What makes a good project? Project management as a problem of translation

Neil Alderman
Chris Ivory
Ian McLoughlin*
Roger Vaughan

Newcastle University Business School

* Monash University

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Abstract

In this paper we review developments in the discipline of project management and propose our contribution to the current ‘rethinking’ debate. The paper suggests that in complex projects there is a need to understand projects as actor-networks. Project management in complex networks can be usefully understood as a problem of translation of often distant actors operating in project nodes that present contexts at variance with the perceived needs of the project. We suggest that project managers need an appreciation of the ways in which these actors will make sense of the project’s requirements and the frames that condition their thinking and interpretation of knowledge and information. We suggest that successful projects, ultimately, will be those that achieve this translation task through the creation of a convergent project network.
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Introduction

The increasing complexity of the project management task has led to debate about the way projects are currently managed and to the search for new concepts and theories through which to understand and support the project management function. One of the key recent responses to these challenges to project management in the UK was the establishment of the EPSRC Rethinking Project Management research network (Winter and Smith, 2006). The aim of this research was to move beyond the perceived limitations of conventional approaches to projects and their management and to ‘re-think’ them. In this paper we outline a set of ideas that have emerged from our own empirical studies of complex projects and together represent our contribution to this debate.

In approaching this rethinking task, we focus on the complex social aspects of managing projects and identify theories and concepts we believe to be relevant to understanding and managing them. Our observations stem from the research we have carried out into a particular class of complex project that we have termed the long-term, service-led project. These are projects where the contractor (typically) is required to engage not just in the design and delivery of a capital product or facility, but to provide a downstream service to the client based on the maintenance and/or operation of that facility, possibly extending even to its ultimate disposal. The theoretical considerations presented here seem to us to offer potentially useful ways of thinking about the complexities created by such projects.
We start by examining what is meant by ‘conventional’ approaches to project management, and recent developments that attempt to apply the resource based view to thinking about project management capabilities in the context of complex product design and production. We suggest that, in a sense, this represents the ‘state of the art’ with respect to thinking about how complex projects might be managed, but we still believe this to be inadequate in terms of its power to ‘re-think’ complex projects. We discuss a number of social theories and models that our empirical research suggests can contribute to a better understanding of the project management process in complex projects. Ultimately, we are interested in using and adapting these theories to create the building blocks of an advanced project management capable of dealing with the sort of uncertainty and ambiguity present in the projects we have studied.

**From ‘project management’ to ‘the management of projects’**

There are two dimensions to what has recently been termed the ‘mainstream’ project management approach (Hodgson and Cicmil, 2006: 1). The first approximates to what Peter Morris (1998) describes as the ‘traditional view of project management’ concerned with ‘iron triangle’ (Atkinson, 1999) of time, cost and quality (see the review of Kloppenborg and Opfer, 2002) and its associated concern with project delivery as well as the tools and techniques required. For example, as a project manager:

You plan, using work breakdown structure (WBS) and various scheduling and budgeting techniques; you organize, allocating WBS tasks to organizational units by using an organization breakdown structure (and task responsibility matrix) and structuring units with projects or matrix organizations; you organize teams,
exercise leadership, and deal with conflict; and you monitor progress using various measures and reporting techniques. (Morris, 1998: 4)

The overriding mind-set of project management in this framework is one of control ‘…in the cybernetic sense of control involving planning, measuring, comparing and then adjusting performance to meet planned objectives, or adjusting the plans’ (Morris and Pinto, 2004: xvi). A good project in this context is one that meets the constraints of the ‘iron triangle’.

This seems perfectly appropriate, we would argue, when the project is to construct and commission some physical entity involving known technologies in a stable organizational context. In this context, one in which the specification of the project is, at least in outline form, complete and known before undertaking it, the idea of decomposing the project task through techniques of ‘work breakdown’ and through ‘organizational breakdown’; then aligning the two in work package design is entirely reasonable. Much, although by no means all, of this understanding of project management has been encapsulated in the attempts of professional bodies to codify their knowledge base in collected ‘bodies of knowledge’ (e.g. PMI, 2004; APM, 2006).

The second dimension of the project management literature defines a broader field, some of which, but by no means all, is represented in the ‘bodies of knowledge’. This literature is often critical of the first for being too much focused on the operational delivery of projects and not sufficiently concerned with defining their impact in advance, at a more strategic level. To adopt Morris’s terms, this second approach
emphasises ‘managing projects’ rather than being just concerned with ‘project 
management’. This latter literature is about:

‘…Managing projects as entities. Its focus is the project. It is about 
accomplishing projects successfully. It is about managing change and transition. 
And today, as never before, it is value driven. It is about meeting and exceeding 
customer expectations about getting the best bang for their buck, creating value, 
and shortening implementation schedules (time to market)’ (Morris, 1998: 4).

Although this leads to questions about whose value is being served or indeed should 
be served. The focus on adding value for the client, for many projects, is perhaps too 
narrow. Large complex projects, by their very nature, often serve a multitude of direct 
and indirect stakeholders.

In a similar vein, Lundin and Soderholm (1998) suggest that the narrowest views of 
project management tend to ‘black box’ the context of the project. This disregards 
‘the phases before and after implementation’ and the possible impacts these may have 
on the project; for example, creating momentum in the project in the first instance or 
learning from the project once it is completed (Lundin and Soderholm, 1998: 41: 46).

In the context of long-term service-led projects, project managers are increasingly 
being asked to deliver value to the contractor and the customer down-stream and 
beyond the traditional delivery point. According to Morris and Pinto (2004), ‘what is 
needed is to broaden the focus to cover the management of external and front-end 
issues, not least technology … [and] client issues’ (Morris and Pinto, 2004: xvii). We 
therefore need to go beyond the traditional domains of project management theory 
and consider new insights.
The key difficulty with complex projects is that there are often inherent unknowns associated with interpreting a client’s business proposition and attempting to plan a project to deliver a service with a lifetime that extends into an uncertain future. Long-term, service-led projects have to migrate into and negotiate a pathway through what Hamel and Prahalad (1994) have termed ‘white space’, where future needs are as yet unarticulated and project foresight is required - without the benefit of useful hindsight. This suggests a sense in which projects and those managing them will be ‘feeling their way’ towards a solution rather than following a reliable blueprint or project plan. The management problems multiply when one considers that implementing the solution must also be done in the context of suppliers, consultants and partners who may themselves also be feeling their way toward what is required of them. This requires, in our view, new models of the project world and new project management competencies for dealing with it.

Project management capabilities in the context of complex product systems

The research reported by Davies and Hobday (2005) on ‘complex product systems’ (CoPS) provides a useful focus on the strategic role of project-based forms of organization in the context of these kinds of complex capital products. The starting point for their analysis is the resource-based view of the firm (Penrose, 1959). This views the competitive advantage of firms as a function of their capability to exploit resources defined by their market and technological base (Richardson, 1972). In the longer term, the ability of the firm to remain competitive and grow is dependent upon its capacity to innovate in order to exploit and reconfigure its resources to move into new technologies and/or markets (Davies and Hobday, 2005: 57 – 8). They suggest that ‘organizational capabilities located at the project level’ (i.e. project management
competence) have emerged as a key factor in being able to cope with rapid change in the business environment (2005: 61). We agree that the focus should be on the capabilities of the project manager and the project management system employed.

According to Davies and Hobday (2005) one of the ‘core capabilities’ that is required to be able to innovate through project-based forms of organization is that of ‘systems integration’ (Prencipe et al, 2003). This can be defined as, ‘the core technical and strategic capabilities which enable a project business to combine all the various production inputs including components, subsystems, software, skills and knowledge, to produce a product, system construct or service’ (Davies and Hobday, 2005:88).

From the resource-based perspective, project capabilities also represent the ‘appropriate knowledge, experience and skills necessary to perform pre-bid, bid, project and post-project activities’ (Davies and Hobday, 2005: 62-3). These embrace the building and maintaining of relationships with customers; developing business cases and proposals including links with strategic partners; developing project-based forms of organization to deliver the project to the customer; the development of learning resources, both within and between projects as well as at the level of the business (Brady and Davies, 2004); and arranging or undertaking post-delivery operational, maintenance and other services to the customer. These latter are critical in long-term, service-led project. Indeed, the emphasis on the customer underlines the point that project managers are now not only responsible for meeting time, cost and quality definitions of project success, but also achieving customer satisfaction as well (Pinto and Kharbanda, 1995). As Pinto and Kharbanda (1995, 46) state: ‘any project is only as good as it is used’ and in long-term, service-led projects this use is absolutely central to the value derived by the client.
As well as applying the hard tools of project management, project managers need to be able to exercise ‘soft’ skills to ‘influence a wide range of interested parties, using personal skills and institutional support’ (Boddy, 2002: 4). At the same time, senior management needs to draw upon ‘programme management techniques’ in order to manage a portfolio of projects (Payne, 1995; Pellegrinelli, 1997) and their competing demands for organizational resources (Engwall and Jerbrant, 2003). The organization may itself need to develop temporary relationships through alliances, joint ventures or participation in consortia to deliver the project, requiring it to be able to adapt and switch to different roles from one multi-firm project to the next (Davies and Hobday, 2005: 66). This extends the original concerns of resource-based theory with the internal capabilities of the firm to a consideration of the operation of the firm within a network of resources that need to be managed.

The resource-based view of the firm is a powerful way of thinking about project management in the context of complex projects; in particular, by focusing on the required capabilities of project managers, projects sponsors and others in relation to managing the interaction between organizations and their environment, and by giving strategic guidance as to what options firms have in responding to changing circumstances. However, in themselves, frameworks derived from such starting points do not capture the dynamics of projects at the level of what has been termed the ‘lived experience’ of project participants (Winter and Smith, 2006). Empirical observation suggests that many complex projects do not take place in quite the way that resource-based capability notions suggest they should. The rationale behind long-term, service-led projects is straightforward; reaching the desired end point is not.
As we have noted, ‘mainstream’ approaches to understanding projects tend to see the problem of project management as one of finding better means to control inherent uncertainties in the face of quality, cost and time drivers through a largely instrumental and rationalistic management paradigm (Koskela and Howell, 2002; Linehan and Kavanagh, 2006; Thomas and Buckle-Henning, 2007). Thomas (2000) argues that this results in a form of management and organization aimed at developing closed systems, distinct from their contexts, with clear objectives, methodologies and organizational principles that involve the rational application of known tools and techniques in order to exercise control over a set of otherwise uncertain circumstances (Thomas, 2000: 41-42). Moreover, ‘the implications for management research of this view is that there is a “best” way (or a few best ways) to manage projects; the sooner we discover and apply them the sooner we will have more project success’ (Thomas, 2000: 42).

Indeed, it is here that the complexity of projects is reflected in the often messy, chaotic and politicised experience of project participants. Their experience is not so much one of developing more effective project capabilities to control the inherent uncertainties of complex projects, but rather one of finding ways to live with the irresolvable ambiguity often manifested in ‘fire fighting’ problems and intervention at the level of detailed project activities (Ivory and Alderman, 2005). The focus for us is on the social processes which make up the ‘lived experience’ of projects and the models which can help render these processes, if not entirely manageable, then at least comprehensible to those attempting to manage them.
The Dynamics of Project Complexity

For us, the distinction made by Wang and Von Tunzelmann (2000) between complexity in terms of breadth – *relational complexity* – and complexity in terms of depth – *cognitive complexity* is particularly useful because it points in the direction of seeing complexity as a socially constructed phenomenon rather than as something that is inherent in technologies or environments, which in some sense are assumed to ‘act on’ and have ‘effects upon’ the project independently of the actions, behaviours and interpretations of the actors concerned. Thus, relational complexity points to the organizational, group and individual dynamics that arise when the mode of project delivery involves networks of multiple teams, groups and organizations and where the relationships and interactions between them become a critical factor in shaping both the project and its success. Similarly, cognitive complexity, points to the problems involved for those engaged in large projects in simply comprehending what the project is about, the viewpoints of the stakeholders involved, what its constituent elements are, and how these relate to and interact with each other (Figure 1). No one individual, group or organizational element has perfect information about the project.

To drill down into the issues of relational and cognitive complexity by drawing on theoretical insights from the last decade or so of writing on and around projects and technology, we draw on a range of models of social processes that our empirical observations have shown to be pertinent to ‘re-thinking’ project management in contexts of high levels of uncertainty and ambiguity in projects. The understanding and application of these processes offers an augmentation of existing project management tools in the context of complex service-led projects. Rather than suggesting existing tools be replaced, alternative perspectives represent a set of
competencies, rooted in a conceptualisation of social processes in projects, which could form the basis for an ‘advanced project management’ or an extended project management toolkit.

Our own ‘re-thinking’ of project management begins with the idea that projects should be thought of as interacting actor-networks (Callon, 1980; Law 1992; Latour, 1996). Actor networks are a way of dealing with (and also creating) relational complexity. This is a well established model of human and technology action and interaction; one which envisages a very political world in which various alliances of technologies and humans jostle for control and resources within a project space. However we also augment this model with ideas not normally associated with actor networks. We include the idea of network ‘nodes’ – which describe durable and potentially resistant spaces and locations upon which the network is reliant, but over which the project manager has limited control and sometimes limited understanding. We seek to address issues of cognitive complexity (complexity in depth) by considering concepts associated with critical approaches to knowledge, sense making and cognitive frames. We do so in response to our empirical observations of the centrality of knowledge, and its production and consumption, to complex projects. We also want to be able to describe human actors, not merely as self-interested agents concerned solely by their positioning in relation to one another (as actor-network theory might assume), but also as struggling to make sense of the world from the perspective of different embedded cognitive frames; to understand and interpret what is being required of them in the context of uncertain and ambiguous demands.
Projects as Actor-Networks

Attempts to engage in service-led project activities involve considerable management and organizational challenges in terms of the building of the extended project networks needed to deliver an integrated solution and an on-going service to the client. In part this reflects the difficult strategic choices involved. In outsourcing, the solutions provider needs to be prepared to consider solutions to meeting customer requirements that bring together technologies and products from a wide range of vendors, possibly at the expense of the firm’s own (Foote et al, 2001). To acquire new capabilities, the provider may need to develop new strategic partnerships or joint ventures, or create new forms of temporary organization (Packendorff, 1995), such as a Special Purpose Vehicle (SPV) for the delivery of the project, which (as suggested in figure 1) increases the number of stakeholders and increases the complexity of the project network.

The idea of managing in networks introduces a new set of problems and conundrums for project managers. Rather than simply monitor the execution of packages of work agreed at the outset of the project to ensure adherence to quality, time and cost objectives, the role of the project manager also becomes one of developing and managing relationships across an extended network of actors – human and non-human. The competencies required to do this might include the ability to assess the likely motivations and barriers to action of a wide range of actors in different technical and organizational settings and the ability to translate that knowledge into effective influence over those actors. Actor-network theory (Callon, 1980; Law 1992; Latour, 1996) addresses precisely these issues. Actor-network theory is ostensibly a theory of innovation that has developed out of a desire to trace the emergence and
direction of new technologies and artefacts in their social, political, organizational and market settings. So although actor-network theory is not itself a theory of projects, its interest in emergent artefacts (innovation), the output of projects, means that its subject matter tends to draw on projects. Callon’s (1986) study of the failure of the proposed electric car system in France in the 1970s, Law and Callon’ (1992) study of the failed TSR2 fighter aircraft in the 1960s in the UK and Latour’s (1986) study of the failed French transport system, ARAMIS, are now classic studies of the struggles to hold fledgling project networks together.

At its heart the theory proposes a model of the co-ordination of actants (human and non-human actors) in the pursuit of technological goals. The actor-network approach “…rests on the idea that innovation and the strategies that shape it may be described in a network vocabulary that emphasises the interrelated and heterogeneous character of all its components, whether social or technical” (Bijker and Law, 1992: 18).

Heterogeneous actor-networks are built by the active enrolment (translation) of ‘actants’ into a single network. The work of translation is done using intermediaries including money, contracts, specifications, schedules, talk and prototypes which are deployed to encourage other necessary actors to join the network and to control them once they are in place. Critically, network builders must persuade other actors of the benefits of their involvement in the network. Intermediaries persuade and inform by carrying the necessary information to bring actors into line with one another. It is easy to see how for ‘network’ we could just as readily read ‘project’ here.

Broken down in its constituent parts it becomes much easier to trace the evolution and subsequent success or failure of projects. The resulting networks, like projects, can be
convergent or divergent. In convergent projects the understanding of intermediaries amongst actors is shared with the result that they have predictable translation effects. Actors do not resist translation and translations are, therefore, efficient. Such projects typically have clear and agreed ‘obligatory points of passage’ through which all other actors and intermediaries must pass (Latour, 1988, p. 43).

In weak and divergent projects, actors do not all share a common understanding of the intermediaries circulating the network and many may fail to recognise the legitimacy of an organization or institution regarded by others as an obligatory point of passage. When this happens they will respond to instructions unpredictably and resist the roles assigned to them. As a result, key actors may begin to pursue their interests elsewhere. These networks, while inefficient (they will require plenty of ‘back stage’ work (Buchanan and Boddy, 1992) to keep them on track), may survive to reach their original goals, but if they become too divergent they become vulnerable to collapse. Collapse occurs when important actors cease to be mobilised by the network’s intermediaries; they no longer perceive their interests to be served by the project and withdraw. As Latour puts it:

> The full difficulty of innovation becomes apparent when we recognize that it brings together, in one place, on a joint undertaking, a number of interested people, a good half of whom are prepared to jump ship, and an array of things, most of which are about to break down” (Latour, 1996: 58);

a situation surely familiar to many an overstressed project manager.
A network approach to projects provides a useful descriptive framework – a single vocabulary for framing and discussing projects. The usefulness of actor-network theory, and what sets it apart from other approaches to projects, is that it focuses on the efficiency of network translations rather than other ostensibly more objective measures of success (Linde and Linderoth, 2006); that is, the effectiveness of project management in building networks to bring about change (whatever direction that might take). An effective project is one in which network translations result in actor convergence, stable shared goals and a single obligatory point of passage. Successful projects, in this view, are those that avoid cancellation.

### Multi-nodality and networks

Actor-network theory is part of a post-modern social science that sees concrete reality as ‘emerging’ out of a multitude of interactions. Thus:

“…the image that we have got to discard is that of the social oil refinery. Society is not a lot of social products moving round in structural pipes and containers that were put in place beforehand. Instead, the social world is a remarkable emergent phenomenon: in its processes, it shapes its own flows” (Law, 1994: 15)

However, our observation is that the larger part of lived project experience is of repeatedly having to accommodate already existing organizations, technologies and bodies of knowledge. In the case of complex projects all of these may need to be re-shaped (translated) to accommodate new project objectives – a process they may well resist. To describe these potential pockets of resistance in a network context we borrow the notion of multi-nodality from Wynne (1998).
The concept of multi-nodality draws attention to the open textured and dispersed nature of most technologies, particularly to their distribution in different locations and contexts. Wynne observes that technologies are rarely the unitary stand-alone objects we imagine them to be. Rather they are fragmented and dispersed across distant and imperfectly understood contexts – never more so than when they are part of extended supply chains. Attempts to build extended project networks comprising multiple organizations, geographical locations and business cultures, result in a multitude of uncertainties and imperfect understandings as a result of the fragmented and dispersed nature of the network. Different nodes, with their own embedded management cultures, reward systems and operating procedures, which may not be entirely appreciated by project managers and others at the outset of the project, are drawn into the network with unpredictable consequences for project outcomes. We use the notion of multi-nodality to account for what we see as the inevitably brown-field nature of projects in that they emerge in the context of multiple pre-existing (usually organizational) contexts. This is unproblematic when those organizations are already well aligned with the aims of the new project, but in many complex projects this is unlikely to be the case.

**Knowledge, sense making, framing and networks**

We wish to introduce three further related concepts to our armoury in order to further our understanding of the difficulties of delivering complex projects in the context of multi-nodal project networks. These are knowledge (in particular the knowledge needed to deliver new customer requirements), sense making (making sense of new
project requirements) and framing (embedded ways of working and thinking that may be at odds with new requirements).

On the surface projects appear to be solely about the manipulation and re-configuration of the physical world into new artifacts and associated services. It is also obvious that what makes all of this possible is knowledge and the management of knowledge. Here we are talking not only about the knowledge required for building project management capabilities, but also about the knowledge involved in the creation of design specifications, determining and interpreting client requirements, designing engineering artifacts, solving design problems, designing facilities management services and so on.

Problematically for project managers, knowledge is not a simple commodity that can be bought and sold like any other. The knowledge required to perform a complex task is rarely located in one place, rather it is distributed ‘across different contexts and different levels of social relationships’ (Scarbrough, 1998: 228). In complex projects this pattern of knowledge distribution will extend beyond established structures of inter-organizational relationship. Knowledge is also context bound. It is ‘sticky’ (von Hippel, 1998), such that transfer from one context to another alters it as it is inevitably socially mediated and negotiated (Weick and Roberts, 1993). Not only is it imbued with the values and assumptions of those who produce it (Brown and Duguid, 1998), but it is also interpreted in accordance with the values and assumptions of those who receive it (Baumard, 1999; Bolisani and Scarso, 2000). All of this takes place in a context characterised by multiple and often poorly aligned interests (Suchman, 1994,
2000) in which the motivations to share knowledge are unevenly distributed and often weak (Ivory et al, 2007).

As such, knowledge, for example about customer requirements, cannot simply be collected and transferred into project planning tools. The transfer of knowledge is a social and cognitive process. Knowledge is not an ‘artefact’ to be transmitted intact from one place to another, but is continually negotiated and contested. For example, if knowledge concerning customer requirements were simply an artefact codified in the form of the customer’s technical specification the problem of knowledge transmission would be straightforward. However specifications, particularly, though by no means exclusively, those that deal with broad performance parameters rather than technical details, are not a foolproof guide to what the customer actually wants. Rather they are open to a high degree of interpretation, especially when they are communicated from one context to another. Indeed, from this viewpoint, to occur at all, the transfer of knowledge of customer requirements across organizational boundaries requires acts of interpretation and re-interpretation or what has been termed, in the context of communities and groups, sense making.

The concept of sense-making, as espoused by Weick (2001) and others captures the idea of a shared interpretive schema. Sense-making perspectives have a longstanding place in the study of management and organizations and to some extent in the study of projects. The origins of this approach to the study of organizations rests primarily in the work of Karl Weick (1979,1993, 2001), Wiley (1988) and Gephart (1993), but insights so derived have only recently been applied to projects and project management (Thomas, 2000).
An understanding of projects from a sense-making perspective focuses far more on the processes of organizing projects rather than on the structure of projects and the capabilities and resources required to execute them. The concern is more with, ‘…the deliberate social interaction occurring between humans working together to accomplish a certain task…Thus a sense-making focus on project management directs us to look at the processes of action and interaction that enable individuals to make sense of organizational activities and how they interact to effect the emergent projects. Researchers are directed to explore ways to facilitate the inter-subjective sense-making to reduce communication failures and confusion’ (Thomas; 2000: 42).

This may appear counter to the mainstream understanding of project management with its focus on tools and techniques in the narrower view, and its focus on the contingent relationship between the business context which initiates the project and the different means by which projects might be delivered in the broader view. However, Thomas (2000), at least, argues that sense-making adds the insight that both project initiation and delivery are socially negotiated phenomenon and that the project itself is an emergent entity and not ‘given’ at the start of the process or as something comprised of external components (e.g. technology) which act independently of the sense-making process. We believe this to be a vital insight.

What the sense-making approach highlights in the context of project-based forms of organizing – especially where these take on the properties of complex projects – is
that different groups and communities do not necessarily view the projects they are working on in the same terms as one another. The lived experience or actuality of projects is much more likely to be fragmented by competing ways of making-sense.

Arguably, the sense-making perspective offers a different insight. Conventional views of project management see managing projects successfully in terms of gaining access to the right information, whilst uncertainty, or weak management, is seen in terms of a lack of information. However, the sense-making perspective invites us to view information itself as ambiguous and equivocal, which is filtered and re-constructed through different ‘frames of reference’ (Weick, 1995). In this view, the role of the project manager, rather than being one of responding to unambiguous inputs, is one of attempting to deal effectively with ambiguity.

We can expect the extent of ambiguity and uncertainty in complex service-led projects to be high. At the same time, expectations concerning such projects are more likely to be divergent and difficult to satisfy. There will be greater scope for failures of communication and more than sufficient scope for confusion amongst participants as to goals, objectives, the meaning of information and so on. The complexity of projects can be seen as disruptive to the sense-making process through the need for new interpretative schemas and frameworks through which to interpret and respond to stated requirements.

Sense-making also has a strong contribution to make to an understanding of the translation process in actor-networks. The concept of sense-making draws attention to the inherently subjective nature of interpreting reality and its objects (which can
include intermediaries such as specifications, project schedules and contracts) and the consequences of this for building and maintaining project networks. Specifications, however clearly written from the perspective of one actor, will be subject to variable interpretation by actors working with different sense-making frames who have to make sense of what is expected of them and what they can reasonably be expected to deliver. As the project network expands and more and more actors are enrolled into it, differences of understanding will also be drawn into the network. The result will be unanticipated further translations and unanticipated effects as the embedded habits of thought of individuals, groups and communities (Goffman, 1974) and, 'schemata of interpretation' (Snow et al, 1986) of individuals encourages them to order, categorize and label the world around them in different ways.

**Network convergence and divergence as a measure of project management effectiveness**

Based on the ideas from actor-network theory discussed above, our central proposition is that good projects are, in network terms, convergent. This convergence, we suggest, is created not just by a convergence of interests (political convergence), but also by a convergence of understanding, knowledge and framing about what the end goals of the project are (cognitive convergence). A dogged focus on a stable set of goals can be crippling for an organization (Kaynes, 2005), but it is essential for projects. Without shared, or at least compatible goals, projects cannot remain on a single trajectory for long. While actor-network theorists are keen to point out that projects all too readily fragment into multiple trajectories it is precisely the job of keeping projects on a single trajectory that project managers must achieve. Failing to do so, even if it is not the undoing of the project, is at the very least a source of great
inefficiency. A good project will therefore be an efficient one in network building terms and one that is therefore more likely to succeed in terms of satisfying key stakeholders. Poor projects will be inefficient in network building terms and less likely to meet the aspiration of project stakeholders and are more likely to face cancellation.

Our empirical observations suggest that the task facing the leaders of complex service-led projects is not just the transformation of materials into artefacts and associated services, but also of the mind-sets of the suppliers, service firms and engineering designers that have to support them in doing so. It is from our observations of the need of project managers to think and act outside conventional existing project management tools that we have derived our own view of the limitations of conventional project management and what an extended toolkit might look like. It is not our intention to seek to throw out conventional rational project planning and monitoring tools, but to examine what it is that project managers must also achieve in order to deliver complex projects.

From the theoretical considerations presented in this paper, the delivery of complex, projects depends on the successful translation of actors within the project network. Project managers therefore need to pay attention to this translation task, which is not something that is achieved through the application of the conventional tools and techniques of the project management toolkit as exemplified in the formal bodies of knowledge (although these tools may still be needed for a variety of other reasons), but through political and networking activities that seek to engage other actors and enrol them into the project. Multi-nodality in projects implies that project managers
have to gain an awareness of the frames and sense-making activities employed in more distant parts of the project network that they may not initially have cognisance of and which may be at variance with those of their own organisational context.

Successful translation of actors in distant nodes will increase the likelihood of project success. A failure to translate such actors exposes the project to the effects of decisions and actions at variance with the needs of the project (as defined by the project management team, project sponsor or project integrator). It is also clear from our empirical work, that conventional mechanisms for exchanging knowledge, such as technical specifications and the like, are not up to the task of translation, as competing frames override the intentions of those issuing such documents or instructions. The process of translation needs active management and perhaps can not always be undertaken at a distance. Mechanisms that bring project partners together, both in geographical space and in conceptual space are required.

**Conclusion**

In this paper we have suggested that concepts and propositions from a number of areas of theoretical development in the social sciences, offer the potential to rethink project management in ways that could shed light on some of the complexities of modern major projects. Whilst a growing number of contributions in the literature are applying one or other of these perspectives, our contribution is to suggest a way in which some of these ideas may be usefully combined to provide a richer picture of the operation of complex projects as networks within which different actors have to be enrolled or translated and in which the processes by which sense is made of new requirements and knowledge are more clearly articulated and understood.
We are unable to articulate the precise contents of an advanced project management toolkit. We suggest that this remains a major exercise for academic research. Our contribution is to suggest that we should be looking beyond the conventional rationalistic toolbox for the components of that toolkit and those theoretical propositions that have provided a rich resource in other areas of management and innovation research offer a useful direction for developing project management.

**References**


Figure 1: Complexity in major projects