

A War On Terms: *moving the discussion of managing complexity in projects forward*

Discussion Paper following the APM Conference 2007

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Opening remarks

If we are to begin to consider the real issues surrounding the matters of managing complexity in the context of projects, then there are some significant and fundamental issues, I think, to be addressed first. In this discussion paper I am going to make suggestions as to what some of these issues are and how we might begin to resolve them. Also, I will put forward some topics that I think need to be part of the “managing complexity in projects” discourse.

Firstly, it is important to accept that if we are to fully embrace the concept of complexity in projects then we must come to understand and acknowledge the evolutionary nature of the human social environment that projects manifest and take place. The social complexity literature refers to evolutionary psychology and sociology which attempts to understand the human mind, human behaviour, and human society/culture in terms of the evolutionary pressures that shaped them. The literature is extensive and draws on theoretical and empirical research from a range of fields including behavioural biology, psychology, sociology, neuroscience, anthropology, and memetics. I mention this because as I begin to unfold what needs to be done in order to truly discuss complexity in the context of projects I will necessarily reframe many traditional concepts of project management. For me, this is an extremely exciting and fruitful discussion to be had. For others, I know some of the topics will appear confronting and jar with their current thinking. I hope that the latter group invest time in contributing to this discussion. Not only will they temper the zeal and attachment of those like me, but they will add a very practical insight into how concepts of complexity might be rewardingly applied.

The language of this paper is intended to be inclusive, and hopefully embraces academics and practitioners, without patronising either. This is no way an attempt to review the literature on any particular topic. Furthermore, as with all good discussions, this one is laced with empirical evidence, some conjecture, and biased with my opinion.

Fundamental issues

The human social system is a complex system in which emergent behaviour manifests. The behaviour of project management or that of managing projects is one such manifestation. If we are to seriously consider the matter of complexity and whether or not, or how emergent behaviour manifests and could be managed in the context of a project, then we must be prepared to first iron out some fundamental issues that can be evidenced from the project management literature and the questions raised on the floor of the recent 2007 APM conference.

I suggest we are running into problems when we speak about complexity in the context of projects because we are not clear (ontologically speaking) about *what* we are talking about when we use the word ‘project’. The lack of clarity is exacerbated by the term ‘complex project’. Consequential

of our lack of ontology, term (words and language) are used and applied rather liberally with little regard (unintentionally) for their meaning. Also, we need to appreciate that the lingua franca of project management is founded largely on a Newtonian (cause and effect) view of the world, where individual agents (humans and organisational entities) act independently. To fully embrace complexity in the context of projects we must resign ourselves to the fact that Newton was only half right. We have allowed our values and beliefs about the world to influence our understanding of it. To correct Newton, not only can cause influence effect, but effect can influence cause. We must seriously begin to consider a systems or networks approach to the management of projects. Lastly on my list, but certainly not finally, if we are to embrace a systems or network approach then we necessarily have to re-evaluate what we mean by competency, and moreover what this means in the context of managing complexity.

Below I’ve expanded on each of these topics, and collected what I have to say on these matters under the headings of Ontology, Language, Network Approach, and Competency.

Ontology

A primary issue we face in project management discourse is that of ontology. That is to say, when we talk about “the project”, what precisely are we talking about? Are we meaning the object of the project (e.g. a product - a new fighter jet), the environment or context in which it takes place (physical, social, economic, etc), the individual agents involved in the project (project workers, stakeholders, institutions), all of these, or just some of these?

If we are to begin to talk about managing complex behaviour (i.e. emergent behaviour) in a project, we need to be clear about our terms and how we recognise and quantify the emergent behaviour (whether it be productive or non-productive) that has the potential to manifest.

When one talks about the behaviour of a complex system (e.g. the human social system) it is easy to muddle ontology, and this is the case with many competency standards, particularly the current Competency Standards of Complex Project Management (CSCPM). To unpack the concept of ontology a little further, as the components of a system interact, they can form a pattern that is stable over time. Such patterns are called emergent objects or entities [1]. For example, a *school* of fish is a pattern of fish that can be stable for a period of time. The *price* of goods and services emerge from the accumulated interactions of buyers and sellers, and physical objects (e.g. *materials*) emerge from the accumulated interactions of individual particles. Therefore, when one defines an entity as emergent, one has adopted a particular ontological perspective of seeing the entity as a composite assembly of interacting components that are maintained in a dynamic equilibrium. These emergent entities are of a different ontological nature to their component parts, as flocks (the observable emergent behaviour) comprise birds, and so on.

What then, when we are talking about matters of complexity, are the observable emergent behaviours or properties in a project? How do we recognise and classify these behaviours?

Language

Having accepted that there is a valid and relevant conversation to be had in discussing complexity (how much complex behaviour there could be) and how it surfaces in the context of a project, I suggest that we be careful with our choice of words, and speak of “project complexity”, the “complexity of a project”, or “how complex the project environment is”, rather than speaking about “complex projects”. This latter term, as Harvey Maylor and I have previously argued, is not helpful. All human behaviour is manifestation of complex behaviour. Some behaviour is more complex than others.

Do not underestimate the power of words, especially when discussing social complexity. Yes we know that words can start and end wars, but they are not an abstract concept; their form is inextricable from the anatomy of the human brain. It seems natural to assume that language evolved as vocal behaviours became increasingly refined. However, language ability evolved as brain centres that controlled prehensile (e.g. seizing, grasping, holding) movement in the left hemisphere adapted to process increasingly sophisticated forms of gestural language [2]. Although vocal language eventually eclipsed gestural language, we can still observe this gestural inheritance in the ways we speak, think, and the words we use.

To consider just one example of this, I often come across the phrase “research project”. The casual conjunction of these two words is not helpful as both have a very different etymology with regard to physical behaviour they represent and describe. Bodies of work that have been described as “complex projects”, or those that have part of their scope that cannot yet be defined, appear to have a little of both. We must recognise this in the language we use to describe these bodies of work.

The word ‘project’ derives from the Latin ‘pro’ and ‘jacere’ [3]. ‘Pro’ in Latin means “before”, “forward” or “for”. As a prefix it can also mean “front”, “in front of”, or “earlier than.” So if one proceeds someone, one goes before them. ‘Jec’ or ‘jac’ comes from ‘jacere’, the Latin verb meaning “throw” or “hurl”. So to eject something is to throw it out. Therefore, the word ‘project’ originally involved the physical movement of throwing a physical object forward. One might project one’s jaw in defiance, or project an arrow or bolder. What about the word ‘research’? The prefix ‘re-’ means “once more”, “afresh”, “anew”. ‘Search’ relates to the physical activity of trying to find something by looking or otherwise seeking carefully and thoroughly; to examine thoroughly in order to find something. The physical behaviour of ‘research’ is very different to that of ‘project’. Ask any researcher!

The sense that words like ‘project’ originally pertained to physical movement of a physical object has eroded since the Middle Ages. It is quite common that verbs involving movement turn into markers of the future. For example, ‘going to’ originally pertained to the physical movement of someone going somewhere. Today, ‘going to’ is not so much commonly used to describe someone moving on a

course in physical space, but in time towards some point in the future. The word ‘project’ is more commonly understood to mean “an enterprise carefully planned to achieve a particular aim” and “a proposed or planned undertaking” [4]. ‘Project’ is today very much a future expression. Some activities that pertain to what could be called ‘project work’ actually involve physically projecting an image of work to be done in the future (e.g. a Gantt chart) onto a screen.

Through the liberal application of the word ‘project’, there is a significant danger that project management is regarded as a polymorphous activity, as project management can be regarded in many different forms and take place in innumerable situations. In this sense almost every human endeavour can be considered a project that requires managing. One’s garden or wedding could be considered to be a project. Somehow the sense of fulfilment and pleasure one gets from gardening seems to be diluted when one reduces it to a project. Similarly the sense of hopefulness and sharing of a wedding can be diminished by invoking the currently limited language of project management.

I suggest that it would be difficult to continue a meaningful discussion about complexity in the context of projects without acknowledging the preciseness of the terms and language we are to use.

Network Approach

It is my opinion that we are not being clear about the nature of what it is we are discussing, neither are we being expansive in our language. I also suggest that we are extremely focused on the concept of ‘a project manager’ who somehow controls all. But the reality of a human social system that exhibits complex behaviour is that is driven by the interaction of the individual agents (humans and organisational entities), not by one person.

One significant way humans misunderstand the natural world by attempting to draw analogies between it and their own social structures which are consequential of their values and beliefs about the world. For example, when observing ant or bee colonies, analogies are drawn between the behaviour of busy human workers and the activities of industrious ants. In this way members of an ant or bee colony are ascribed to a human social structure and categorised (inappropriately using language again) as workers, soldiers, and queens. Even the traditional theories of bird flocking were based on the idea of a “leader” bird at the front of the flock, but this is simply wrong.

Complexity science today views bird flocks, as wells as ant and bee colonies (and yes – human society), as decentralized and self-organizing. These communities as well as others exhibit complex behaviour. In a flock of birds, each bird follows a set of simple rules, reacting to the movements of the birds most proximate. From these simple local interactions orderly flying patterns (the flock) emerge giving the appearance of some overall controlling influence. Insect societies are also not run through command and control but through a flat, decentralized organizational structure in which individuals make their own simple decisions using information garnered from the local environment, or through signals and interactions among individuals [5, 6]. Insect societies harness the power of self-organization and with the appropriate set of feedback, inter-individual interactions, and proximate mechanisms, group-

level adaptive behaviour emerges [7]. No individual directs the foragers where to find food, the network of trails and interactions drives this. Neither is any individual allocated to tasks. Tasks, by their predisposition, allocate the workers [8]. For example, a worker ant uses a simple rule based on the rate of encounter with other ants. If the ant meets another ant every 2 seconds it continues foraging. But if the ant meets other foragers every 0.5 seconds it stops foraging. Each ant knows nothing about its colony, in the same way that a bird has no sense of the overall pattern or intention of the flock. The bird at the front is not a leader, controller, or manager of the behaviour in any meaningful sense.

This decentralising or 'no lead bird' behaviour presents important implications for what it means to talk about managing complexity in the context of projects. It suggests that there can be no centralised control of complex behaviour, and that control for the overall behaviour of the body of work is some function of the parameters of the individuals in the system. These individuals could either be the individual people or corporate and organisational entities, or more likely various and changing, combinations of both. Of course, and in a rather traditional manner, we currently manipulate the individual parameters of these individuals by means of implementing policy and/or process.

Complexity science applied to the behaviour of teamwork would fuel an interesting discussion on ethics. The concept of teamwork and mutual cooperation is consequential of our value/belief system. However, to apply such laudable behaviour to all living things as well as ecosystems is an illusion [9]. The illusion being that all living things comprise parts that intricately harmonize and regulate to keep them alive, while the ecosystems have species that do something similar [9]. However, bacteria, fungi, plants, animals, and humans, that are on earth today are the ones that have successfully *exploited* the others in their environment [9]. One example I have is from a recent piece of research I participated in which explored the mental models of effective teachers who worked specifically with students who have disabilities. During open-ended interviews with the teachers and their close colleagues it became apparent that the really great teachers were good team players. But when one observed the teachers' behaviour (ethnographically speaking) it was obvious that they were actually quite manipulative. The really great teachers (from the point of view of the student and their family) played the educational system (resources, funding etc.) with the appearance of a win-win strategy, but in fact the result always favoured their own students above those of others.

If we are in future to run postgraduate programs on managing complexity in the context of projects, we must include game theory. And then we can begin to discuss how effective a strategy win-win is when you are actually playing for win-lose. Do we begin to teach this principle?

Competency

What does competence mean in the case of managing complexity in a project? As I've remarked previously, birds that fly in a flock formation appear to be competent at doing so. Rarely one observes individuals colliding or arguing for position. Of course no bird was taught to fly in formation. These hardwired traits are a consequence of natural

selection as there are survival advantages in flying amongst a group.

Computer models can simulate bird flocking (one manifestation of complex behaviour) and they do this by giving each individual bird a set of identical rules to follow. In a crude computer simulation of a bird flock each bird adheres to three rules; Cohesion - each bird flies towards the centre of its local flock mates; Separation - each bird keeps a certain distance away from local flock mates to avoid collisions; and Alignment - each bird aligns its speed and direction with that of its neighbour. Obviously to make the simulation more realistic other rules are required. A significant point to consider here is that in a real bird, the parameters for such rules as the separation distance have been limited by the process of natural selection. If a bird were born with separation values abnormally larger than its counterparts, it would be likely that it did not fly in close formation and thereby be exposed to prey, thereby removing its genetic trait from the gene pool. In computer simulations of bird flocking it is possible to vary the parameter of the rules, pull the levers of the individual rules each bird follows. It quickly becomes apparent that there is no linear relationship between the parameters of the individual bird and the flock formation. One small adjustment to one parameter can break the flock apart, disabling it from any future formation. It also becomes apparent that there is no simple causal relationship between individual rules and the flight formation or shape of the flock. If the computer simulation shows birds flying in a delta formation, and one wants to manage the formation into a single straight line, there is no way of knowing what parameter to adjust. In a project, what practices (perhaps via policy or methodology) do we need to manipulate in order to manage complex behaviour (once we've defined what that is)? And how do we measure whether or not those involved are proficient?

Education and training has a powerful formative role in social structures [10-12], and has a truly complex relationship with the forms of social and economic organisations [13, 14]. A competency standard or performance criterion shapes identity, as well as the learners' expectations of work; determining what kind of work they are attracted to and what kind of work they will tolerate (just like the ants). They change not only the recruitment patterns of employers but also the way employer structure work [14].

Competency standards become unstuck when they involve measuring management, interpersonal and problem-solving skills that are not directly observable and not objectively measurable. As competencies broaden and become less well defined, so their performance criteria become increasingly vague and subjective, and the essence of the job being described is lost in the competency's very attempt to capture it. "high-level managers tend to know a good manager when they come across one, but are unable to describe all the qualities of a good manager" [15].

Clearly there needs to be more empirical research on the effectiveness of different methods of project management. However, without a clear concept of our ontology and language use, it is impossible to find appropriate behavioural criteria to measure what goes on in the management of complexity in a project. With regard to traditional project management there are many methods

both old and very new that are advocated on little more than a hunch or personal prejudice. More relevant empirical facts are required, but these cannot be found if there is uncertainty in how to identify cases of complex behaviour occurring. Furthermore, it is vital that practitioners understand what complex behaviour is because this understanding drives their behaviour in the workplace. Practitioners, and their professions, need to be clear about the nature of the central activity they are occupationally engaged in.

So, before we begin to talk about managing complexity, how do we characterise the activity of project management so as to distinguish and appreciate it from all other activities? For example, when one enters a workplace how does one tell if someone is engaged in a project management activity? How can one tell whether or not a project manager is, in fact, managing a project? To begin to answer these questions we must distinguish how project management is regarded. In one sense project management is regarded as an enterprise in which an individual might be engaged in for a period of time. The term project management here is functioning (ontologically) as a high level label for a whole enterprise which may be broken down into many specific entities. This is how project management is characterised in competency standards. However, if we examine any one of the elements, we find that many of them are not activities we would in the strictest sense of the term call project management. Communicating with colleagues, costing, budgeting, conducting a risk assessment may be legitimate parts of the enterprise of project management as a whole, but one would certainly not regard these and many others like them as solely project management activities. We need a description of project management that allows us to state clearly what a project management activity is, and what a project management activity is not. Then we will be able to speak of specific project management activities, then perhaps specific activities for managing complexity.

For an enterprise to be 'project management' it must necessarily include specific project management activities. But how does one distinguish specific project management activities from others? Why isn't conducting a risk assessment a specific project management activity. It is apparent that project management is ontologically different to, and not as specific identifiable as, an activity such as swimming, reading, or driving a car. There are, no doubt, an enormous amount of activities which could be classed as contributing to project management. One might be measuring, recording and reporting progress in relation to agreed plans. Alternatively, one might be estimating costs for tasks or interviewing potential project staff. All of these could be considered project management activities in a specific sense, but none of them would be individual described as project management.

If project management simply involved carrying out a limited number of specific activities then it would greatly simplify the business of training and certifying project managers. This is the fundamental assumption made by all project management competency standards. On the surface, this idea appears to have much merit. However, this approach is too naïve, because many, if not all of the specific activities which occur within the activity of project management almost certainly occur when one is *not* managing a project. One might be 'measuring, recording and reporting the progress of junior soccer club members to their parents.

Alternatively, one might be estimating costs for the annual school fare or interviewing potential assembly line workers. None of these activities actually implies that project management is taking place. I suggest that one cannot hope to get a clear definition of what project management is, or measure whether one is competent at it, by producing an ever more exhaustive list of activities.

How then is one to characterize the specific activities of project management? I suggest that they can be characterised by examining the purpose or intention that motivates the activity. It is by clarifying the intention of an activity that something such as reporting on progress is in fact project management, and not just telling someone what you've been doing.

What a particular activity is, what a person is doing, depends on how they see the activity. Consider a general example: a person is observed communicating face to face with a client. What is this person doing? They may be advising them of a breach in ethics, asking them for technical details, or negotiating for more money. Which of these it is depends on the person's intention. Evidently, a physical state of affairs, an activity, can be described without knowing the person's intention. An account of what is observed does not tell us what the activity is. It is possible that if behaviour is observed to occur in a particular context then we may be able to infer what the activity is, but we can only have any level of certainty if we have reference to its intention.

This line of reasoning suggests that there could be two interesting research questions;

What is the intention(s) by which a project management activity can be singled out from all other activities?

What are the observable features that enable us to judge whether an activity is not a project management activity?

A crude answer to the first question I suggest is; the intention of project management activities is to bring about a level of operational control in a body of work that lies outside the normal operational controls of the organisation¹.

The concept of project management is therefore totally unintelligible without a grasp of the concept of management control theory. It asserts that there is no such thing as project management without the intention to bring about control. Rather significantly therefore, one cannot characterize project management independently of characterizing control. The *raison d'être* of project management rests on that of control. And is this not the case for managing complexity?

If a practitioner spends time communicating with a colleague without the intention of gaining a level of management control over a particular body of work, then this practitioner was not participating in a project management activity. In taking the role of a professional project manager, is one not being paid to carry out this intention?

¹ I hope this opinion sparks off a discussion

If project management is concerned with the activities that bring about control, what is the intention of control? It is to influence the behaviour of staff and resources towards the achievement of the objectives of that organization [16]. To put it another way, its the mechanisms designed to increase the probability that people will behave in ways that lead to organizational objectives [17]. Control is rarely absolute or complete and so some would argue its more appropriately called coordination [18]. Whatever you call it; examples include staff selection, induction, training, procedures, policy, and methodology.

So to summarize a little, a project management activity is the activity of a person (the project manager) or an organisation (a framework), the intention of which is to bring about a level of control in a body of work that brings it in line with that of existing operational processes. The controls are to provide some level of assurance that the work will deliver results in line with the objectives of the organisation. Any notion of an activity that is not concerned with gaining control of a body of work cannot be measured as a project management activity.

Project management competency standards seem to exclude this – why? Standards comprise activities that are readily observed. That is to say that standards measure the routine aspects of work, that which is documented, and often the less important aspects of work. Imagine if one were to compile a list of competencies for driving a car by simply recording the activities of an expert driver. Every now and again one might observe the driver winding the window up and down or adjusting the air-conditioner, but one would not describe those activities as driving. One could not make technical and operational improvements to the air-con or window mechanism, or run courses for drivers on such things that would improve driving performance in any meaningful way. In this example the mistake of recording all the activities observed to be performed by the expert is plain to see. However, I suggest this is not the case with current project management competency standards. They do not characterize the activities in terms of their intent. And because they are not founded on empirical evidence that demonstrates that their intervention leads to an increase in control, true project management activities are mixed in with those that are the project management equivalents of window winding.

Of course the logic of this last argument can be easily extended towards that of defining what competency means with regard to managing complexity in the context of a project.

Closing remarks

As with all discussion papers, I hope to have produced more questions than I have answers. Hopefully fellow practitioners and academics will at least agree that before (or while) we being to talk about managing complexity in projects, we need to address some fundamental issues.

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