust Audit by managing the expectations of the project stakeholders through refined communications during regular feedback and other risk absorption control strategies.

The most appropriate timing for communication to take place would be during the project team formation stage. By setting the scene early through communication, it would be possible to reduce for example, concerns the stakeholders may have inaccurately believed were caused by the withholding of information. Also, at the start of the project it may be possible to enable the staff to meet and begin the process of building 'rapid' trust for those who have not worked together before. Team formation and building techniques have often been limited to outdoor team building adventures. It is suggested that they only address part of the trust that would be required in an IS project, as it was argued in Chapter 5 that trust used in outdoor activities is limited to the higher order types of trust. It was further argued that it was unlikely that a person would neither deliberately nor passively allow another person to receive an injury in a dangerous situation, such as climbing.

Consequently, in order to provide project team members with a more balanced view of the range of trust that may exist in an IS project, it is suggested that in addition to outdoor team building techniques the team could also take part in such as a Project Paradox workshop. The learning that has been shown to take place during and following a Project Paradox workshop would alert those participating to levels of trust such as calculus. The results from Project Paradox runs presented in Chapter 7 have demonstrated that participants acted from a position of self interest rather than to achieve project objectives.

Having participated in a Project Paradox workshop the stakeholders would also become aware and better informed to answer the Trust Audit questions. For example, feedback obtained after running Project Paradox in the European Aeronautic Defence and Space Company (EADS) Systems and Defence Electronics in Germany in 2003 indicated that prior to completing the Trust Audit questionnaires the participants could benefit from the education relating to trust obtained from participating in a Project Paradox workshop. Examples of the feedback from the EADS (2003) Project Paradox workshops can be found in Appendix H.

8.6 Summary of the Trust Audit

A framework for an IS Project Trust Audit has been presented. The stakeholders who could contribute to the framework have been identified as defined by the PRINCE 2 project management methodology.

Four key areas of trust were presented, these were: Vulnerability, Credibility, Culture and Visibility. Examples of typical questions that would test the condition of these four areas of trust were discussed. A method that could be used to present the results from the Trust Audit has been provided in Figures 8.2 to 8.6. These demonstrated how the overall trust within an IS project could be presented. Using techniques similar to that of executive information systems (EIS), it is possible to drill into the consolidated figures and identify both the stakeholder groups and the four specific areas of trust that indicate a cause for concern.

The framework for the Trust Audit is clear, however, the exact questions and calibration of the instruments continue to be refined and form part of the further research for the development of the Trust Audit in practical applications. Feedback received from participants of Project Paradox workshops (Appendix H), suggested that prior to competing the Trust Audit questionnaires the stakeholders would be better informed to answer the questions after they had been a participant in a Project Paradox workshop.

Chapter 9

9.0 Summary, Evaluation and Conclusions

9.1 Introduction

At the start of this thesis it was reported that the success rate of IS projects was low. Examples of the failures from both the UK and USA demonstrated the unacceptable scale of the problem. The literature review provided evidence to show this had been occurring for at least the last 2 decades. The chronic nature of the problem was exacerbated when repeated research confirmed that the success rate of IS projects was not improving. This produces a negative impact and consequential loss both financially and otherwise for the many different stakeholders involved with IS projects. Naturally such a problem is a concern and provided the rationale for the research. The aim of this research was to provide an understanding into how the success rate of IS projects could be improved. In order to focus the work, two research objectives were proposed.

Consideration into the research approach resulted in the use of a triangulation of multi methods that were conducted in two sequential stages. The first stage used a questionnaire. For the second stage a new business game was developed. Both research methods were considered to be positioned within the interpretative paradigm of phenomenology.

9.2 Summary and Evaluation for Research Objective 1

The first objective of this research was, to identify factors and criteria in IS project management which, could lead to project success.

9.2.1 Success and Failure Factors

A review of the literature with a focus on the factors for IS project success and failure proved to be inconclusive. Many studies had attempted to identify key success factors, but have offered only limited help in identifying the reasons for failure. The standards and publications, such as the BoK, produced by professional bodies in the UK and the USA indicated 'what is' and 'how to' for project management, but were found to differ within and between different countries. One problem encountered was that the subject domain covered a broad eclectic group of topics that included the factors of information systems, management and project management. Combining all these points led (Tsoukas 1994) to conclude that the lists of critical success factors were no more than a '... codification of work'. Ward (2000) considered that the uncoordinated research into project failures, '... explore and expand a problem, develop considerable knowledge of a subject but do not necessarily get any closer to a solution'.

However, although no clear agreement could be found into the reasons or causes for failure, the literature review in Chapter 2 did provide an indication into the topics suitable for further research. The factors selected for this research relied on the interpretative approach of the author. The first factor to be considered was the influence of the systems environment within which IS projects takes place.

The literature of systems' theory informs us that '... the variety of the environment' would always be greater than '... the operators that serve it', while in turn '... the operators will exceed the management which attempts to control or regulate them' (Beer 1985). Therefore, as project managers attempt to control and regulate a unique undertaking within a changing business environment, some project failures could be considered to be inevitable. To help understand the complexity involved in mapping the correct type of IS projects with different business requirements, a framework was developed and presented in Figure 2.2. This was supported by an argument that the failure of an IS project could also be influenced by an incorrect strategic or political decision rather than failure being a factor of the project management or the technical validity of the resultant IS.

Furthermore, providing the loss from failed IS projects does not represent a significant percentage of a business profit, some project failures could also be considered to be acceptable. Whether or not a central or local Government department who had a failed project could ever accept failure as acceptable is debatable, because they involve a consequential loss of limited taxpayer contributions. Nevertheless, it would be useful to know the threshold level of failed but acceptable and unacceptable projects that the IS community are prepared to tolerate.

Included within the stage 1 questionnaire were questions that related to the number of successful and failed projects which, the respondents had been involved. The analysis indicated that the respondents had been involved with 852 IS projects, with 84.7% resulting in success. This indicated a higher success rate than the statistics showed in Chapters 1 and 3. A reason for the difference in these findings was argued to be in part because it was not possible to take a true random sample of the complete boundary of project management and project success. Each research has therefore to be conducted using only a limited or stratified sample of the total population for project management. The evaluation of this finding was that the high reported failure rate of IS projects may be due to exception reporting.

It should also be pointed out that the majority of the failures are reported from the Government projects. This information is available because these projects need to be open to public scrutiny, through the National Audit Office and Public Accounts Committee. It was further argued that Private sector companies would have little incentive to report project failures that could in any case cause a reduction in shareholder confidence. The accuracy of the reported high rate of project failures is, therefore, challenged by this research and is worthy of further research. It is suggested that this could be achieved by conducting some large-scale surveys to determine whether exception reporting of IS project failures is producing a biased view or whether the reported high failure rate is indeed correct.

Factors such as the use of a project management methodology, systems methodologies and CASE tools, were not found to be critical to project success, validating the findings of other researchers. Planning, commitment and communicating were linked to the successful IS projects. The use of COTS in place of bespoke systems development was found to be associated with a high level of project success.

Using consultants on IS project stages was found to increase with a corresponding increase in project costs. This was interesting when compared with other research that indicted the rate of IS project success reduced when the project costs increase (Gallagher 1995). This is not suggesting that the use of consultants cause the higher project failures; however, further research into the area of increased costs linked to project outcomes with and without the use of consultants would be worthwhile. An additional research topic would be to identify the level and type of trust that existed in IS project teams when consultants were employed. For example, would the temporary nature of a consulant's contract with an IS project team influence how the team co-operate with each other?

The 'Brooks Law' (Ward 1994) that defines a method to calculate the optimum number of staff resources was repeatedly verified as a reliable estimating tool for planning.

The literature review indicated that the project manager was considered to be a critical success factor. The results from a large survey of project managers showed that they considered project tasks associated with people issues (dealt with in the right hemisphere of the brain) to be the most important aspect of a project managers role/task (Webster 1994). When the same project managers were asked what role/tasks they had completed recently in practice, their responses indicated it was the technical tasks such as planning, (dealt with in the left hemisphere of the brain) to which they had devoted most of their time. A potential conflict was found to exist in that project managers talk about using the right brain functions, however they mainly use the left brain functions when dealing with project management issues as illustrated in Figures 2.4, 2.5 and 2.6.

A significant finding from the literature review concluded that while other disciplines had considered trust to be a factor of success, this has not been expressed in project management. At the start of this research there was no reference to trust as a success factor in project management literature. It also seems that no research had been conducted in connection with trust and project management. In addition, the subject of trust was not included in the UK APM BoK (1995) or the BS 6079 (1996). The literature of risk and the risk analysis and management (PRAM) guide (Simon et al eds. 1997) also excludes any reference to trust. A gap in the literature had been identified that was considered important to warrant further research and became the focus for stage 2 of this research.

Finally, in this section concerning success and failure factors an observation is offered concerning the potential for confusion between the two. Some authors have specifically researched success factors; others have focused only on failure factors, while yet others discuss both success and failure in the same way. For example, analysis of the literature revealed that User involvement was identified as a success factor (Geddes 1990). At the same time User involvement was also included in the tables of failure factors (Gallagher

1995). However, the factor of having smaller 'milestones' was linked only to success, while 'a lack of resources' was exclusively catalogued as a failure factor (Gallagher 1995). It is suggested that having two categories of success and failure factors is confusing. An illustration of how these could be combined into one framework was presented in Figure 2.7.

Clearly some factors are only linked to failure and it is suggested that these are the most critical of critical success factors. These are the foundation upon which success will depend, because if they are not in place, the literature suggests that success is not likely.

The next category of factors are those that reside as either success or failure. These should be considered to be the second order of importance. Finally, to achieve success, the factors that are unique to being identified as success factors need to be satisfied. The pinnacle of Figure 2.7 represent success factors which, it is suggested would be specific to each project. It should be noted that even with these in place, success is not guaranteed since the unknowable risks will always be present. On the other hand the foundation level of success factors would be generic to all projects.

The confusion becomes greater when the success and failure factors are mapped against the content of the APM BoK (1995). Since not all factors in the BoK are represented as either success or failure. Unless of course it is possible that a factor could be considered null in terms of it's influence over success and failure. If this is believed to be the case, they need to be identified in order that project managers understand the importance they have. To finish this section concerning the factors it is recommended that the use of the framework suggested in Figure 2.7 that incorporates both success and failure factors would help in the development of our understanding of the scale and criticality of success factors.

9.2.2 Criteria to Measure Success

DeLone and McLean (1992) and other authors considered that the search for success factors is no more than a speculative exercise until the criteria to be used to judge success are known. However, the search for new criteria has not attracted the same level of interest compared with the effort expended to identify new success factors. The most frequently discussed criteria in the literature were found to be cost, quality and time. An argument was developed suggesting this is limiting the chance of success, if these were the only measures against which success was judged. This research proposed a framework, termed 'The Square Route' (Figure 2.8) that includes additional criteria against which success could be measured. The purpose of 'The Square Route' is to indicate that additional categories could be considered when measuring project success, including subjective criteria.

The analysis of the questionnaire for stage 1 produced 255 suggestions of how the success of IS projects could be measured. Respondents mentioned the criteria of cost, quality and time in 44% of their suggestions. However, the three new categories of criteria that were included in the 'Square Route' were mentioned in the remaining majority (56%) of the suggestions. This provides support that the additional criteria proposed in the 'Square Route' would be used in practice if they were an available option. Other industries have managed to overcome the temptation to limit the criteria to judge success to those that are quantifiable. It was considered a weakness for IS project management not to include more qualitative criteria. For example, the American Nuclear industry uses the concept of prudence as a success criterion. If those project managers had behaved in a prudent manner, such as were their decisions reasonable, a project that was over time or cost could still be considered a success.

The correct selection of criteria is critical to the future success of a project. At a time when organisations focus staff effort towards core activities, it seems reasonable to suggest that the criteria will become the focus for the energy of those staff. It follows therefore, that what will get done will be directed primarily towards that which is measured, i.e. the criteria. A selection of incorrect or unnecessary criteria for an IS project will divert limited project staff resources into wasted nugatory work. Meanwhile criteria found by Wateridge (1996) to be important, such as '... were the staff happy in their work', could mistakenly be forgotten.

When criteria are selected, deWitt (1988) urged that the reason for their inclusion should also be considered. It was suggested that the review stage of a project should not use criteria in terms of judging success or failure but rather '... what went right, what went wrong and why'.

Another significant finding from the stage 1 questionnaire was the potential that trust in project teams could influence success. When this was combined with the discovery that there was a gap in the project management literature concerning trust, it made the subject worth further investigation and informed the second research objective. Trust became the focus for stage 2 of this research. A new business game called 'Project Paradox' was developed and tested as described in Chapters 5 and 6.

9.3 Summary and Evaluation for Research Objective 2

The second research objective was: to understand the likely impacts that trust in project teams would have on the success of IS projects.

The link between trust and IS project success was identified by the analysis of the replies to the questionnaire in stage 1, this showed:

- 98% of the questionnaire respondents believed trust was important to the success of IS projects,
- 84% had experienced a breakdown of trust,
- 68% considered that controls were not able to act as a replacement for a lack of trust.

The significance of these results became apparent when they were compared with the next highest success factor i.e. planning, that was mentioned by 33% of the respondents.

A further literature review indicted the generic importance of trust. Many definitions were found, however, since trust was found to be discipline specific there was some difference in context. Anthropology, for example, considered trust in non-commercial terms. Marketing on the other hand viewed trust through an economic model with factors such as limited information and delayed payments providing a unique need for trust. The difference between trusting the technical competence of a person was also contrasted with the type of trust that would be used to consider whether to trust a person's likely fiduciary social behaviour.

However, the overall impression from the literature indicted that trust was in operation when someone was vulnerable to the actions of others, but was not worried that the 'other' would attempt to take advantage and benefit personally from the disparity in power and control.

The ideal project environment was considered to be where a reciprocal altruistic or symbiotic behaviour would exist. It was further argued that an environment to support such behaviour should have a shared and complementary set of objectives for the stakeholders.

Project management was found to incorporate the features of rapid trust due to the temporary nature of projects and other project specific factors. Trust was found to spiral in a positive or a negative direction; the withholding of information being the principle reason for a decrease in trust. Trust was found to exist at three levels, calculus, knowledge-based and identification-based. Calculus trust required controls to be in place to operate. A higher level of trust, termed knowledge-based included an element of forgiveness in place of controls. This required people to have a positive prior experience of working with each other.

At the identification-based level of trust, one person could act as the agent for another though having common beliefs and aims. These three types of trust are also known under the terms economic, cognitive and social. Social and cognitive trust are within the bounds of anthropology but economic (calculus) trust is considered to be the most likely level of trust used by project teams. With calculus/economic trust, individuals decide whether to risk trusting and co-operate with others through a 'rational choice' model.

The research focused on whether teams would trust each other in a project setting and measured the level of co-operation between teams. A new project scenario called, Project Paradox was developed to test whether trust was likely to exist in an IS project setting. Project Paradox was a finitely repeated non-zero sum game that retained the 'essential tension' of trust created by the decision rule within the Prisoner's Dilemma, a part of game theory. However, Project Paradox was designed as a placebo, N-person game with varying amounts of information available to the players during different playing orientations.

First, the playing of Project Paradox was simulated with the decisions to co-operate or not, using a Non-strategy, i.e. when the decisions co-operate or not were taken at random. The results of the Non-strategy produced the value against which the team results could be compared.

The analysis of the strategies used in the 14 games in scenarios 1 and 2 were mapped against the results of other adaptations of the Prisoner's Dilemma. Further comparisons were made against what is usually accepted as the most significant previous study by Axelrod (1984).

The teams who participated in the Project Paradox runs used a range of strategies such as 'Tit for Tat', 'Prober' and 'Grudger'. From the analysis a new strategy was observed that was not considered by previous researchers. This was termed a 'Benevolent Finisher'. In this strategy a team who 'beat' another team finished the game by co-operating when it was too late to influence the result insofar as the score was concerned. Teams who played the 'Benevolent Finisher' attempted to repair the breakdown of trust they had earlier caused in an attempt to 'win' the game.

In the Axelrod (1984) experiment, the Non-strategy (i.e. when decisions to co-operate or not were made at random) was beaten by all other strategies and produced the lowest value. In Project Paradox only 19 from 42 runs (45%) produced a value that was higher than that achieved using the Non-strategy. The team players of Project Paradox had taken a majority of their decisions not to co-operate with other teams. This clearly indicated that they either did not trust the other teams or that they were using the lowest level of trust i.e. the rational choice model of trust and co-operation. Rather than operate at the social level of fiduciary trust, the players chose to adopt opportunistic behaviour instead of the social and moral considerations in their decision making. The players were demonstrating that they were not trustworthy in the Project Paradox environment.

Parallels could be drawn with the low success rate of IS projects if these behaviours were used in live project developments. For example, a project with several stakeholders with conflicting objectives is likely to have less co-operation from the teams than if a joint objective had been agreed. Accepting a sub-optimum set of objectives and to some extent all stakeholders being unsatisfied was suggested in an interview Collins (1994) as a more realistic expectation than when all stakeholders attempt to achieve 100% of their individual requirements.

The decisions to co-operate (trust other teams) became worse as Project Paradox progressed over time; the level of decay are shown in Figures 7.19 and 7.20. It can be seen that although in both scenarios, trust began to decay over time, the level and speed of decay for the second scenario was marginally less than that for first scenario. In scenario 1, the teams played in an environment representing a co-located project, where the decisions were taken using limited information. This was achieved by restricting the communication between the teams. For scenario 2 the teams played in an environment representing distributed project teams who had the opportunity of making decisions with unrestricted communication.

The results of Project Paradox indicated with 95% confidence that the data used in scenarios 1 and 2 were obtained from different populations. The change in the scenarios had contributed to the difference in the rate of decay of trust between scenarios 1 and 2 demonstrating the importance of communication and building trust to the success of projects. The decay of co-operation over time demonstrated that the teams had entered into a spiral of distrust as discussed by Munns (1995).

The hypothesis for this stage was presented in Chapter 6 and posited that IS project teams would co-operate (trust) no less than if the decisions to co-operate were decided at random. Recall that from the Axelrod (1984) experiment the Non-strategy (i.e. using random data) produced the lowest score from 15 different strategies.

Additional tests for significance were also conducted to test the hypothesis. These indicted that the data used in scenario 1 was from a different population to the data used in the simulation of using the Non-strategy. This was significant as it indicated 'something else' other than chance had produced the difference in the results. The players had demonstrated that they had used rational choice decision making to form their judgements, i.e. they chose to co-operate less than when random data was used. The data collected from scenario 2 was also compared with the data from the Non-strategy. This result indicated that it was with more than 99% certainty that the data for the Non-strategy came from a different population than the data for scenario 2.

In both scenarios the players had signalled that they were not prepared to co-operate, to a level that could have been achieved even through chance. The null hypothesis; that there is no difference between the co-operation in scenario 1 and the figures obtained using a Non-strategy, therefore, fell. Something other than chance had produced the difference in the results between the Non-strategy and results from scenarios 1 and 2. The conclusion from this result was that the conscious decisions made by the teams not to co-operate had caused the difference. The reason for their behaviour was that they were not able to be confident and trust that the other teams would also co-operate and not seek personal advantage. It is believed that this is a significant finding for the project management community.

In a project environment when the teams have little or no prior knowledge of the other teams, they are likely to be wary of the intended behaviour of the other teams. In this context, this research has demonstrated that some teams will operate at the lowest level of trust (calculus). They are likely to use a strategy of self-interest, resulting in opportunistic behaviour, rather than working at a higher level of trust (knowledge-based, social trust).

An increase in communication was found to improve the level of co-operation in projects based on 'swift trust'. However, it was observed that even with unlimited communications, there was a high probability of decay in co-operation over time. Maintaining staff morale and motivation throughout the stages of a project is important. Knowing that co-operation has been demonstrated to decay over time is also a significant point for those managing IS projects.

Obtaining commitment from all stakeholders requires a high degree of trust. This is required specifically when the stakeholders work at the social level of trust. At this level of trust individuals expect others do not act in an opportunistic manner but will make their decisions for the general good of the organisation or project, sometimes called fiduciary trust. It was argued that if stakeholders feel surprised at the end of a project, it could be that their expectations set at the start were not realised for the project. However, when stakeholders feel a level of disappointment at the end of an IS project this can still result in the project being classed as a success; because achieving a sub-optimum of stakeholder's requirements can be considered as success.

In order to provide improved information to enable a higher level of trust to be possible, the framework for a Trust Audit has been proposed. Other researchers had considered the benefit of trust inventories and measurement schemes. However, they did not go far enough or take into account the specific attributes of IS projects and their staff. It was recognised that it may be difficult to measure trust, however, it was considered possible to identify the levels and types of trust linked specifically to the stakeholders involved with IS projects.

It was, therefore, possible to indicate how a Trust Audit would be developed and this was presented in Chapter 8. For example, the Trust Audit takes account of the stakeholders as identified in the PRINCE 2 project management methodology and covers four areas of trust namely:

- Vulnerability (to the action of others),
- Credibility ('can' professional and technical and 'will' fiduciary),
- Culture (of the organisation),
- Visibility (and openness of information).

The risks identified specifically linked to issues of trust, as identified from the analysis of the results from a Trust Audit, could then be managed to contribute to the success of future IS projects.

9.4 Conclusions

From the analysis and evaluation of these research findings, the following 11 conclusions are made. Most of these could be developed into further research actions and suggestions are offered (*in italics*) into how these could be progressed.

- The existing split between the way success and failure factors are researched and reported is confusing. A recommendation to combine and rank the success and failure factors into one framework has been made in Figure 2.7. *It is further suggested that that process would be supported by the use of a new single term that could be calibrated as both positive and negative. Some factors were found to exist in both categories of success and failure while others were only considered as being part of one. Failure factors were described as the most critical of critical success factors and these should be identified. It is suggested from the analysis of this research that a new critical of critical success factors would be the level of trust in the project teams and this would be dependent on several factor, such as the organisational structure.*

- Consider the use of additional success criteria as suggested in 'The Square Route'. It is recommended that not all criteria need to be objective and quantifiable. *Other, subjective criteria such as using the concept of prudence should also be encouraged and research could be conducted to identify the requirements of all the stakeholders.*

- The inclusion of the criteria: cost, quality and time, in most of the descriptions for project management, could produce a misleading perception insofar that these criteria may be the focus and the only criteria to be used to measure success. *It is suggested that a description for project management which does not limit the focus to these criteria may help prevent any misunderstanding about how success could be measured. Examples of this can be seen from Ward: 'It is an interdisciplinary process of achieving a satisfactory end result', and Turner: 'it is the conversion of vision into reality'. The definition suggested by the author is: project management involves the application of knowledge, skills and intuition to deliver an acceptable product or change.*

- Adopt a more flexible method of defining aims and objectives at the start of an IS project, in keeping with the Rapid Application Development (RAD) method. At the same time the objectives must be shared by all participants. This will increase the level of trust at the start of the project which, was found to be associated with having clear, but not rigid objectives. *The development of a project initiation document, the ideal contents of that need to be identified as further research needs to be trailed. This would include a study into the degree to which, stakeholders are prepared to forgo their specific requirements in the search for agreed project objectives.*

- Dissolving rather than resolving the ability of teams to improve self-interest would increase the focus on project or business objectives, rather than team objectives. It is proposed that this could prevent teams from behaving at the lowest level of trust (calculus), where there is a chance to use opportunistic behaviour against other teams who are vulnerable to the actions of others. This requires the design of a non-zero sum finitely repeated project environment made possible by having forgiveness in place of penalty clauses. However, total or blind trust is not desirable and some controls will always need to be used to prevent the chance of spectacular failures. *It is suggested that* *the controls which would support this include those available at the start of a project. These include having a rigorous team selection process that provides a triangulation of evidence that both technical ability and fiduciary trust are at the required levels. These type of controls are of the preventative rather than disciplinary nature. It is further suggested that the level of penalty that an individual or team would be given to prevent them from not co-operating should be considered. For example, in Project Paradox scenarios the rank order of the Payoffs maintained the 'essential tension' of the Prisoner's Dilemma. However, the Payoff value of -10 may have been a risk worth taking not to co-operate. It would be interesting to identify the threshold Payoff value for 'Punishment' that would influenced the level of co-operation, this being an example of a preventative control.*

- Benefits have been linked to long-term project teams. Currently they are known to give the teams a chance to increase the level of trust from calculus to knowledge-based trust and possibly to the highest level of identification-based trust. *This initiative could include a comparison between research variables such as using 'strong' and 'weak' matrix project structures. Part of that research could include the impact to the success rate of IS projects when consultants are involved, since they would be a component of a 'weak' matrix.*

- Improved levels of information and communications were linked to an increase in co-operation and trust. All options to facilitate information flow and communication channels between teams should be considered. *For example, information is unlikely to be either complete or perfect. However, it has been shown that mistrust develops if people believe or discover that information has been withheld. To overcome this, it is suggested that communication between the project manager and the team members either via anonymous questionnaires or interviews should take place to identify whether or not, staff have a concern about a lack of information. The aim would be to ensure all stakeholders are not surprised by the outcome of events, since this has been linked to poor communication. At the same time, the stakeholders should be encouraged to accept a sub-optimum of the overall requirements since such an outcome could still result in the project being a considered to be a success.*

- The analysis from this research has shown that if the decision makers in project teams are subsequently affected by the decisions, they are likely to use rational economic decision making to inform their judgement, in an attempt to obtain the best for their team or personally. A recommendation to address this problem is to use 'trusted intermediaries'. They could base their decisions from a neutral independent position and have the overall business or project aims uppermost in forming their decision making, rather than personal gain. *Other researchers have indicated that there is no such thing as an independent third party within a project team. It is suggested however, that academics or a small team selected from a professional body could provide advice to IS project teams. The question would be, who would pay and are they clearly independent? To overcome this it may be possible for organisations to contribute to a fund of independent advisors that could be managed through professional bodies.*

- Further develop Project Paradox into a group or family of games to test for additional types and levels of trust. *This could be achieved by the introduction of other trust games that simulate the 'one-shot' environment and one that requires sequential rather than simultaneous decisions needed by the Prisoner's Dilemma. Different types of decisions are taken in IS projects and extending Project Paradox to include these would ensure a more representative view of a team or project environment trustworthiness, the results of which could be included in the Trust Audit.*

- Consider additional team building activities. Fiduciary trust is the type being tested during outdoor team building activities. However, team members are unlikely to let others become injured in these type of exercises. The type of trust that project teams have been observed to use has been demonstrated to be rational economic (calculus trust). *Including a game such as Project Paradox as part of team building would increase the benefits of such activities, as the teams would understand the ramifications of both social and economic types of trust.*

- Include trust as part of a formal risk schedule. Research indicates project managers use the left hemisphere of the brain in preference to the right hemisphere in work related activities. Trust is a factor that will reside in the right hemisphere, however, including trust in a risk schedule will transfer it to a technical task i.e. those controlled by the left hemisphere of the brain, the side found to be used most by IS project managers. *A framework was presented in Chapter 8 that demonstrated how a questionnaire targeted at the stakeholders of an IS project would indicate the level and type of trust in the team and organisation. From this it would be possible to indicate whether the risk of low trust existed and that some appropriate risk management should be carried out.*

9.4.1 Concluding Remarks

The dependency on accurate and timely information systems continues to increase while the success rate for IS projects remains low. This research has concluded with 11 initiatives to help address the problem.

The key finding from this research relates to the importance of identifying trust as a risk within IS project management; a factor that was previously ignored before this research started and that now requires further research. It is recommended that the practical application of both the Project Paradox simulation and the Trust Audit, will contribute towards educating the IS community about the issues of trust as a critical success factor.

Appendices

Appendix A

Subjects covered by the UK APM BoK (1995)

Project management	Organisation & People	Techniques & & Procedures	General Management
Systems Management	Organisational Design	Work Definition	Operational/Technical Management
Programme Management	Control & Co-ordination	Planning	Marketing & Sales
Project Management	Communications	Scheduling	Finance
Project Life Cycle	Leadership	Estimating	Information Technology
Project Environment	Delegation	Cost Control	Law
Project Strategy	Team Building	Performance Measurement	Procurement
Project Appraisal	Conflict Management	Risk Management	Quality
Project Success	Negotiation	Value Management	Safety
Failure Criteria			
Integration	Management Development	Change Control	Industrial Relations
Systems & Procedures		Mobilisation	
Close Out			
Post Project Appraisal			

Appendix B

Subjects covered by UK BoK (2000)

General

Project Management   Programme Management   Project Context

Strategic

Project Success Criteria
Strategy/Project Management Plan
Value Management
Risk Management
Quality Management
Health, Safety & Environment

Control   Technical   Commercial   Organisational   People

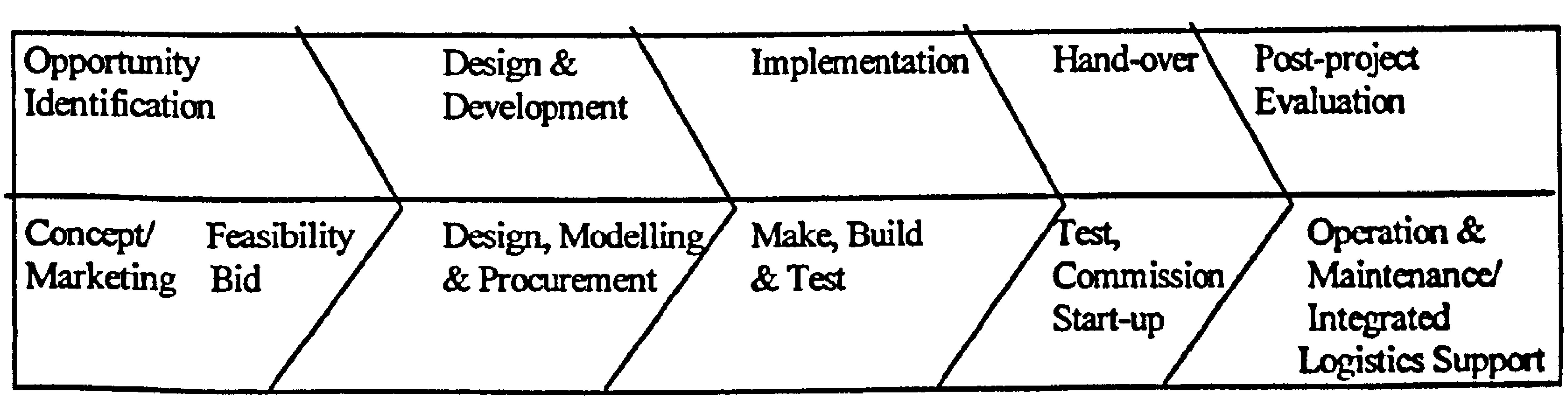
Control: Work Content and Scope Management, Time Scheduling/Phasing, Resource Management, Budgeting & Cost Management, Change Control, Earned Value Management, Information Management.

Technical: Design, Implementation & Hand- Over Management, Requirements Management, Estimating, Technology Management, Value Engineering, Modelling & Testing, Configuration Management.

Commercial: Business Case, Marketing & Sales, Financial Management, Procurement, Legal Awareness.

Organisation: Life Cycle Design & Management, Opportunity, Design & Development, Implementation, Hand-over, (Post) Project Evaluation Review (O&M/ILS), Organisation Structure, Organisational Roles.

People: Communication, Teamwork, Leadership, Conflict Management, Negotiation, Personnel Management.



Source: Morris, P.W.G. & Dixon, M. (2000)

Appendix C

Profile of management writers Source: Crainer (1998)

Author	What	How
Bower	Teamworking	**Trust**
Carnegie	Communication	Sincerity
Champy	Roles, style and systems	Critical measures of performance
Demming	Quality	Statistics, **trust**
Drucker	Management by objectives	Educating
Henderson	Cash management	Boston Square business model
Juran	Quality:	Self-supervision
Ohmae	Strategy	Use of key Factors
Peters	Excellence	Freewheeling project-based structures
Taylor	Scientific management	Planning and control of every action
Barnard	Organisation objectives	Communicating
Fayol	6 Principles	4 Activities
Geneen	Unshakeable facts/analysis	Meetings, information
Matsushita	Customer service	Focus upon benefits
Packard	Involvement/leadership	Management by Wandering Around,
Sloan	Management structures	Strategic business units, education
Watson Jr	Company beliefs as core values	Polices, practices, goals
Ansoff	Strategic planning	Task and Gap analysis
Argyris	Organisation learning	Staff learning built into jobs
Bennis	Leadership	Vision, **trust**, communication and learning
Handy	Managing chance	Information, Intelligence and Ideas
Herzberg	Motivation	Understanding hygiene and motivation factors
Jaques	Objectives	Responsibility for long term decisions
Kanter		Empowering individuals
Kotler	Marketing function	Using different product perspectives
Levitt	Marketing	Focus upon customer not the product
Lewin	Change	T(raining) groups
McGregor	Motivation	Theory X (lazy) theory Y (reliable)
Maslow	Motivation	Levels of personal needs. Clear goals/objectives
Mayo	Motivation	Teamwork and communication
Porter	Strategy	Customer, costs, clear goals
Pascale	Management framework	7S model. Based on Systems(3) and people(4)
Minzberg	Roles of management	Interpersonal, Informational, Decisional, Scheduling and Negotiating

Appendix D

Organisations who contributed and did not request anonymity

AT&T
Lloyds-TSB
Zurich Municipal
Portman Building Society
Government Crown Agents
Sema Group
Booker Belmont Wholesale
Consultants MCP
Reuters
Exel Logistics
AMP
Glaxo Wellcome
British Airways
Ministry of Defence Director General of Information Technology Systems
Shell UK Ltd
AGF Insurance
Thames Water
Lombard
Group 4
Bull Information Systems Ltd (Integris)
Royal Mail
Eldridge Pope
Reed Personnel
P & O Properties
Intel
Barclays
Ordnance Survey
National radiological protection board
Rank Xerox
Vosperthornycroft Control Ltd
ICL
Poole Hospital
Marks and Spencer
SC Johnson Wax Ltd
National Health Service Trust
Banque Nationale DeParis

Other replies were received from companies who were prepared to provide data but requested anonymity. Those were major companies who represented the following sectors: publishing, insurance, cosmetics, manufacturers, information providers, brewery, confectioners and the arts.

Appendix E

Questionnaire 1 (252-256)

Successful IS Project Management

The aim of this research study is to understand the decision variables and their influence in the successful implementation of IS/IT development projects. The meaning of the word project in this questionnaire is limited to that boundary. The results from this questionnaire will enable the identification of some of those variables which will provide a focus for detailed research to be conducted.

A successful project for the purpose of this research would be one that met the agreed business requirements.

The research report will not attribute any remark or reply to any individual, organisation or company.

Thank you for taking time for this research.

Roger Atkinson

Question 1

How many successful projects have you been involved in within the last five years:

[ ]

Question 2

How many un-successful projects have you been involved in within the last five years:

[ ]

Question 3

When you begin or join a project, what are your expectations of success?

Low success expectations	1	2	3	4	5	High success expectations
	○	○	○	○	○	

For questions 4 to 13 please base your reply on only one successful project with which you were involved.

Question 4

In your opinion, what were the three most important factors that influenced the successful implementation of the project?

[ ]

[ ]

[ ]

Question 5

a) Was a project management methodology used?

O Yes

O No

b) If yes, which methodology?

Question 6

a) Was a systems development methodology used?

O Yes

O No

b) If yes, which methodology?

Question 7

a) Were any CASE tools used?

O Yes

O No

b) If yes, which CASE tools?

Question 8

What was your involvement in that project? For example, PM, User, Technical Supplier...

Question 9

In which of the five broad financial bands did that project belong?

O Up to £50,000
O Between £50,000 and £100,000
O Between £100,000 and £1,000,000
O Between £1,000,000 and £10,000,000
O Over £10,000,000

Question 10

How many full time project staff were employed?

☐

Question 11

a) Were external consultants used at any stage of the project?

○ Yes

○ No

b) If yes, please list the stages.

Question 12

How long did the project take from start to successful implementation?

☐ Yrs ☐ Mths

Question 13

To what extent was the project solution based on bespoke or Off The Shelf (OTS) packages? Please select 1 or 5 as appropriate. If a combination of bespoke and OTS was used, please select 2 to 4 to indicate the balance as appropriate.

	1	2	3	4	5	
Bespoke	○	○	○	○	○	OTS

Question 14

In your opinion do you believe trust between project team members or others involved with the project to be of importance?

	1	2	3	4	5	
Trust not important	○	○	○	○	○	Trust is important

Question 15

Have you, during the life of projects in the last five years, felt that trust had been broken?

	1	2	3	4	5	
No Project (i.e. Never)	○	○	○	○	○	All Projects (i.e. Each and Every Project)

Question 16

Do you consider management controls are capable of compensating for a lack of trust?

- O Yes
- O No

Question 17

What criteria would you consider using when judging whether a project was successful?

Question 18

In your opinion, over the last five years was the trend more or less likely that a project would be successful?

Less likely	1	2	3	4	5	More likely
	O	O	O	O	O	

Question 19

Please provide *any* further information you believe to be a variable likely to influence the success of a project.

Question 20

If you have been involved with an un-successful project, in your opinion, was anything overlooked, forgotten or missed? Please give examples as appropriate.

Optional

Please supply the details requested below if you would consider answering a further questionnaire.

Name:

Address:

Telephone:

Submit Questionnaire | Clear All Values - Start Again

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This document last updated on Mon Mar 18 1996 12:41:01 by Dr. Adrian R. Warman

Appendix F

Questionnaire 2 (258-262)

Successful IS Project Management

The aim of this research study is to understand the decision variables and their influence in the successful implementation of IS/IT development projects. The meaning of the word project in this questionnaire is limited that boundary. The results from this questionnaire will enable the identification of some of those variables which will provide a focus for a detailed research to be conducted.

A successful project for the purpose of this research would be one that met the agreed criteria

The research report will not attribute any reply to any individual, organisation or company.

Thank you for taking time for this research.

Roger Atkinson Senior Lecturer The Business School :

Questions 1 -3 : About you

Question 1

How many successful projects have you been involved in within the last five years?

....

Question 2

How many failed projects have you been involved in within the last five years?

.... failed projects

Questions 3

In total how many years have you project managed?

.... Years

Questions 4 - 13: About a specific project

Question 4

What were the *criteria* against which success was measured?

....

....

....

Question 5

In your opinion, what were the most important *factors* leading to success ?

....

....

....

Question 6

Were any project management methodologies used? Please circle as appropriate

Yes No

If Yes, which? ....

Questions 7

Were any systems development methodologies used? Please circle as appropriate

Yes No

If Yes, which? ....

Questions 8

Were any CASE tools used? Please circle as appropriate

Yes No

If yes, which? ....

Question 9

In which of the five broad financial bands did the project belong, Please circle as appropriate

1. Up to £50,000
2. Between £50,000 and £100,000
3. Between £100,000 and £1,000,000
4. Between £1000,000 and £10,000,000
5. Over £10,000,000

Question 10

How many staff were employed?

.... number of staff

Question 11

Please list any stages during which consultants were employed

....

....

....

Question 12

What was the elapsed time for the project from start to implementation

.... Years .... Months

Question 13

To what extent was the project solution based on bespoke or Off-the-shelf (OTS) packages? Please circle 1 to 5 to indicate the balance as appropriate.

Bespoke 1 2 3 4 5 OTS package(s)

Questions 14 - 19: Any project

Question 14

In your opinion, do you believe trust between team members or others involved with a project to be of importance to achieving the success criteria ? Please circle as appropriate.

Trust is Important 1 2 3 4 5 Trust is not important

Question 15

Have you during the life of a project believed trust to have been broken or lost? Please circle as appropriate

No Projects 1 2 3 4 5 All Projects

If yes please describe the cause.............................. ....

....

Question 16

Do you consider management controls are capable of compensating for a lack of trust ? Please circle as appropriate.

Yes No

Question 17

What criteria would you consider using to measure whether a project was successful

....

....

....

Question 18

In your opinion, is the trend for project management to be less or more likely to be successful?

Less likely 1 2 3 4 5 More likely

Please suggest what you believe has caused the trend

....

....

....

Question 19

When starting a new project it is likely that you will make some assumptions which would have to come true to improve the likelihood of project success. Please list any assumptions you make when starting a new project. E.g. staff will remain until project completion.

....

....

....

Question 20 Failed projects

Question 20

The cause or reason for project failure may have been because some task was carried out incorrectly i.e. a sin of commission. It is also possible that the reason for project failure was because some task was forgotten i.e. a sin of omission. Please list any *sins of omission* which in your view may have contributed to the failure of any IS/IT projects.

....

....

....

Signature of person completing questionnaire ....

Optional

Please supply details requested below if you would be prepared to answer a few questions over the phone. Calls would require only a few minutes to complete and will be arranged for a time convenient to you.

Name..

Company..

Telephone...

Please send replies to:

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Tel: 01202 595582
E-mail ratkinso@bournemouth.ac.uk

Appendix G

Project Paradox Rubric (264)

The Project Management Business Game

Welcome to work. You have been selected to join a new project in one of three important roles. The project executive have decided to operate the project within a formal project management style and structure. The executive are also aware of the dangers of following in a prescriptive way a rigid method and have agreed terms with the project manager which provides for some intelligent, loose interpretation of formal guidelines. Accordingly Senior Business, Senior Technical and Senior User positions within the project have been created. You will fulfil one of these posts. Project PARADOX is to introduce a new global information systems network for a newly merged business venture in travel and sport holidays. The new company is GLAX-Oil Holidays Ltd. The two original established companies have been involved in the manufacturing industry, but both believed however the time seemed right to expand into the growing leisure and travel service industry.

Working for you are a team of highly dedicated, motivated and educated project staff. It is likely that you may also have the opportunity to bring with you one or two staff from your previous projects. This is now accepted as usual business practice. Take it for granted that your team can and will provide the best advice and support possible. Your colleagues, the other two Senior Directors also have teams equally capable of providing support within their functional areas.

The task as always is to implement the project on-time, within budget and to the agreed quality criteria as yet to be agreed. Within the organisation is a performance related bonus scheme which relates to the three Senior Directors and their staff. If you are seen to be performing well as a unit, team rewards are yours. The other directors have the same contract as you and their staff will also personally benefit if they can demonstrate a high performance within the life of the project. The performance related pay (PRP) measurement scheme will be awarded on a did-you-do-it-right basis. This requires the project to be on-time to budget and with quality requirements. Other possible project success criteria, reflecting did-you-get-it-right, will not be considered for the PRP. That is to say for example, did the end-users like the end product or did the results of the post implementation review, held 6 months after project closure, indicate the system was accurate and supported business targets. The project will be split into seven stages. The exact name of these stages is not important. You could consider for example the project to be managed using the one pass 'Waterfall' development method with stage names such as feasibility, design implementation following in sequence to completion. Using the Rapid Application Development (RAD) or Rapid Incremental Development (RID) method with seven iterations for decision making are other ways to consider the project.

The matrix below in Table 1 indicates the possible decisions both you and your colleagues can make and the resultant bonus or penalty each decision will yield to both you and them.

Table 1

Business	**Y 300**	**Y -100**	**Y -100**	**Y -100**	**N 500**	**N 250**	**N 250**	**N -10**
Technical	**Y 300**	**Y -100**	**N 500**	**N 250**	**Y -100**	**Y -100**	**N 250**	**N -10**
User	**Y 300**	**N 500**	**Y -100**	**N 250**	**Y -100**	**N 250**	**Y -100**	**N -10**

Good Luck

Appendix H

Examples of Feedback from The European Aeronautic Defence and Space (EADS) Systems and Defence Electronics Run in Germany Nov. 2003 after participating in a Project Paradox Workshop.

- A positive contribution would be achieved at 'all' levels of the organisation hierarchy by 'all' functional occupational classes participating in Project Paradox workshops.
- Taking part in Project Paradox workshops influenced how working in teams in the future would provide confidence from the beginning but beware of 'dirty tricks' and abuse of confidence.
- As a result of participation in Project Paradox workshops the following emergent learning and issues related to trust were reported. 'Once broken there is no way back to trust and co-operate'. 'Without trust there is no way forward for a project and failure is the outcome: no satisfaction and no benefit to anyone'. 'If trust and co-operation can be built, then the project will move fast and successfully'.
- 'It is easy to lose the trust of other people but very difficult to earn it again'.
- 'Each member of an organisation can make a positive contribution because each member has different experiences and therefore a different behaviour in project work: the workshop is a good way to analyse this behavior'.
- 'I think the environment created in this workshop was very realistic'.
- The most appropriate time to participate in a Project Paradox workshop would be either '... before joining a project team or ... during induction'.
- Taking part in a Project Paradox workshop influenced the approach to working in teams in the future because 'I will always co-operate initially instead of simply weighing up the best way of achieving own ends'.
- 'I learned that it is always better to trust initially'.

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