

# Fundamental uncertainties in projects and the scope of project management

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## Abstract

This paper builds on discussions that took place over a series of meetings in the UK of the Rethinking Project Management Network. The management of uncertainty is seen as a necessary condition for effective project management. Sources of uncertainty are wide ranging and have a fundamental effect on projects and project management. These sources are not confined to potential events, and include lack of information, ambiguity, characteristics of project parties, tradeoffs between trust and control mechanisms, and varying agendas in different stages of the project life cycle. Common project management practice does not address many fundamental sources of uncertainty, particularly in ‘soft’ projects where flexibility and tolerance of vagueness are necessary. More sophisticated efforts to recognise and manage important sources of uncertainty are needed. Such efforts need to encompass organisational capabilities, including some aspects of organisation culture and learning.

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## 1. Introduction

This paper is concerned with the kinds of uncertainty present in projects, and what might be done to manage them. The paper builds on discussions that took place during meetings of the UK EPSRC funded Network on Rethinking Project Management over the period 2004–2006. Early on views about uncertainty in projects were summarised in a series of learning propositions to orientate further discussions. In developing this paper, previous work of the authors was an initial base, but perspectives and issues that emerged from the network presentations including case studies and discussions, extended this base. Follow up discussions after presentations largely supported

the validity and usefulness of the authors’ work, in many instances providing further related insights and questions.

Throughout network meetings the presence of uncertainty in a variety of forms was constantly recognised as a central issue. Initial deliberations about uncertainty focused on appreciating the variety of sources of uncertainty requiring management attention and that go well beyond a set of possible events that might impair project performance. This has implications for the development of formalised approaches to project risk management. These approaches need to recognise the full range of sources of significant uncertainty associated with any given project. Subsequent network discussion reflected on the reasons why project management to date seemed to be lacking in attending to all this uncertainty. One explanation is that conventional project management is too focused on operational planning and control. This prompted reflection on how projects with particularly problematic sources of uncertainty might be characterised, and what implications this has for modifying

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or extending a conventional planning and control perspective on project management. In particular, there is a need to recognise that many project contexts are characterised by very high, difficult to quantify, levels of uncertainty where management flexibility and tolerance of vagueness are necessary. Following this line of thought, network discussions concluded that more attention needs to be given to understanding and developing less tangible, but more generic management processes associated with building trust, sense-making, organisation learning, and building an appropriate organisational culture better suited to operating with high levels of uncertainty.

The structure of this paper follows the sequence outlined above. Section 2 considers some key areas of uncertainty that warrant serious management attention in most projects. This has implications for the desirable scope of common project risk management processes that augment project management. Section 3 suggests that one obstacle to effective management of uncertainty is that conventional project management does not pay enough attention to conception and end stages of the project life cycle, or to strategic aspects of projects. Section 4 describes a ‘hard’/‘soft’ typology of projects that highlights major sources of ambiguity and vagueness that may be problematic using conventional plan and control project management. Section 5 briefly considers some implications of ‘softness’ for the scope of project management processes, including the role of trust. Section 6 identifies the importance of organisation infrastructure and in particular the importance of organisational culture and capacity for organisational learning.

## 2. Uncertainty management as part of project management

Much good project management practice can be thought of as effective uncertainty management, clarifying what can be done, deciding what is to be done, and ensuring that it gets done as noted earlier. For example, good practice in planning, coordination, setting milestones, and change control procedures, seeks to manage uncertainty directly. However, common practice does not consider the range of sources of uncertainty present in projects or what a coordinated approach to proactive and reactive uncertainty management can achieve. Three key areas of uncertainty featured in network discussions: uncertainty associated with estimating, uncertainty associated with project parties, and uncertainty associated with stages of the project life cycle.

### 2.1. Uncertainty in estimates

An obvious aspect of uncertainty in any project concerns estimates of potential variability in relation to performance measures like cost, duration, or quality related to particular planned activities. For example, we may not know how much time and effort will be required to complete a particular activity. It was evident from network discussions, and all the case study presentations by project

managers, that estimating activity for planning and control purposes is a critical project management process. The causes of uncertainty about estimates include one or more of the following:

- lack of a clear specification of what is required;
- novelty, or lack of experience of this particular activity;
- complexity in terms of the number of influencing factors and associated inter-dependencies;
- limited analysis of the processes involved in the activity;
- possible occurrence of particular events or conditions which might affect the activity;
- emerging factors unknowable at the start of the project;
- bias exhibited by estimators, typically optimism bias [1,2].

Thus, uncertainty results from vagueness, ambiguity and contradictions associated with lack of clarity because of lack of data, incomplete and inaccurate detail, lack of structure to consider issues, the working and framing assumptions being used to consider the issues, known and unknown sources of bias, limited control of relevant project players, and ignorance about how much effort it is worth expending to clarify the situation [3].

### 2.2. Uncertainty associated with project parties

In many projects, particularly large ones, key performance issues are often less related to technology, but rather are related to uncertainty introduced by the existence of multiple parties and the associated project management infrastructure.

While employees and other agents of a project owner are essential to the achieving of project performance, they also contribute to uncertainty about future performance. This uncertainty arises from several factors associated with each project party, including [4]:

- uncertainty about the level of performance that will be achieved;
- the objectives and motivation of each party;
- the quality and reliability of work undertaken;
- the extent to which each party’s objectives are aligned with the project owner’s objectives, and the scope for moral hazard where one party is motivated to do things which are not in the best interests of the project owner;
- the actual abilities of the party;
- availability of the party.

In any organisational context including all projects, the introduction of agents is prone to the three problems of: adverse selection, moral hazard and risk allocation. The uncertainties presented by these problems can be substantial [5]. When these agents are different organizations, these problems can be particularly challenging. Where project owner and agent(s) belong to the same organization it might be expected that such problems would be less likely

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