The integrated management model: Risk Management driven decision-making in IT Projects

Fayez Albadri
Ernest Jordan

Macquarie Graduate School of Management
Macquarie University, Sydney, Australia

Abstract

Although there is some agreement on the value of risk management (RM), there is a disagreement about key concepts, definitions, roles and applications. There is also lack of a clear understanding of the relationship between RM and project management, both of which need to be used in major projects. The aim of this paper is to test, through case studies, the real risk management related issues in IS projects. A risk management model is proposed based on the analysis of existing RM approaches, standards and guides and supported by findings from typical IT projects case studies. The proposed model is integrated with project management and planning and can be used by management as an effective decision making tool. The paper suggests the main features and the general outline of the proposed model. The detail of the model, its testing and fine-tuning are part of a comprehensive work that is a subject of a doctoral research.

1. Introduction

The uncertainty surrounding the Y2K problem, and its likely impact on government and corporate business over the last decade, resulted in a sense of urgency in executives and decision-makers to seek means of protection. This was most clearly manifested by a corporate focus on important 'mission critical' systems and the development of strategies, contingencies and new projects [25]. Whilst some organizations have chosen to fix their existing systems, many others have treated it as an opportunity to put to rest their old systems and to invest in new technology systems of strategic value. Generally this has led businesses to seek solutions offered by large scale integrated corporate systems such as Enterprise Resource Planning software (ERP) and Computerized Maintenance and Materials Management Systems (CMMMS) [2]. In many cases, the huge investments involved were justified by the high priority given to this problem based on perceived risks rather than a realistic Return on Investment (ROI) study.

Amidst this intensive environment of project management and system development in many organizations, IT & IS management professionals and consultants are increasingly finding it hard to adopt one reliable approach to deal with project risks. There are conflicting messages and a great deal of confusion about the role of risk management in system development and its relationship to project management, incident management and contingency planning. The importance of this issue is highlighted by many projects failing to deliver the forecast benefits. Surveys conducted by management consulting and professional groups such as PwC, D&T and E&Y indicate the scale of the problem. Some studies suggest that as low as only 10 per cent of systems in the United States are successfully implemented to their initial expectations. Other studies indicate that the rate of failure and cancellation of large systems can be as high as 50% [7].

The recent Ernst & Young study, *An Australian View of RM*, provides an insight to corporate commitment to RM. The survey covered 260 of Australia 's Top 2000 organizations. [24]

- 87% of Australian organizations believe the importance of RM.
- Less than 50% of the Australian IT organizations think that RM is very important to their business.
- 39% of the organizations do not have RM documentation
- Less than one third of the organizations have actively managed risks.
- Four out of ten organizations do not include RM as a regular board agenda item.
- 35% of the organizations do not have a process to update their risk profile.
- There are considerable differences in adopted RM approach.
- Government and IT have yet to fully embrace sound RM policies.

Many of the failures associated with system projects, delays, cancellations and failures, highlight a persisting problem associated with the lack of, or the ineffective use of risk management. These inadequacies are attributed to the lack of reliable RM models that can be integrated into the project management process and system development methodologies. It is the intention of this paper to demonstrate, through case studies, the real RM issues in information systems development projects, and to build and suggest a risk management process model specifically aimed at major developments, such as ERP and CMMMS projects.

2. Risk Management

2.1 Definitions of risk

In the English language the term risk is used interchangeably with words such as danger, jeopardy, hazard, uncertainty,

chance or peril. Other definitions of risk used in RM literature include the possibility of loss, injury, disadvantage or destruction [14], and the exposure to the possibility of such things as economic or financial loss or gain, physical damage, injury or delay, as a consequence of pursuing a particular course of action [4]

Risk management is commonly defined as the process of identifying risks, implementing strategies to manage them, and designing contingency plans to supplement those strategies should the risk actually begin to affect project success [14]. Other RM definitions include the prevention of unwanted negative consequences of an event from which there is no prospect of recovery [1], or the systematic application of management policies, procedures and practices to the tasks of identifying, analyzing, assessing, treating and monitoring risk. [15]

Risk analysis is a systematic use of available information, to determine how often specified events may occur, and the magnitude of their likely consequences. Whereas risk assessment is variously described as the process that assigns a probability of occurrence and severity of consequence to a project risk or the process used to determine risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria. [15]

2.2 Risk concepts and types

Looking back at risk definitions, it is not hard to notice the implicit or explicit linkage between risk and uncertainty. It is because of this uncertainty that a need arises to manage risks every time management needs to take a decision on a course of action [14]. Long before RM had become a formal discipline, assessing risks by decision makers and project managers had been a mental exercise that incorporated a concept of measuring risk through the likelihood of an event, and the consequence of its happening. The multiple attribute utility theory has been based upon subjective expected utility since the '30s. Accordingly, the theory of risk is based on the simple probability theory.

Standards Australia (1995) states that "Risk is analyzed by combining estimates of likelihood and consequences in the context of existing control measures. "… The likelihood of events occurring and the magnitude of their consequences, are evaluated in the context of these existing controls. Likelihood and consequences are combined to produce a level of risk". Risk assessment involves comparing the found level of risk with previously established risk criteria, and deciding whether the risk is acceptable or not.

Risk management is generally qualitative and subject to judgement colored by experience, prejudice and politics. However, the use and application of the 'principle of newness' in relation to risk can improve the process and the outcome [14]. The suggestion by some researchers that 'newness' is the only real source of important risk leads to a more practical definition of the scope of work in risk management. Consequently, risk management involves identifying the new aspects in question, and then adopting strategies to avoid, mitigate or otherwise accommodate the issues identified according to priorities suitable for the project. This promotes the importance of applying tests of newness to the activities, tools, resources and products that constitute the venture. The other risk principle to be highlighted here is the relative nature of the seriousness of risks (the combined consequences and likelihood). No two projects will have the same risks and no two organizations will face the same consequences for a given set of risks. [14].

2.3 Risk management approaches

As the concept of managing risk was increasingly finding business applications especially in the area of Finance and Insurance, RM has started evolving as a new discipline. The early nineties witnessed the formalization of RM with the publication of some risk articles and the release of different risk management standards and corporate risk guidelines and manuals. Major consultant groups took the lead by suggesting risk management procedures and plans as part of system development methodologies. (E&Y, PwC, D&T, KPMG, BSC, etc).

As the importance of RM has become increasingly recognized, there have been many attempts by different professional groups, researches and standards, to define, or redefine, RM, its structured processes and its applications. Most notable of those are Standards Australia, Standards New Zealand, professional risk associations and other consultant and professional groups. Academic institutions also have contributed to the promotion of Risk Management as a discipline by offering courses and units as part of the management and business graduate and postgraduate programs. All the above, and many others, have made a significant contribution to RM. However, for the purpose of this study, a brief investigation of the RM approaches as proposed by some of these groups has been undertaken. These groups have been selected because they are considered representative of the different risk approaches and models adopted by business. The purpose here is to compare the similarities and differences among different approaches.

2.4 The Australian/New Zealand Standard for Risk Management

This standard provides a generic guide for the establishment and implementation of RM process involving the identification, analysis, assessment and ongoing monitoring of risks. It also provides the following analysis and documentation tools in its appendices: [15]

- Application of RM
- Generic Sources of Risk and Areas of Impact
- Qualitative Risk Analysis / Matrix
- Steps in Developing and Implementing RM Program
- Examples of Risk Definition and Classification
- Quantitative Risk Expressions

Although useful and simple to read, the standard is too generic and subject to interpretation when applied to major projects where project management is also applied. It does not address issues specific to IS projects and it does not propose a rigorous model. Although it suggests that RM can be used as a decision making tool, it does not explain how or to identify specific decision points with the exception of the 'Risk in Procurement' Guidelines.[6] [16]

2.5 The DSMC Risk Management Guide (RMG)

The US Defense Systems Management College (DSMC, 1989) [9] Risk Management Guide is one of the longest-established protocols for military and high-tech projects. It establishes generic stages for RM:

- Identify concerns
- Identify risks & risk owners
- Evaluate the risks as to likelihood and consequences
- Assess the options for accommodating the risks
- Priorities the RM efforts
- Develop RM plans
- Authorize the implementation of the RM plans
- Track the RM efforts and manage accordingly.

In reviewing this approach, based on the assumption that the programs under consideration involve significant development activities in software, hardware and operational concepts, Simmons (1998) suggests that this offers guidelines for managing risks and proposes a RM approach but stops short of adopting a model. It also reinforces the point that management is responsible and accountable for RM.

2.6 ADCMS Australia Project RM Guidelines

The objective of this document [9] is to promote the understanding and use of RM techniques. It is intended for managers within the Western Australian Department of Contract and Management Services (DCAMS). The emphasis of this document is on the identification, analysis and treatment of project delivery risks. It suggests that because projects are unique, there is a high degree of uncertainty in achieving a project's objectives. Even though most processes within projects are relatively stable and predictable, the relationship between the processes is such that the outcome is sometimes uncertain.

The Project Risk Management Process suggested in this document is similar to other risk standards. Through each step, there is a monitoring and review requirement to ensure that the RM process is effective, however, the level of risk analysis tools and techniques required depends on the particular project requirements and the data and information available. A comparative analysis using subjective methods may be used to assess broad project risks and determine priorities, but more detailed analysis may be required for specific risks. The guidelines discuss different analysis techniques, with a strong emphasis on qualitative methods.

2.7 The Chapman / Ward Approach

The widely used book by Chapman and Ward (1992) [3] suggests a framework for integrating RM into management of projects. It does so by attempting to map well defined RM processes to corresponding stages of the project life cycle. The emphasis is on processes rather than documented analytical techniques. The authors recommend that practitioners develop their own responses - with experimentation and innovation - to particular situations rather than adhere rigidly to generic approaches. The notion of "risk efficiency" is a central theme of their work because RM processes consume valuable resources.

2.8 CCTA PRINCE 2

PRINCE [18] (PROJECTS IN CONTROLLED ENVIRONMENTS), is a project management methodology covering the organization, management and control of projects. It was first developed in 1989 as a UK Government standard for IT project management. PRINCE 2, the new version of CCTA's project management is a process-based approach to project management. The processes define the activities to be carried out during the project. It also describes a number of *components* that are applied within the appropriate activities.

PRINCE 2 claims to provide better coverage of the management of risk by applying the concept of risk at activities level, however a close investigation indicates that the risk management component is like other components of secondary importance to the decision making drivers in managing projects. Its claim of integration is also questionable and seems to be linking the risk component to the primary project management rather than integrating both. [18] [23]

2.9 SEI's CMM Model

Software Engineering Institute (SEI) has developed the Capability Maturity Model for Software (CMM) to ensure that reliable and usable software can be developed on time and within budget. [22] CMM is a framework that describes the key elements of an effective software process. It describes an evolutionary improvement path from an ad hoc, immature process to a mature, disciplined process.

The CMM can be used for software process improvement, assessments and capability evaluations and it covers practices for planning, engineering, and managing software development and maintenance. When followed, these key practices improve the ability of organizations to meet goals for cost, schedule, functionality, and product quality. The CMM establishes a yardstick against which it is possible to judge, in a repeatable way, the maturity of an organization's software process and compare it to the state of the practice of the industry. The CMM can also be used by an organization to plan improvements to its software process.

2.10 The CRAMM Methodology

The latest version of the CRAMM methodology [20] released in 1997 provides a catalog of threats and countermeasures. The implementation of this risk model goes through three phases:

- Definition of study boundary
- Threat Evaluation
- Countermeasure selection

Risk evaluation includes evaluating assets, threats and vulnerabilities (impacts). The countermeasures reduce any of or a combination of the probability of threat occurrence, vulnerabilities and impacts.

2.11 The Holistic Risk Methodology

The Holistic Risk Assessment methodology, developed by Corroon and Oliver [12], is an approach for assessing the total risk of any undertaking, be it a commercial operation or a planned project, investment or opportunity. HRA is based on a proprietary database that divides any organization into ten segments. Consultants then work through an array of critical business exposures and from this develop a comprehensive risk profile for the client. The risk profile, as a management tool, can be used for strategic planning. "By developing the approach of an inquisitive non-executive director, HRA not only concentrates on key areas of total organizational activity but also filters any detected areas of concern into actionable points over realistic time frames." [12]

2.12 Summary

The approaches discussed above are typical of the attempts to formalize RM processes. It is evident that most of the usual RM approaches and models are considered ineffective and inappropriate for IS projects particularly because they fail to address the IS development / management issues. In the majority of cases they are not properly incorporated in system development methodologies and, in cases where they are, they are not properly translated into project plans. Furthermore, RM is not integrated with project management and there is a knowledge problem and general confusion about concept, roles and relationships. As a result, RM is not utilized effectively as a management decision-making tool.

Nevertheless, there have been few attempts to vitalize and use risk management to improve IT project management. Most notable are the Chapman / Ward approach, CTA PRINCE 2 methodology, SEI CMM model and others such as Rob Thomsett's work concerning risk assessment of IT Projects including his 'Third Wave' and 'INSIGHT' program [26]. These approaches get close to using risk principles within the IS project but do not commit to a comprehensive model that integrates risk management to project management decision making tools.

3 Research Methodology

The research methodology benefits from some of the concepts, considerations and arguments in Eisenhardt's case study research method (1998) [11]. We focus on understanding the dynamics present within two major projects and employ multiple level of analysis where needed. Combined data collection methods specific to the subject case study are used. The aims are to provide description, test theory, and generate theory. The research program is defined in broad terms and investigates risk management and its effectiveness in IT projects. In this paper we try to build from existing theory, towards a more comprehensive model that merges risk management and project management. It will be the task of future research to test that model.

The general features of ERP [8] and CMMMS projects and the environment diversity in which they are implemented qualify them to be selected as case studies for the purpose of this study. On one hand they are likely to replicate or extend the emergent theory because their general features are comparable, and on the other hand their scale and environmental diversity is compatible with the notion of building a model applicable across a range of IS project types. Overlap of data analysis with data collection is useful to give a head start in analysis and take advantage of flexible data collection, allowing adjustments to questions, data sources and research strategies during the data collection process. The real risk issues were noted as they were happening from within the two projects in team meetings.

4 Case 1: The CMMMS Project

4.1 The organization

The client was a major oil and gas company. Since its establishment in the early 1970s, it had developed substantial business interests in all sectors of the oil and gas industries including the exploration, production, refining of oil, natural

gas and other products. The organization structure was composed of business and support services divisions. The business divisions were concerned with the areas of exploration, production, gas processing, chemicals, refining and other services, whilst the support services divisions covered the areas of human resources, administration, finance, and management

4.2 The system

The organization had used a computerized maintenance system and an in-house developed computerized materials system for over 10 years, which had become outdated. The decision to replace the existing systems with an integrated CMMMS was driven mainly by the Y2K problem and the urgent need for a state of the art integrated system to cope with the rapidly increasing business requirements. The selection of the system was reached after an extensive package evaluation carried out by a team of participants from different business areas.

4.3 The project

The project's main goals included the establishment of a single centralized repository for materials and maintenance-related information and to utilize the best practice capabilities of the chosen CMMMS package with minimum customization. The project duration was 12 months with schedule completion by end of July 1999, with project procedures being derived from a standard project implementation methodology. The project major phases were analysis and requirements definition, design, development and implementation.

The "Project Plans" were produced and reviewed at the beginning of major phases. The detailed project plans with activities, duration, resources, constraints and deliverables were developed in agreement between the client and the vendor. Resources for the implementation of the project were drawn from both the vendor and the commissioning organization. The implementation team consisted of various business and technical specialized members from business units, the IS&T department and the vendor.

A project manager from the client side and an engagement manager from the vendor side managed the project. The client resources included a quality and control coordinator (QCC) and a group of business team leaders in the areas of maintenance, materials and procurement and IS&T department technical officers. The vendor resources included administrative, business and technical consultants in all areas of the business. From the outset of the project, members of the team were familiarized with the implementation methodology, project phases and deliverables, control plans, standards and procedures and were provided with the necessary system training.

4.4 Risk management procedures

A number of risks were identified for the project. Each risk was described, with the strategy adopted to manage the risk. Progress on RM was reported to a monthly project board meeting. The project progress was monitored and tracked by means of weekly and monthly progress reporting by the client and the vendors team leaders. Both meetings tracked deviations to the plan and identified issues and concerns and assigned corrective actions. Typical documents included the QCC-prepared analysis, progress and performance measurement testing documents.

4.5 Performance Indicators

- The delivered system has been tested and accepted by the client as being what they want. (differences between contractual and specification documents).
- It took over 6 weeks for the system utilization to go up to 70% of normal use. (Support problems)
- Customer satisfaction index 6 weeks after going live - Good.
- 25% of milestones payments were not on time (delays)
- 15% of the vendors mobilized project personnel failed to deliver and were demobilized with very little contribution to the project. (Recruitment of resources failure)
- The skill set of the client's representatives was not suitable for the project. (delays for unplanned education and knowledge transfer)
- Project control - documentation and standards were not adhered to. (delays - keep reinventing the wheel on project expense)
- Problems with the customer were largely due to lack of customer handling skills on the part of the project team.
- The ratio of project actual activities to planned activities ratio is very high (Indicating bad planning and / or uncontrolled execution)
- Three major components of the system have not been delivered (Technical / platform constraint)
- The project was delayed and overrun by 2 months using two resources dealing with pending issues.
- Huge client resistance to changing the contract formally, needing to get agreement at CEO level. (Not practical – caused delays)
- High customer users' resistance to new system (contained by change management activities at late stage)
- Bad quality of customer data. (delays)
- Actual worked hours / Budgeted hours =200%.(planning)
- Charged hours / Budgeted hours =140%. (overrun)
- Costing Variance : Estimated / Actual = -10%

5. Case 2: The ERP project

5.1 The organization

The client was a major Australian utility organization that was established in mid 1990s as part of a major restructuring of the industry. As a result, the organization faced key challenges including adopting a stronger commercial focus, improving the quality of the products and services, and introducing processes to ensure regulatory compliance. The organization provided utility services related to the supply of water and the collection, treatment and disposal of wastewater and drainage water on commercial basis. Water services were provided to over 700,000 properties and sewerage services for about 100,000 properties. A board of directors and a managing director managed the organization. The organization structure was composed of business divisions responsible for treatment, distribution, customer service, engineering and planning. The support production division covered finance and administration.

5.2 The system

Driven mainly by the Year 2000 problem, the client embarked on a major project that incorporated both replacing a significant number of existing systems and the repair of other systems, to meet future business needs. The replacement project - the one of interest to this study- covered many legacy systems. A core team of both business and technical professionals representing different business areas and divisions was formed mainly to lead a wider group of employees to identify where the current systems were failing, and to justify the need for change. There had been many problems with the legacy systems.

Consequently, the project core team completed a draft of the requirements of the new system and were involved in the evaluation of the proposed packages. The intensive effort of this team resulted in the selection of a reputable ERP integrated system and a recommendation to the board of directors that it replace the existing systems that had been in use over the previous 15 years. The ERP system was selected to be a corporate system solution to replace all the legacy systems in the areas of work management, asset management, supply, financials, contracts and project management. The decision to select and implement the integrated ERP was made based on a strong conviction that there was a need to concentrate resources in areas of most need and to rationalize all projects and ensure they fitted the strategic direction of the organization [7]

5.3 The project

The importance of the project to the organization's business warranted the full support of the board of executives. As a large investment and major change initiative, it was considered critical to deliver very significant benefits. The ERP system project team members reached a peak of 70 full time project employees, consisting of various specialized members from business units, IS&T, the vendor and the implementation partner.

In view of potential problems associated with future system upgrades, the project board agreed to a recommendation by the project manager to keep customizations of the system to a minimum and to enforce this, customization approval procedure were introduced. Comprehensive orientation workshops and seminars, and training programs were provided for all team members. This included project scope, plans, milestones, resources, methodology, deliverables, documentation, roles and procedures. The project adopted the implementation partner's standard methodology. Over a duration of 18 months the project was divided into five phases and detailed project plans and phase deliverables were produced by the implementation partner and agreed by the client.

5.4 Risk management procedures

The client and the implementation partner worked together to identify, prioritize and manage high risks. A number of risks were identified and described, with the strategy adopted to manage the risk. Progress on RM was reported to the monthly project board meeting. The project progress was monitored and both weekly and monthly progress meetings tracked deviations to the plan and identified risks, issues and concerns and assigned corrective actions. The main objective was to minimize the effects of risks related to critical success factors by adopting RM procedures and strategies to the identified risks. This approach has played an important role for a successful outcome. Several high priority risk related activities were addressed, monitored and tracked frequently throughout the project.

5.5 Performance Indicators

- The delivered system has been tested and partially accepted by the client. (Quality)
- System utilization has not picked up to normal levels a year after of going live. (Support problems)
- Late milestones payments (Project Delays / Cost)
- Late mobilization manpower resources. (Schedule delay)
- Some of the implementation partner consultants have limited experience.(Quality)
- Some of the client's team members failed to represent the business and functionality requirements. (Quality)
- Technical problems and delay with implementing the interfaces. (Delay)
- Major system components / module functionality does not meet prescribed business requirements.
- High customer users resistance to new system (contained by change management activities at late stage)

- Quality of customer data. (data preparation delays)
- Actual worked hours / Estimated hours =120%. (Delay / cost overrun)

6. Analysis

The two case studies which are the subject of this paper are representative of a class of projects with the following characteristics: high importance to business, major change, new technology, large investment, intensive IS development environment and shared resources between the vendor and the client.

6.1 Risk management awareness

Interviews with client and vendor employees in both case studies indicated that the majority of the employees had very little knowledge of RM concepts, procedures or value to the project. Risks, issues and concerns were interchangeably, inconsistently and conveniently, used in meetings and reports. This lack of clear understanding of RM and its role in the project resulted in many time-wasting, lengthy debates about definitions that escalated into disputes in some cases.

In both projects it was evident that difficult or problematic issues were frequently mistaken for high-risk areas. This resulted in misjudgments that led to problems with priorities and, in some cases, meant efforts and resources were concentrated in the wrong areas. Nevertheless, there were serious attempts by individuals in both projects to question the validity of the adopted methods and to promote a more effective approach.

6.2 Risk management methodology

Both projects adopted RM methodologies that were similar in that they covered the activities of planning, identification, analysis, management and tracking over two main phases, planning and implementation. The planning phase included producing a RM plan that contained all identified risks, associated risk level ratings and risk strategies and/or treatments. The effectiveness of RM at this planning phase was associated with the following measures:

- Participation of key business players with good RM knowledge,
- Identification of all risks,
- Rating of risks by means of qualitative and quantitative analysis based on agreed criteria,
- Adoption of RM strategies and treatments based on cost / benefit analysis of options,
- Assignment of risk ownership and accountability.

The implementation phase started with mapping risk treatments to activities in the project plan as prescribed in the implementation methodologies. The RM plan itself remained live for frequent reviews and analysis that were reflected on the project plan via the established map. The effectiveness of the adopted RM approach as a management decision making tool, was associated with the following:

- Effective projection of risk treatments into the project plan.
- Frequent review / tracking of the status of all risks.
- The need to redefine acceptable risks.
- The flexibility to add new risks or to delete risks.
- Speedy and effective execution of contingency plans if/when needed.
- Proactive remedial action.

6.3 Risk management planning

Identification of concerns and risks in the two projects followed the prescribed method in the adopted risk methodologies. However, it was not hard to notice that both used a high level approach in identifying risks. It is also possible to see that some of the identified risks are common to both projects, specially those which are associated with the 'newness' factor i.e. new system, new technology, new situation, new consultants. This is because of the uncertainty associated with newness.

In the ERP project a workshop was the forum for a risks brainstorming session led by a consultant and key players from IT and other business departments. A list of concerns and risks were created and discussed by the group and later circulated for review by branch managers and section leaders in all departments. In the CMMMS project, risk identification was based on a risk identification template that was provided with the RM methodology. The IS&T department led the creation of this list of risks. There was very little participation by employees in the process of producing a final list of risks.

The risk assessment / analysis used in both projects is highly qualitative. Although the adopted RM methodology suggests a risk rating based on the combination of impact and probability, the assessment in the CMMMS case did not incorporate probability. Both cases used three rating values of high, medium and low risks. The risk rating was mainly based on personal experience and gut feeling rather than on criteria defining value of loss or otherwise.

In both projects, the RM strategies used for the identified risks included a list of measures to eliminate or minimize the impact. These represented proactive measures and considerations to be included in the project plan. Both projects lacked a measurable change of risk level rating as a result of applying strategies. Properly conducted analysis would

include cost / benefit analysis based on a what-if evaluation of possible treatments and associated change of risk level. Risk value appeared to have been completely undermined. Furthermore, the decision to create contingency plans for some of the high risks was not as a result of proper analysis and consideration of all variables.

6.4 Risk management implementation

The applied methodologies provided guidelines and definitions for identifying and managing risks within the project. They also proposed RM strategies and methods for tracking identified risks, but fell short of clarifying how RM activities were to be projected onto the project plan.

The ERP project RM plan was done in isolation of the project plan i.e. risk treatments were not incorporated in the project plan as activities. However, risks in the RM plan were tracked in frequently held meeting between team leaders and the project manager. The project manager and his opposite number from the implementation partner discussed any changes of the risk status and the newly identified risks before they were forwarded, with executive summary, to the monthly risk board sessions for decisions.

It was evident throughout the project that risk changes in the RM plan were a reflection of changes in emphasis of the different phases' activities and deliverables. Unfortunately, because this was an isolated exercise, recommended actions were mostly cosmetic and generic in nature. This approach indicates a lack of confidence in RM to drive decision making in managing the project.

A more interesting case is the tracking of risks in the CMMMS project. In tracking the project plan for achievements and deviations in weekly progress meetings, a number of issues, concerns and actions were added to the relevant registers. Although this was a project management tracking methodology, some of these concerns were escalated to become risks, and were eventually forwarded to the monthly project board meetings. However, the lack of commitment to a formal RM process for use in decision-making resulted in uninformed or under-rated risk assessment.

The project plans changed drastically in activities, deliverables and resources over its life span. Such changes and other deviations from the plan (i.e. actual / plan comparisons) had no impact on the risk profile of the project. Overlooking such an important measure indicates a missing element in the adopted process.

To be well informed of the real significance of identified risks at any point in the project is a key indicator of the effectiveness of the adopted process. A risk assessment based on the criticality, probability and plan deviations should be used to compare the risk profile at any given point in the project with levels in the risk plan. Confusing *difficult* issues with *high risk* in the RM plan has resulted in artificially high-risk assessments that resulted in concentrating resources and effort on low risk areas.

6.5 Risks vs Performance Indicators

This paper is not the place for performing detailed analysis of the success or failure of the two projects. However, for the purpose of this study we focus on performance indicators, that are related to risk management. In the majority of cases, schedule delays, cost overruns or quality degradation of the delivered solution has resulted from risks that have been identified in the RMP but not properly managed. This highlights the strong correlation between the relative success of the project and proper management of identified risks. It also highlights the ineffectiveness of the adopted RM approaches that is short of integration to the management of the project and is not vitalized as management decision tools.

7. Conclusions

The RM approaches adopted in the projects give a clear indication that there is an undeclared lack of confidence or commitment to RM as a positive decision making tool in project management. Both projects adopted RM methodologies but failed to interpret them positively as project management tools. Because of lack of RM awareness or because of lack of commitment on part of management, all efforts in the planning and the implementation of RM failed to reap the benefit. The two case studies are supportive of this claim.

Although they provide some improvement, project management methods that do incorporate risks, such as Prince2 do not have the full benefit of integrating risk to decision making because they of artificial boundary between risk management and project management activities.

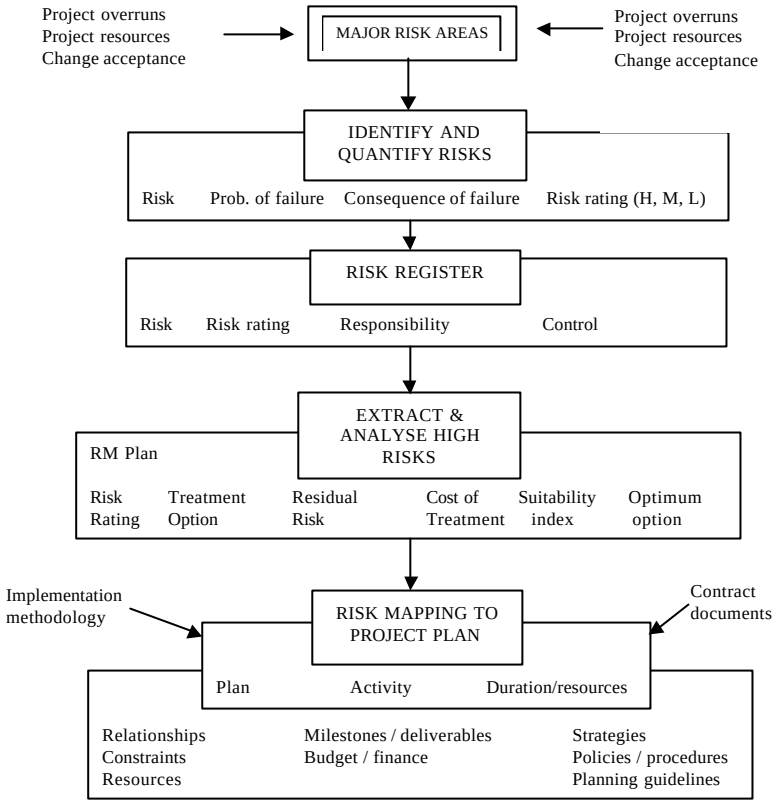

Figure 1 Risk planning and implementation model

The investigation indicates that there is a lack of, and a need for an appropriate RM model that can be used effectively in the management of IS projects. It requires the following characteristics:

- flexible enough to be integrated to the system development methodology, project management and planning.
- an effective management tool which will help in the decision making process.
- tailored to suit IS environments and the specific issues affecting the implementation of major projects

This proposed model (see Figure 1), is based on, and benefits from, the RM theories, concepts, processes and procedures as detailed in risk standards and manuals. It also benefits from many serious attempts to implement RM in IS projects. The case studies have established the need for such a RM model and there is a need for major research to study a range of projects and test the model comprehensively.

References

[1] APESMA (1996) Management Education Program, Risk Management, Association of Professional Engineers and Scientists, Australia, unpublished course notes.

[2] Chakraborty, P (1998) "Strategies for the Enterprise: ERP demystified, Part II", *Dataquest Supplement*, **16**, 24, pp 5-7.

[3] Chapman, C., and Ward, S. *Project Risk Management - Processes, Techniques and Insights*, John Wiley & Sons (ISBN 0-0471-95804-2).

[4] Commonwealth of Australia, (1995) *Managing Risk: Guidelines for Managing Risk in the Australian Public service*, Joint publication of the Management advisory Board and Management Improvement Advisory Committee, Draft, July 1995. Canberra ISBN 0 644 45464 4. [Also final report & risk in procurement]

[5] MAB-MIAC (1996). *Guidelines for Managing Risk in the Australian Public Service*, No. 22, AGPS, Canberra, Australia

[6] Purchasing Australia (1996). *Managing Risk in Complex Procurement*.. Australian Government Printing Service: Canberra

[7] Computer Finance (1997) "Why Don't We manage Risk Better", *Computer Finance,* October, pp11-14.

[8] Computer Finance (1998) "ERP- want it quick and cheap. Accelerated Implementation Option", *Computer Finance*, March, pp15-17.

[9] DCAMS (1996) *Strategic Asset Management: Project Risk Management Guidelines*, Risk Management Section, Department of Contract and Management Services, Western Australia, August 1996.

[10] DSMC (1989) *Risk Management, Concepts and Guidance,* Defense Systems Management College, FT. Belvoir, VA.

[11] Eisenhardt, K.M. (1998) "Building Theories from Case Study Research", *Academy of Management Review*, 1998, **14**, 4, pp. 532-550.

[12] Innovate (1997) "Risk Assessment: Engineering helps build unique risk assessed scheme", The Association of Consulting Engineers Australia (ACEA), *Innovate Magazine*, April 1997, p21.

[13] RSD (1994) *Asset management: Risk management Guidelines*, Regional Services Directorate, Western Australia, Document RS003/PC796.

[14] Simmons, C. W. (1998) "Risk Management – An Introduction and a discussion" in *Technical Management – A Pragmatic Approach,* (http:/www.airtime.co.uk/users/wysywig/).

[15] Standards Australia (1995) *Risk Management*. AS / NZS 4360:1995.

[16] Standards Australia (1996), Risk Management Seminar, unpublished course notes, May 3, 1996, Perth, WA.

[17] Charette, R. (1996). The mechanics of managing IT risk. *Journal of Information Technology*, 11, 373 - 378

[18] Central Computer and Communications Agency (1997). *The management of risk*. http://www.open.gov.uk/ccta/pubcat/riskkey.htm of 13 Nov 1997

[19] Powell, P. and Klein, J. (1996). Risk management for information systems. *Journal of Information Management*, 11, 309 - 319

[20] Sokratis Katsikas (1998), Risk Analysis and Risk Management - CRAMM Methodology - University of Aegean S Navy http://epic.onion.it/workshops/w08/slides13/ , Sept 1998

[21] Willcocks, L. (1994). *Information Management: The evaluation of information systems investments*. Chapman and Hall: London.

[22] SEI Metodology – Key Practices of the Capability Maturity Model – Software Engineering Institute - Carnegie Mellon University

[23] The Association of Project Management. - PRINCE 2 -http://www.apmgroup.co.uk/

[24] Ernst & Young Australia (1998) – Benchmark Survey – An Australian View of Risk Management P2

[25] Bob Violino & Bruce Caldwell - Racing to 2000, Information week, Manhasset, Nov 17, 1997

[26] Rob Thomsett (1992) Third wave Project management – A handbook for Managing the Complex Information systems for the 90's – Yourdon Press