Published in: International Journal of Project Management 23 (2005) 584-590

Understanding internally generated risks in projects

Abstract

This paper identifies a class of risk that is common, important and yet poorly managed in projects. Internally generated risks arise within a project management team or its host organisation, from their management systems, culture and decisions. Even when a project applies recognised risk management processes, and seems to be managing its risks well, research demonstrates that Internally Generated Risks are a different matter altogether. This calls into question how such risks can be managed, and whether current risk management practices need to change.

Key Words: Risk, Systems Approach, Health Checks, Maturity, Implementation

Understanding internally generated risks in projects

When a project team has fewer staff than it needs to operate effectively, struggles to deal with bureaucratic financial constraints, or is not supported by higher management, the project is likely to be less successful and may even fail. These are sources of risk to the project, but they cannot be blamed on the external world, nor on the nature of the task. They arise from how the project and its host organisation are setup and operate. They are internally generated risks.

Internally Generated Risks (IGR)

In seeking to understand internally generated risks, we need first to know what we mean by the word 'risk'. Definitions vary widely, but risk is most commonly defined in terms of uncertainty – such as *"the chance of something happening that will have an impact on objectives*" [8]. This is a narrow use of the word, useful when we are concerned with the '*risk of something happening'*. When we talk about '*the greatest risk'* or we say that we have a '*significant risk*' we mean more than its probability – we are also considering the nature of the possible impact. Applying that broader meaning in the context of projects, the definition of risk used in this paper is:

'*a risk is a threat to project success, where the final impact upon project success is not certain*.'

Provided that there is some uncertainty in whether the threat will eventuate, some uncertainty in the nature of the possible impact on the project, or both, then a risk exists. Given this, we can define Internally Generated Risks (IGR):

"Internally Generated Risks are those risks that have their origin within the project organisation or its host, arising from their rules, policies, processes, structures, actions, decisions, behaviours or cultures."

For example, if a project task is assigned to a project manager who lacks appropriate experience or skills, the likelihood of project success will be reduced. The decision to assign an inexperienced manager creates risk for the project and since that decision was taken within the host organisation, the risk is by definition an IGR. Some risks may appear to be internally generated but in fact are inherent to the nature of the project. For example, creating a breakthrough new technology

carries a risk of failure simply because it is pushing the boundaries of what is possible. That risk would apply to any project team, in any organisation, that was trying to do the same work. It is inherent in the nature of the work and does not arise from the rules, policies, processes, structures, actions, decisions, behaviours or cultures of the project organisation or its host.

Figure 1 illustrates a total possible set of risks, including IGR[3]. A risk cannot be both externally generated and internally generated - they are mutually exclusive categories. Similarly, a risk also cannot be both inherent and internally generated.

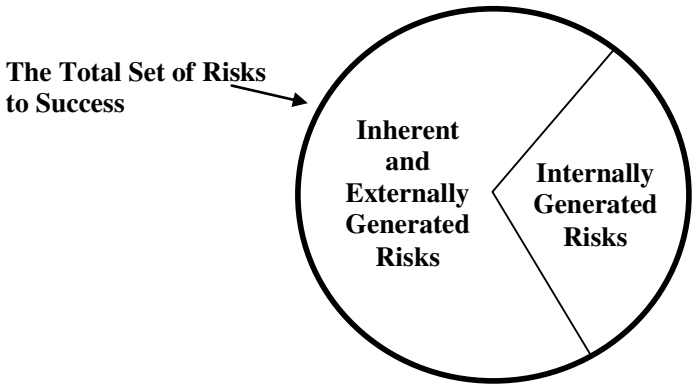

Fig. 1. Distinction between internally generated, inherent, and externally generated risks.

Internally generated risks may take many forms, but from the definition it seems likely that many will arise from or involve human behaviour. Even when the direct source of an IGR seems to lie in the operation of a process or from a structure, people are likely to be involved to some extent because it is people who design, own and operate structures and processes. If human behaviour is often involved, we might also expect that many IGRs will be difficult to quantify in terms of probability and impact. Human behaviour involves hidden factors such as mental models, beliefs and values that have to be inferred from behaviour. They can only ever be partially understood by outside observers. This means that predicting human actions, decisions or other behaviour is problematic, making estimates of risk where humans are involved subjective and unreliable [9].

The Research

There is a large body of research into risk in projects, and a good deal of that research includes dealing with risks where human behaviour is involved. For example, McLucas [11] investigated projects that failed and found that many of the causes of failure were linked to human behaviour. Flyvberg [13] discusses the same issues on a larger scale, in his study of megaprojects. However very little research is available that is focused specifically on how and why risks arise internally, how they are managed, and whether this is significant. Gilbreath [2] discusses such risks and their impacts, but does not appear to base that discussion on empirical research. Conrow [9] spends time categorising and considering risk types, but does not identify those arising internally as a category in their own right.

A literature search indicates that there has been little research on Internally Generated Risk as a specific category of risk. For this reason, the research hypotheses to be tested were designed as a first step in understanding IGRs. They were:

1. Hypothesis 1. Internally Generated Risks are common.
2. Hypothesis 2. Internally Generated Risks are significant.
3. Hypothesis 3. Internally Generated Risks are poorly managed.
4. Hypothesis 4. The amount of Internally Generated Risk in a project is related to how effective it is as a project organisation (its maturity).

Research was conducted on nine projects - three projects in each of three organisations in Australia and New Zealand. Each project was large enough to require three or more permanent staff and each had a schedule lasting more than 12 months. Five involved civil engineering construction, one was a technology enhancement project, two were internal systems improvement projects and one was a software development project. Clearly nine projects of four types cannot be claimed to fully represent all possible projects. However they are considered to be sufficiently diverse to be a reasonable basis for a general discussion about IGRs, and whether further research is warranted.

Risk data was gathered using group workshops and one-on-one confidential interviews, seeking to document the views of a range of project stakeholders on a range of issues related to a key question, which was: *"What makes it hard for you to succeed in your role in your project, or for the project to succeed as a whole?"* This was deliberately an open question, allowing a wide range of responses. The use of workshops and confidential interviews provided the opportunity for responses to arise in different ways, including the freedom to acknowledge issues that were too sensitive to discuss in open forum.

The data gathered was examined in detail, every identified risk was cataloged, and an initial assessment of that risk carried out against the definition of IGR. Risks that were provisionally identified as IGRs were then mapped in detail using a risk mapping technique developed from the concept mapping work of Novak[15], McLucas [11] and Callison [12], and assessed against a further set of criteria. After this process, those risks confirmed as IGRs were assessed for their probability and impact, and treatment measures were identified and mapped. Each risk map and the understanding it represented became part of the basis for the analysis that followed later.

A concern during the research was that much of the data gathered was subjective and could be biased by the project stakeholders, by the research method or by the researcher's own involvement. A number of steps were taken to protect the results against this possibility. One was to ensure that at every stage of the process of data gathering and analysis, project stakeholders had the final say. This meant that the content of the risk maps and the data developed for final analysis was in large part outside the control of the researcher.

For example, one perceived risk was that the number of IGRs might be unintentionally inflated. To reduce this problem each Internally Generated Risk was assessed for its likelihood and impact and this was translated into an overall risk rating on a five point scale: Very Low, Low, Moderate, High and Extreme. Those risks that fell into the bottom rating were rejected as 'trivial' risks, for the purpose of the analysis. Further, IGRs where external or inherent sources contributed 50% or more to the risk rating were also discarded.

The last of the hypotheses required that a project management maturity survey be conducted. The survey method involved a two-part questionnaire, filled in by project stakeholders. The first part was an overall maturity assessment against a five point scale, similar to the scales used by Morris [10] and by Checkland [4]. The second part was a project performance assessment against the nine elements of project management espoused by the PMI and by many other project management organisations [5].

Hypothesis 1 - Internally Generated Risks are common

If we assume that no project organisation is perfect in all of its rules, policies, processes, structures, actions, decisions, behaviours or cultures
then every project organisation will have some risks arising internally. In fact most organisations are involved in a constant struggle to improve their rules, policies, processes, structures, actions, decisions, behaviours or cultures. That being so, we might expect to find that IGRs are common.

The control measures taken to ensure that unintended bias did not invalidate the analysis, tended to limit the total number of IGRs. As well, the time available for risk identification was limited.

Given this, it can be assumed that not all IGRs were identified, and that the numbers shown in Table A are conservative. Despite those restrictions, the smallest number of non-trivial IGR identified in any of the nine projects was 15, and the highest was 30.

Project	Number of Non-Trivial IGR
1	30
2	20
3	21
4	24
5	20
6	15
7	16
8	16
9	16

Table A: Frequency of non-trivial internally generated risks identified by project

The criteria for testing Hypothesis 1 was defined as:

Internally Generated Risks are common if the mean number of such risks in projects is 10 or greater per project.

Applying the null hypothesis and the *t*-distribution for small samples, the data from Table A indicates that there is less than a 1% chance that the mean number of IGRs in projects is less than 10. That is, against the test criteria we can conclude with some confidence that internally generated risks are common in projects. This confidence is boosted by the knowledge that the number of IGRs shown in Table A is conservative.

Hypothesis 2 - Internally Generated Risks are significant

Complex projects need all the help they can get and may fail if internal management systems and behaviour are less than optimised for the purpose. For example, any project can fail if insufficient resources are applied, if senior management does not play its part, or if competing priorities are allowed to get in the way [6]. It seems likely that IGRs can be powerful in their impact upon the likelihood of project success, even sometimes outweighing all other sources of risk.

Project	Number of Non-Trivial IGR	Number of High or Extreme IGR
1	30	19 (63%)
2	20	7 (35%)
3	21	18 (86%)
4	24	15 (62%)
5	20	19 (95%)
6	15	2 (13%)
7	16	8 (50%)
8	16	8 (50%)
9	16	9 (56%)

Table B: Number of high or extreme IGR identified by project

Table B shows the number of risks rated as High or Extreme. High risks are defined as those that have a least a 10% chance of cause a 30% blowout in schedule, cost or performance. Extreme

risks have at least a 10% chance of causing the total collapse of the project and or at least a 20% chance of a 30% blowout in schedule cost or performance. After applying these definitions, the test criteria for Hypothesis 2 was:

Internally generated risks are significant if the mean number of IGRs rated High or Extreme in projects is 5 or greater per project.

Using the data shown in Table B, and applying the null hypothesis and the *t*-distribution for small samples, there is less than a 1% chance that the mean of the number of High or Extreme IGRs in projects is less than 5. That is, against the test criteria we can conclude with some confidence that internally generated risks are significant in projects.

Hypothesis 3 - Internally Generated Risks are poorly managed

If project risk management is effective the majority of risks to success should be identified, understood and managed. Here, "managed" does not mean that risks have been reduced to any specific level – only that deliberate management action has taken place to manage the risk. Even after management action, the level of any specific risk might remain High or Extreme.

On the assumption that High and Extreme risks always require a management decision, only those IGRs rated as High or Extreme have been included in Table C. Removing lesser risks removes IGRs that may not have been treated simply because they were not important enough to warrant attention. This reduces the possibility of inflated an assessment of the number of unmanaged risks. Each remaining Internally Generated Risk was then reviewed to assess:

- had it been identified by the project team prior to the research?
- was it documented and reported in any recognised way prior to the research?
- at the time of the research, had a management decision been made on how to treat the risk and was that treatment being implemented?

Project	High or Extreme IGR	Previously Identified	Documented or Reported	Treated or Managed
1	19	6	1	3
2	7	5	5	4
3	18	9	2	2
4	15	9	2	2
5	19	13	11	4
6	2	2	0	0
7	8	6	3	1
8	8	3	3	1
9	9	6	2	1
TOTAL	**105**	**59**	**29**	**18**

Table C: Identification, documentation and treatment of IGRs

The test criteria for Hypothesis 3 was:

Internally generated risks are poorly managed if the mean percentage of High or Extreme IGR being treated or managed effectively in projects is less than 75%.

Using the data in Table C, and applying the null hypothesis and the *t*-distribution for small samples, there is less than a 1% chance that the mean percentage of High or Extreme IGRs being effectively managed is equal or greater than 75%. That is, against the test criteria we can conclude with confidence that Internally Generated Risks are poorly managed in projects.

Hypothesis 4 – The amount of Internally Generated Risk in a project is related to how effective it is as a project organisation (its maturity).

Project management maturity models are used as benchmarking tools and to focus improvement effort [4]. Often, they assess project management capability or performance against the elements of project management – for example the nine knowledge areas described in the Guide to the PMBOK [5]. The results are then collated or mapped, to assign a score against a defined set of maturity levels [4]. Such models can be adapted in detail to match a particular type of project and context, or they can be broad and generic. It is difficult for them to be both at once, and in practice this means that maturity models have to be used with caution.

According to Hypothesis 4, a highly mature project organisation generates relatively less risk for itself than does an organisation that is less mature. The implication is that an inverse correlation exists between project management maturity and the level of internally generated risk. If this is true, is should be evident from the data.

In order to provide a measure of the total Internally Generated Project risk, each non-trivial IGR was assigned a score of 1-5 according to its risk rating, then the scores were summed for each project. This provides a set of nine data points – as a relative measure of total IGR. The raw scores were scaled, for ease of comparison with maturity.

Maturity was assessed using a survey questionnaire of each project's stakeholders in two parts. The first part was an assessment of maturity on a scale of from 1-5, against a definition for each level. The second part assessed performance against each of the nine elements of project management identified in the PMBOK (5). Both forms gave results for the maturity assessment in the range 1-5, where 5 represents a highly mature and effective project management organisation. These results were then averaged, to provide a single maturity rating for each project. Both maturity and total IGR are shown in Figure 2.

To test for correlation, a non-parametric test using the rank correlation coefficient (Spearman rank) and the *t*-distribution for small samples was used, to examine the null hypothesis that there is no correlation between the two sets of data. The rank correlation coefficient was calculated as -0.55, indicating a possible negative correlation. The significance of the correlation was assessed by calculating the "t" value. This indicated that the null hypothesis can be rejected at a 80%

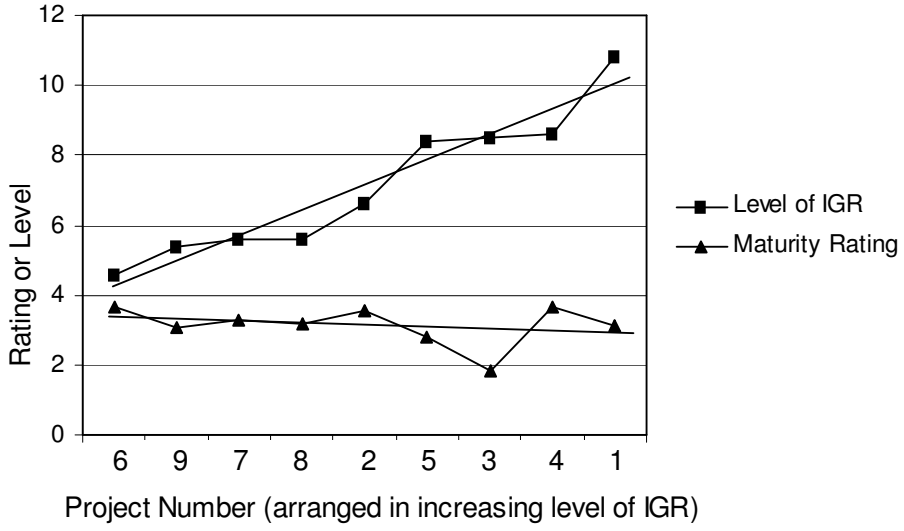

Fig. 2. Project management maturity related to total internally generated risk.

confidence level, but cannot be rejected at 90%. That is, there is some reason to believe that in projects there is a negative correlation between total IGR and maturity. However confidence is not as high as we would like, and this should be taken as an indication only.

Interpretation of Results

Although the nine projects are a small sample, the data indicates strongly that Internally Generated Risks are common, significant and poorly managed. This should be of concern, since projects are pervasive in society today [13].

There are many reasons why IGRs may not be managed well. The first is that risks involving people tend to be sensitive to talk about and difficult to resolve. For example, if a manager is not good at their job or micro-manages subordinates, this will create risks to the organisation's success[7]. From experience, we also know that in such cases it is likely that people will simply put up with the problems created, rather than face the sensitive task of seeking management action. It is even less likely that such risks will be openly documented in formal risk management systems. To do so would be to cause affront not only to the manager in question, but also to their manager - who is accountable to identify and resolve such performance issues.

Risks can be sensitive for other reasons. If a project is under-resourced, staff are being overworked or an internal process is ineffective then risks will be created. Although not directly about people, such sources of risk are often linked to a decision or policy that is "owned" by someone – the person who approved the project despite a lack of resources, the person who is demanding more work than is possible, or the owner of the ineffective process or rule. These internally generated sources of risk may be known and discussed, but in many organisations they are unlikely to be documented in a risk register. To do so might be seen as insensitive or provocative, or simply as politically inappropriate.

Internal risks are also often seen as a *fait accompli* – such as when a project manager is told to "just do it" despite having inadequate resources to do the work properly. If there is no real possibility of the problem being resolved, then there is little incentive to document it as a risk. Reporting such risks may also be seen as being provocative or recalcitrant – as making a political point at the cost of the manager involved.

Finally, internally generated risks are often intangible, and therefore not easily quantified. They do not lend themselves to being managed using risk processes that rely upon quantifying and classifying risks. Managers may also feel uncomfortable trying to describe, assess and classify risks that are about human relationships, culture or behaviour. It may also be seen as a waste of time to bother documenting issues that are intangible or that are thought unlikely to be managed. Ultimately, these issues mean that Internally Generated Risks are less likely to be managed properly.

The Implications for Managers

The first implication for managers is that they should be concerning themselves more with the management of Internally Generated Risks. This is reinforced by the research of McLucas, who showed that the lack of understanding and hence lack of effective management of such risks is a common feature of avoidable disasters [11]. A plausible implication not tested here, is that poor management of IGRs is a contributing factor to avoidable disasters in projects.

A second issue for managers is how to investigate and treat IGRs. For the research, a new risk mapping technique was developed in order to be able to deal with the complexity of the risks involved. It was also possible to conduct confidential interviews to gather data that otherwise may not have been forthcoming. A manager may have neither the necessary tools and skills, nor the opportunity, to investigate IGRs effectively.

The maturity survey results were not strongly conclusive, but did provide some support for the intuitively obvious link between how well an organisation is set up (its maturity) and the amount of Internally Generated Risk it faces. If this inverse relationship is correct, working to remove the sources of Internally Generated Risk is also working to increase project management maturity. This is an exciting prospect, since it offers a way of using risk analysis to support the development of organisational capability, without the current reliance on benchmarking [14]. Since it is inherently context sensitive, the risk analysis of Internally Generated Risks may be able to drive rapid organisational responses to changes in environment.

Implications for risk management as a discipline

The research outcomes raise questions for professional risk managers and for those who manage standards such as AS/NZS 4360. The nine projects all had risk registers and reported their risks through formal systems. All had conducted some degree of risk assessment as part of the project management process. Despite these measures being in place, the risk data is very clear – the projects were experiencing significant Internally Generated Risk, but those risks were poorly managed. There were even cases where Extreme risks had not been identified or were not being managed.

When attempting to draw lessons from this it is necessary to differentiate between project teams being ineffective in applying the risk management standard and other possible explanations. Although not tested in this research, it seems unlikely that all nine projects were not capable of applying the standard risk management approach. The alternative is that the standard approach may itself not be competent when dealing with typical Internally Generated Risks. In turn, this would imply that those risk management standards should be reexamined from first principles in order to develop an approach that is capable of dealing with all risks, including Internally Generated Risks.

Further research

The results are based upon simple hypotheses, and indicate that further study is appropriate. Possible areas of interest include:

- Confirmation of the results for a wider range of project types.
- Identification of the underlying reasons why Internally Generated Risks tend not to be identified or managed.
- More complete testing of the relationship between project management maturity and the presence of Internally Generated Risk in projects.
- Testing whether AS/NZS 4360 compliant risk management approaches can deal effectively with Internally Generated Risks.
- Testing whether project failures and disasters can be linked to the presence of Internally Generated Risks.

Conclusions

Both the arguments and the research data support a conclusion that Internally Generated Risks are important in projects. Internally Generated Risks are common, significant and difficult to manage. Despite their importance as a class of risk, the results imply that common process-driven risk management approaches are inadequate to deal with Internally Generated Risks. This may be because such risks are often complex and or sensitive, and hence can be difficult to document. They may also be difficult to quantify and to classify. The overall conclusion is that Internally Generated Risks are a key class of risk in their own right. They are important, and may require special attention in order for them to be managed effectively.

The level of Internally Generated Risk seems to relate inversely to the level of project management maturity in the organisation. If this proposition is true, this presents an opportunity to develop a new and exciting approach to working on project management maturity. The identification,

analysis and treatment of Internally Generated Risks would be used to drive organisational development[3].

The results of the research indicate that Internally Generated Risks are a major challenge for project managers and for risk professionals. The first step in meeting that challenge may prove to be the most difficult – to move outside the current way of thinking about the management of risk, to make it possible to develop a new and more capable risk management approach.

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