

# **LEAN CONSTRUCTION: TOWARDS AN AGENDA FOR RESEARCH INTO SYSTEMS AND ORGANISATION**

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## **ABSTRACT**

The first part of the paper presents a draft proposal for research intended to find out what is needed at the levels of systems and organisation to facilitate the implementation of Lean Construction (LC). The ethnographic study of ‘specification’—to refer to the way organisational concerns and features are represented—is taken to be the key theme of the research. The second part raises the question of what any findings may look like. It is argued that they will not look like what conventional organisation theory in the rationalist tradition has sought to provide. They will look more like those from the political tradition, insofar as a major concern there has been with how action is controlled in the way it is symbolically represented. Accepting a practical implication from this latter body of work, the need to recognise the constraining effects of the ‘old’ epistemology and the need to gain acceptance of a new one is highlighted. In recognition of having to work within the existing situation, thorough understanding is needed of how it is constituted through the methods used to describe it—documentation, charts, maps and other kinds of representation. It is argued that care must be taken not to confuse descriptive and prescriptive purposes. It is suggested that attention to specification provides a promising conceptual link between tasks, systems and organisation.

## **KEY WORDS**

Lean Construction, theory, organisation, specification, ethnography

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## INTRODUCTION

This paper has grown out of an attempt to articulate a research agenda which aims to extend the focus of LC from the task level, which has hitherto been its primary referent, to wider considerations of systems and organization. The first part of the paper is essentially the draft of a research proposal designed to obtain public funding in the UK to achieve this objective. It is being prepared jointly by Glenn Ballard, John Rooke, Wes Sharrock, David Hoare and myself. The second part is a discussion of some theoretical and practical implications which I see in it and for which I am solely responsible, albeit it expresses the sense I am trying to make of it all in on-going discussion with these colleagues.

## THE PROPOSAL

The proposal is to investigate the introduction of LC techniques into a major construction project. While LC provides the prospect of extensive and systematic rationalisation of construction processes, as is well known, the adoption of new approaches to work organisation often fails to deliver promised benefits because of unanticipated obstacles and resistances to its implementation. The research will be a strategic case study of the introduction of the ‘last planner’ (LP)—into the design phase of the project, seeking to determine whether the technique is effectively implemented and, if not, what difficulties prevent its proper application.

The study is strategic because, though LC techniques have been given successful application, it is as yet indeterminate as to whether these successes were due to the particular circumstances into which they were introduced, and whether they would meet with the same success in, for example, the more routine situations of UK construction where the usual divisions and pressures of construction work might prevail.

## LEAN CONSTRUCTION: A PRODUCTION SYSTEM FOR DYNAMIC PROJECTS

LC is based on the assumption that classical production systems, their underlying concepts, associated techniques and organisational structures have been developed for stodgy projects; those that are slow, certain, and simple. Today, construction projects are becoming ever more complex and uncertain as they are pushed to ever more demanding performance expectations. Today’s production task demands a new production system.

At the conclusion of the IGLC conference in 1996, the graphic (Figure 1) was proposed as a framework for understanding and coordinating international research. Within this framework, members of the IGLC have addressed themselves to the development of such a system by adapting a number of Lean principles from manufacturing to the distinctive, prototype nature of production characteristic of construction. A key technique of lean construction is the LP. The LP principle requires that the person responsible for an assignment (the LP) will only commit to a given level of performance if s/he is confident that it can be achieved. Actual performance is then measured in terms of Planned Percentage Complete (PPC). The LP and the accompanying PPC metric are innovations which apply the principles of *product* quality and reliability in manufacturing to the planning *process* in construction. The

principle enables continuous improvement, as reasons for shortfalls are identified and progressively eliminated and/or measures taken to reduce their impact. Plan reliability is thereby increased. This is a radical departure from normal practice, in that it provides a stable basis for managing the inevitable uncertainties of dynamic projects.

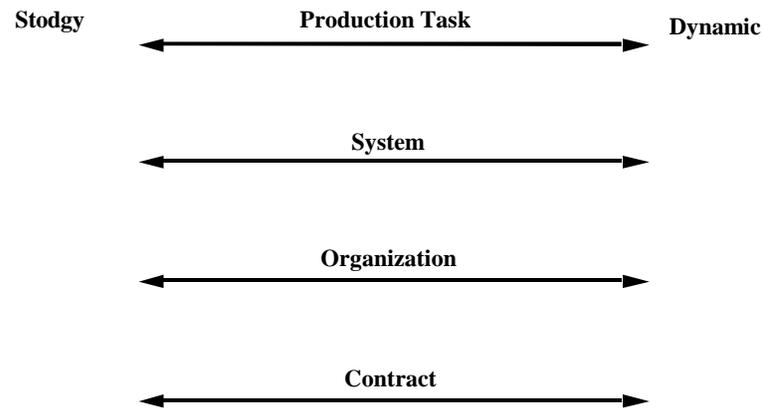


Figure 1: Range of Projects, Sequence of Work (from Greg Howell)

## **LEAN CONSTRUCTION IN DESIGN: THE ORGANISATIONAL IMPLICATIONS**

The benefits of implementing the LP have been demonstrated on a number of projects worldwide. On the strength of this success, it is now being trialled in the design process by the industrial partners to the research proposal. This is a very challenging development since, in essence, design is more complex than construction itself. Thus, while construction can be assessed against conformance to requirements, design creates those requirements. It therefore calls for more extensive systems and (inter-)organisational realignments.

While the essential transparency of LC methods is a means of reducing conflicts of interests, many 'secondary' factors in current practice and culture might militate against its full realisation. Thus, as a first step, it is considered expedient to study a situation where a substantial measure of trust and co-operation already exists. For this reason, an environment has been selected where Partnering and contractual arrangements (using the New Engineering Contract (NEC)) designed to foster cooperation along the supply chain are already in place and where there is a general commitment to improvement and change.

Since the major industrial partner uses NEC for all their contracts and are now introducing LC, the resultant efficiency within its systems and organisation will be investigated. This will require identifying what kind of departure from its traditional practice LC involves, what issues and problems arise within the firm and its framework contractors of incorporating both NEC and LC into planning and project management arrangements.

The NEC, too, is designed to improve planning on construction projects. It is not a defensive contract, but places the onus to get it right first time on the contracting parties. Thus, for example, any mistakes, inadequate or untimely decisions are quickly highlighted and appropriately paid for through the compensation event process. The NEC's facilitation of good project management is thus, in many ways, complementary to those of LC and may itself

have significance for the adoption of Lean Construction techniques in the partners' design offices. The research would investigate how the LP can be incorporated within the NEC contractual and payment systems as operated by the main industrial partner to determine whether the intended flexibility of the NEC allows easy incorporation of the LP principle into its planning clauses. The research will also investigate the potential for conflict between the NEC approved programme needs which constitute a push-driven (wish list /'should') plan, as against the pull-driven logic of LC. The research may, for example, substantiate the need to revise the NEC programming clause and provide a secondary option clause to accommodate the pull-driven LC Agreed Programme.

To develop a new production system for construction is a massive challenge since it questions many deeply held convictions. These include assumptions about normal ways of working and the rationales and assumptions underlying a host of issues concerning human motivation and existing practice. Education and training are integral to achieving this transformation and the current and future education and training need of the partners successfully to adopt Lean techniques will be investigated.

As a strategic case study, the use of LP will be tested in the design process in UK conditions and establish what organisational change is necessary for better implementation. Its aims are: (i) To determine the system and organisational changes that are necessary at the level of day to day working practice to facilitate the successful implementation of LP in design (i.e. the barriers which must be overcome); (ii) To learn how to design systems and organisations for Leaner Construction; (iii) To determine how the LP system relates to the many other change initiatives current in the industry. Questions to be addressed in the research are: What are the cultural, contractual and (practical) features of current systems and organisations of relevance to the implementation /adoption of LC techniques in working practice? What opportunities are there for improvement better to meet design /production requirements? How can LC be better implemented for future construction projects?

## **METHODOLOGY**

Ethnographic research will be a fundamental technique for inquiry into the lean project, supply chain and corporate organisation. This is because the task and system development elements in LC have now progressed sufficiently far that we need to begin exploring the organisational implications. The case study technique is adopted to enable close, detailed and continuous observation of a construction project's work practice at an appropriate organisational level—the design office. This will enable capture of the response of participants to the new technique, the manner and extent to which they adopt that technique, and the circumstances under which they apply, modify or dispense with it. Whether the application of the technique is, in practice, given the same priority as it is in principle, whether there is consistent managerial support for its actual application, whether the consequences of making use of it are compatible with other aspects of practice, and whether its use can be sustained in the face of countervailing pressures from the organisation's structures and in face of the contingencies of project work are all matters to be determined.

**a) Action Research: Instituting Last Planner in the Design Process**

The research team will be in direct collaboration with the Lean Construction Institute who, in its consultancy capacity, will be determining how the LP technique will be introduced into the organisation. Implementation will be monitored. In particular, one researcher will; (i) monitor the implementation of the LP—the effects of time pressure, giving unrealistic assurances, or attempting to meet unrealistic demands. While this is endemic to the whole construction business, it is particularly critical to the design process, where a mistake on paper can cost a fortune later. The development of the design is a good place to invest more time. LP enables designers to demand the time they need. (ii) monitor the use of Percentage Plan Complete (PPC) which is a key measure to be used.

**b) Ethnography in the Design Office**

Since the measures themselves will not tell the details of how the implementation was achieved, what the difficulties were, how people felt about it and so on, the researcher will be in place well before the initiative is introduced. The researcher's brief will be to produce an ethnographic study of the design process, not just the introduction of LC. This will include formal mapping and narrative descriptions using the conventions of LC. Written reports will be furnished weekly, each followed by a verbal debriefing.

As far as possible, the researcher will retain an attitude of indifference to the success of the LC initiative. This may be impossible, if the initiative seems to be in danger of failing, because designers are not taking it up. In this case it may be necessary to press the researcher to help promote the initiative. In this eventuality, the research question is transformed and becomes: what is necessary to get the LC initiative implemented?

**c) Overview of Knowledge Management Issues**

To obtain a wider overview of the organisational environment will be the task of a second researcher. The aim will be to establish the effects of institutional features on the implementation process. These features would include: use of NEC; Partnering policy; established methods of working in the design office; other change initiatives; etc. The investigations of the design office ethnography would be a starting point for this other part of the research. It would involve interviewing participants beyond the confines of the design office itself, acquiring and studying relevant documentation and so on. Construction projects are characteristically complex in the way they are organised. Specific changes cannot be dissociated from – and often have a diffuse relation to – the context in which they take place or from other, concurrent changes in organisation. The researchers would therefore be briefed to study not merely the impact on the LC initiative, but to seek to produce a rich account of 'what is going on' in the firms who are partners in the research relative to the management of the design and construction process.

## CONTEXT: A LEAN CONSTRUCTION ANALYSIS OF THE BUSINESS PROCESS

1. Lean Construction addresses the concerns of the three major approaches to design management and offers three different ways of treating the material process:

- **conversion process** - in which material is physically transformed;
- **flow process** - in which material moves around, or, as more typically in construction, it is work stations, rather than the materials themselves which are mobile—however, it is still possible to produce a meaningful flow analysis by treating the process as if work stations were stationary and it was the material/product which was mobile.
- **value process** - in which value is added to the material/product.

This analysis has the effect of separating out value judgements from the physical processes of conversion and flow, thus allowing the latter to be treated as objective phenomena. The remaining question is how do we analyse the value process? Within the latter we identify:

2. Three aspects of human process:

- **task** - what people do to achieve material processes, this is the starting point and fundamental empirical referent for LC to date
- **system** - this is a conceptual device (system thinking) for describing/analysing, designing and improving task performance, or organisation. The analysis of material process in paragraph 1 is an example, the analysis in this paragraph is another.
- **organisation** - how are tasks to be specified, allocated and integrated? This is what LC must address in order to effect the material process systems it has developed. It is also the empirical focus for the ethnographic and interviewing work to be done on the project. The proposed investigation's analytical focus falls upon:

3. Specification. Specification will be the focus of the proposed research. It is taken to include *inter alia* design and elements of tendering (production of works information, method statements etc.). Of the three types of organizational activity named above, it is the key activity underlying the value process in construction. This is because the finished specifications define the task to be done and a set of criteria by which the work will be judged; but also because the process of specification is one of capturing customer requirements and planning for their fulfillment. Thus, a failure in the specification process means that either the customer's requirements are not met by the product as designed, or the design is unrealistic and cannot be executed in construction. Either way, the customer's requirements remain unfulfilled.

The concept specification, as applied to the systems and organisational levels, implies focusing on the way expected and required behaviour in the total delivery process is actually articulated or specified in the form of organisation charts, job descriptions, contracts and so

on. It is perhaps best seen as any act of communication which aims to identify and establish an empirical referent as the basis for agreement between two or more parties. For example, it is one of the acknowledged difficulties in moving to some form of relational contracting, more appropriate to the organisational requirements of LC, that it is easier to contract for (specify) products than it is to contract for (specify) behaviour. One of the challenges facing the development of LC is precisely how to come to grips with the specification of desired or required behaviour beyond the task level; how to articulate, through some kind of representation, what is intended and how it is to be achieved.

### **THEORY AND THEORISING IN LC: SOME IMPLICATIONS OF THE PROPOSAL**

An important feature of this proposal, as far as I am concerned, is the role given to specification. It emphasises the fact that the focus of the study is how those intangible features of organisation, known to be important, are actually *expressed* in finite, empirically available terms. For example, discussion in the IGLC has featured the notion ‘mental model’. It refers to ideas and expectations that people carry round with them, which influence the way they see things and the way they act. It is agreed that a new mental model is needed if people are to assimilate what LC offers. What it offers is a new theory of production in construction; a new way of seeing, a new *vocabulary*. As the above proposal stated, these efforts have been mainly directed at the task level. The questions now are: how are the mental models, both old and new, *evidenced* at the levels of systems and organisation and how is what we find to be formulated? In other words, what kind of theory of systems and organisation which will complement that at the task level are we looking for?

The IGLC has, to my mind, fruitfully, argued the meaning of ‘theory’ and its role in LC over several conferences. I am in essential agreement with Koskela (1999) that there is the need for an ‘explicit theory’ for production in construction, with his contention that it is prescriptive and with the list of benefits he proposes that it will bring. These are: *Explanation*; the virtue of an explanation is that it makes explicit what empirical features of observed behaviour are claimed to be connected (co-vary or whatever). It contributes to understanding by making it possible to test if the alleged connections are present; to encourage closer observation of the phenomenon with the aim of being likewise specific and explicit. So too with *prediction*, it is the effort/endeavour to develop and apply methods to test one’s claims about phenomena that is valuable. That theory aids *communication*, provides *direction* and facilitates *learning* are all consistent with the virtues of explicitness and specificity. About *testing* the same can be said as with *prediction*.

*Transfer* seems to be about communicating and bringing to light the adaptations that need to be made to the theory or ‘recipe’ in circumstances other than those in which the recipe was devised. I take ‘recipe’ to be an abstract statement which clearly indicates/specifies what empirical referents correspond to the concepts which are contained in the abstract statement. It specifies ‘ingredients’, equipment, temperatures, sequence of action that bears directly on the product outcome. In the object-world, the nature of the materials being processed, the spatial/temporal considerations of moving and waiting are fairly clear. However, the further we move from the ‘object-world’ of production to the social world of organisation, the more

difficulties we encounter in trying to specify. What the words we use actually refer to becomes less certain and their meaning dependent on the circumstances in which they are used.

Thus, while I accept that a theory of production is prescriptive, that it acts as a recipe or a set of rules to be followed to achieve specific objectives, I see difficulties in extending this conception of theory to system and organisation. We become involved in the epistemological problems pointed out by, for example, Schon (1997). While he accepts that we need theory as a guide to action, it cannot be the kind of 'objectivist' theory that is expected in the 'scholarship of discovery'. The expectation of being able to discover the immanent nature of human organisation must give way to 'the epistemology of the new scholarship' as Schon calls it, in which the theory of the practitioner ('the practitioner's reflection in and on action') and the natural language in which it is expressed become the primary focus.

The significance of this is that claiming to know that something is true of the object-world can be stated in a language unknown to the object world itself and is fairly easily tested using the language and criteria of the various communities of natural scientists for assessing claims to knowing. The object-world does not participate in the process of characterising itself nor does it have a voice with which to contradict the scientists. Neither of these features is present when claims are made to know that something is true of the social world. Unlike the object world addressed by the natural sciences, the social world is already characterised and organised through language. It is not a matter of there being phenomena *and* a language with which to describe them. Each constitutes the other. As Winch puts it '[the] very categories of meaning are logically dependent for their sense between men [sic] [...] the very existence of concepts depends on group-life.' (Winch 1958, p. 44)

For example, the concept *value*; the aim to maximise value makes common sense. However, the situationally specific meaning of the concept will vary depending on the organisational arrangements that are in place to determine whether it has been achieved or not. Thus, it can be operationalised in terms of critiquing proposed design solutions. The activities involved in doing this represent an *organizational* arrangement based on a particular conception of value. The alternative, described by Ballard and Howell as 'a dialogue between means and ends' (1997), is a different set of organisational arrangements based on a different conception of value. The point is that the meaning of the concept value *exists* in the organizational arrangements and is different in each case. It follows then that the claim to know that something is the case requires that it be stated in the language current amongst a given community. Thus, it is now widely recognised that claims made about knowing that something is true of the social world is accepted only because it is validated by a community of social scientists. But they, despite employing a specialised vocabulary, adjudicating its proper use, whether rules of inference, consistency, logic and so on have been observed, cannot detach themselves from the social praxis of natural language.

It is also recognised that there is a large gap between what it can be *said* is going on in any social situation and what is actually going on. The account takes for granted and makes use of all the assumptions, tacit understandings, etc. that are embedded in that situation.

This raises the question of how any 'discovery' of some feature of the social world 'works' would be expressed since it must use the language through which that feature is constituted. Any intelligible occasion of its use relies on shared, socially organised

understandings of what is being referred to. This applies equally to specialised terminology and any attempt to employ terms taken from a natural language and used in specialised and/or new ways. In turn and in the nature of language it is not possible fully to articulate the rules that are being observed in its use. None of this, of course, need be a problem. For the most part, we live quite happily with the fact that this is the way it is. It becomes a problem when the expectation is that it is possible to say the kinds of thing about the social world that it is possible to say about the object world.

In recognition of the fact that what one claims to know is stated in a given language for given purposes and given audiences subject to their criteria of truth, Argyris offers the concept of Action Science. In the same way that the scientist submits what s/he claims to know to the community of scientists, so the practitioner is encouraged to turn what he knows how to do into a testable form—knowing that—submitting it to the judgement of fellow practitioners as to its truth. Action Science is a fruitful concept and encourages forms of enquiry that make conventional expectations of scientific proof redundant replacing them with a more realistic acceptance of the situatedness of any claims to ‘knowing that’.

This has, in effect, been the route hitherto taken by LC. Theory and practice have been forged concurrently. Theory has continually been tested as to its validity through practice. A series of principles have been developed, continuously refined and shown to work through situated action. With respect to the task level all the features that Koskela expects of theory have been present. However, as the theory regarding systems and organisation begins to be articulated, it is important not to fall into the objectivist trap discussed above, since, in my view, most extant theory which pertains to technology and its relationship to culture, structure and so on, does.

### **RATIONALIST ORGANISATION THEORY**

For a long time, theorists have tried to discover what underlying patterns, causal linkages and regularities can be found behind reality of everyday organizational life.. If the linkages and regularities can be identified (so it goes), it becomes possible to establish principles and design organizations according to them. For example, where environment and technology are uncertain, unstable and non-routine, then trust, tradition and shared culture and values are important sources of control. Ouchi (1980) calls this ‘clan control’ as opposed to ‘bureaucratic’ and ‘market control’. Clan control, he proposes, is best when horizontal information sharing and coordination are needed. Market control is used when costs and outputs can be priced and a market is available for price competition. Bureaucratic control is used where environment and technology are certain, stable and routine.

In similar vein, Daft and McIntosh (1978) identify four types of technology on the basis of (i) *analysability*, which refers to the characteristics of the information used—greater ambiguity needs richer information (vertical axis). (ii) *Task variety*—greater uncertainty increases the need for information (horizontal axis)(Table 1).

The kind of prescription (or advice) provided in the two examples above are generalised guides to action. For example, it follows from the identification of these technology types, what organisational structures and informational support systems are needed and that

organisations should be designed so as to provide people with the appropriate amount and richness of information.

While there is nothing wrong, in principle, with this kind of advice, we seem to know very little about if or how it is used by managers, what interpretive procedures are applied. More fundamentally, the search for general principles diverts attention from the empirical and prior task of finding out what terms like technology, richness etc actually refer to in specific circumstances.

Table 1: Technology Types (from Daft and McIntosh 1978)

	LOW	HIGH
LOW	<b>craft:</b> small amount of rich information, observation, occasional face-to-face and group meetings	<b>Non-routine technology:</b> large amount of rich information, frequent face to face and group meetings, unscheduled discussion
HIGH	<b>Routine technology:</b> small amounts of clear, often quantitative information, written reports, procedures, schedules	<b>Engineering technology:</b> large amounts of primarily quantitative data, large computer bases, written and technical materials

As long ago as 1957, Herbert Simon argued that the conditions in which conventional maxims of administrative conduct are to be applied can never be adequately specified. He contends, therefore, that in his own attempts to develop principles of administration, the role of such principles is to direct the administrator's attention to fundamental aspects that he might otherwise have overlooked. Albrow comments:

'Organization theory is thus formulated as the study of the *categories* that are relevant to the making of decisions. This makes the relation of the organization theorist to the organization much more complex than hitherto [...] His task is one of illumination. His position may be likened to that of the psychotherapist helping the patient to come to terms with problems which he only dimly perceives without professional help.' (1973 pp. 400)

More recently, Morgan has pointed out that the contribution of organisation theorists has largely been to supply management with a vocabulary. That is, they are not dealing with finite realities 'out there', as conventional theory claims to do, but are engaged in a discourse about how reality is to be represented.

It is frequently said (Morgan 1993, Buchanan et al. 1988, Watson 1996, Stewart 1976) that there is a need to study and understand managerial work, to reveal its distinctive modes of understanding. Thus Stewart argues the need to clarify 'what is distinctive about managerial work'; to 'try to understand the constructs that particular individuals use to think about their jobs'. However, the tendency is to study what managers have to manage rather than studying how *they* do it—the way they create the reality, through the ways they categorise it, the ways they specify it. Normally, the theorists, as it were, stand alongside managers aiming to help them see the world more clearly and providing them with a vocabulary or discourse with which to do it. While this is a perfectly reasonable thing to try to do, it subordinates what is the declared intention of providing, in the first place, empirically

accurate descriptions of managerial work and what effect *that* has on shaping the organisational reality. Description and prescription are confused.

In the pursuit of models with which to explain organisational structures and processes and on the basis of that to prescribe advice, theorists have looked beyond or through actual behaviour seeing in it instances of general constructs. In doing so the empirical nature of the phenomenon under study is rendered invisible. The point is well made by Anderson et al. (1989, p.1) in their discussion of the economic construct 'entrepreneurialism'. 'Preoccupation with the function or place in the system of economic activities and the conflation of that activity with a special kind of economic rationality tends to lead away from the examination of what entrepreneurs actually do. Instead there is a tendency to opt for global summaries of the outcomes of their activities and idealised versions of their decision making.'

### **POLITICS AND CHAOS**

The 'rationalist' kind of organization theory invites managers to share in the process of looking for objective patterns in terms of certain constructs, and manage in accordance with what is shown to follow. If causal connections can be established between, say, nature of the task, information needs, authority structure and effectiveness, then managers will act accordingly. Another approach begins from the assumption of *bounded* rationality, the inevitability of conflict and in its extreme form an acceptance of chaos. While as noted above, Simon saw a role for organisation theorists in helping managers to see more clearly; to act more rationally, he was also seminally aware that managers were boundedly rational. On the basis of asking how managers actually went about making decisions, he found that a major concern for them was how to get their decisions (however they were arrived at) accepted and implemented. There was the practical need, he found, for managers to decide when the search for information on which to base their decisions was sufficient, to look for ways to justify decisions and above all to build coalitions that would support decisions. Simon's work gave rise to studies of decision-making and genuine attempts have been made to describe them (Mintzberg 1973, Cohen et al.1972, Smith 1993). This work has produced, for example, Mintzberg's *incremental model* and Cohen, March and Olsen's *garbage can model*. These have produced many insights into the nature of managerial work. What is notable is the importance these researchers have found in the control of information, the control of communication channels, the control of decision premises, and, above all, in the way issues are 'framed'. In other words, effective organisation relies on constructing versions of the way things are and what needs to be done, that are both recognisable and persuasive.

Theorists working in this latter tradition clearly accept the social construction of reality argument and use it as a central plank in their advice to managers—if you can get people to define it like that, then that's the way it is—and much of the advice they offer makes a great deal of sense (Kanter 1973, Wrapp 1967, Pfeffer 1992).

However, it seems to me that there is a danger of falling into the same trap as that of the rationalists. That is, in the attempt to be useful to managers, theorists take for granted too many assumptions that they suppose they share with them. This again short circuits the aim to describe which I think is the necessary first step to understanding. For example, the accounts

provided by Kanter, Wrapp, etc, presuppose the meaning or empirical referent of all those categories which are part of the discourse shared to an indeterminate extent by theorists and managers; that the phenomena are themselves recognisable. There are, as it were, a whole set of prior agreements about how to recognise ‘a decentralised decision-making structure’ or whatever. It is how this prior agreement is achieved that has been the concern of several other studies into organisation (Smircich and Morgan 1982, DuGay and Salaman 1992, Cooper 1986, Astley 1985). Its focus is the way we ‘map’ the world, selecting this feature and excluding that, emphasising that the map with its associated signs and symbols is not the terrain. Maps, signs and symbols, therefore, do not give us unmediated access to the terrain. Attention to specification, as proposed in this paper, moves to centre stage the ways in which reality is constructed and intentions communicated rather than working with the presumption that it is a matter of describing something that is unambiguously there and/or with reference to it delineating some rational ideal and/or proposing courses of action.

From an everyday, practical point of view, none of this needs to be a problem. If a manager reads, say, *The Change Masters* and can recognise in it circumstances and advice relevant to him/herself, then well and good. If this is so, it is fruitless to agonise over how it is precisely that we manage to make sense to each other. However, it is a problem if one is trying to create a more precise vocabulary for constructing systems and organisations which is the aim of LC. To a large extent, this more precise vocabulary has been achieved at the task level, identifying phenomena in a way different from hitherto. To persuade people to adopt the way of seeing and thinking that the new vocabulary provides is a matter of relatively controllable demonstration in the object world where signs (words) and the things they designate are relatively unproblematic.

With regard to organisation, we are concerned with a different order of phenomena where demonstration is rather more difficult since we cannot be sure that we have obtained the necessary prior agreements. In Argyris’ terms the first task is to create the community of practitioners capable of recognising what any substantive theory empirically refers to. The practical steps taken by leading members of IGLC attest to this. The priority is not so much stating substantive theories in the rationalist tradition but formulating a vocabulary in the only way a vocabulary can be—through situated social practice. Such theory that is beginning to emerge about organisation is thus a theory of change management more akin to the ‘political’ tradition in which the priority is to create the opportunity to understand through demonstrated action what, in experiential terms, the concepts refer to. For example, ‘start with work on projects’, ‘find a change agent’ and ‘find a lever’ (Howell and Ballard 1998). It involves changing the assumptions on which organisational arrangements are devised. I believe it also involves changing assumptions about what theory in and of organisation—how it is framed, used and validated—will look like.

#### **IMPLEMENTING LEAN AT THE ORGANISATIONAL LEVEL**

In sum, it is observed that while the effectiveness of certain principles (say the LP) have been shown to ‘work’, they have exerted a kind of upward pressure on systems and organisation for necessary re-alignment. Implementing these principles has been faced by organisational

practices and forms, generally characterised as the expression of mental models, which are unreceptive to them. These have been variously identified, eg., the contractual model, the product model. Whatever realignments are needed to accommodate LC will have to take place in the context of these existing models and so the problem of demonstration and persuasion will be that much greater. Quite simply, gaining acceptance of the new way of thinking and instituting practices that follow from it, will have to be negotiated not only in the context of existing practice but to some extent in the *terms* of existing ways of thinking. This will involve plotting a very delicate course between justifying action in the terms currently available, at the same time as calling for a critical re-evaluation of these very same terms.

This is most obviously seen in the commercial ‘tests’—notably, what is the payback—that new technologies are required to undergo before they have a chance of showing their worth. As Button and Sharrock (1997 p. 15) put it: ‘What measures can the organisation invoke to determine the value to be gained from such a redesign [necessary for the implementation of a new technology such as LC] before going to the actual lengths of redesigning themselves?’

Another form of test lies in the existence of a model, Schon’s ‘old scholarship of discovery’, of how to establish the truth or validity of any particular claim to knowing. For example, Schon cites the case of trying to obtain funding at MIT to continue work on some promising research into action learning. It was rejected because it didn’t conform to the conventions of ‘proper’ research’. An academic psychologist dismissed the proposal on the grounds that ‘we don’t know anything about learning’. That is, we don’t have any academically validated, substantive theory of learning. A parallel to this is the fact that in the UK, LC’s successes have, in some quarters, met with the response that they can be accounted for (explained away) in terms, say, of crisis situations where anything would have had a beneficial effect. Any amount of practical demonstration that the allegation regarding LC is not true will not convince if the proof offered does not comply with what is accepted as proof. As students of organisation in the political tradition quite rightly point out, effective action consists, to a great extent, in controlling the terms on which action is *judged* effective. Argyris’ and Schon’s arguments for a new epistemology and action science are attempts to supply such terms, but they are still seen as the poor relations of proper research—it is all mere consultancy. (Harriss 1998)

If for no other reason, there is not the possibility of testing it as it is relatively easy to do in the object-world of the task level. We are faced with a scientific ‘establishment’, or at least its gatekeepers, who, given their objectivist standpoint, have every reason for saying ‘not proven’.

Two things seem to follow from this, and I think members of IGLC are already well aware of them. First is that whatever changes are revealed as necessary for fully implementing LC will have to be negotiated within existing methods of accounting. Again, this is a political matter; a matter of rhetoric; a matter of ‘selling’ a way of defining and measuring value. Exactly how, in concrete terms, value is specified is central to this. Second, there is the need to develop methods that persuasively demonstrate cause and effect. For example, as part of the planning system a method that would reveal the implications of strategic decisions on the task level would need to show specifically what consequences ensued from particular choices

made. However, for the reasons given above, I cannot envisage the possibility of some generic or substantive theory that will achieve this.

## ETHNOGRAPHY

Ethnography and the emphasis on specification in the proposed research, in the sense defined earlier, seem to offer a way of coming to terms with some of these issues. The guiding commitment of ethnography is to understand and report social organisation in the terms that members use to constitute that organisation. It takes care not to offer versions, as the rationalist tradition does, which challenge those terms, ironicise people's beliefs and rationales or suggest that they are in any way misguided or incomplete. Ideally, it should 'leave things undisturbed'. The use of ethnography in the proposed research stops short of this last commitment for the obvious reason that we are precisely concerned with a new way of thinking about and doing construction. However, it is my conviction that the central methodological concern of LC is to make explicit what is normally taken for granted so that the reasoning it contains can be rationally inspected. In this it coincides with the ethnographic aim of documenting those unremarkable features of work which enable it to happen. As Button and Dourish (1996) put it: 'A major thrust [is...] the examination of the practices and methods through which people accomplish their work. In particular it has been concerned with how it is organised in such a way as to make it recognisable to others as uniquely the work it is.' (p. 3) In both endeavours the aim is to be specific about the way processes are made accountable.

However there is clearly a fine line between fully understanding how work is carried out and imposing a version that is alien and at odds with the interests of those who are required to reconstrue their work in its terms. It is the difference between seeing an instance of general concept which risks *misconceiving* it and enabling articulation of what the work actually consists of, capturing it to the satisfaction of those who do it. For example, this comment from a design manager: *'I had a meeting and we looked at the M&E processes, ourselves, [Company Name], some M&E consultants [Client] people, an architect and we all got together and we said 'let's try to map out the M&E process—design engineering and construction'. We couldn't do it, just couldn't do it. Nobody! We all scattered back to our businesses and we all came back out to meet again and said what have you found. Couldn't find the data. So we truly came to the conclusion that the industry was very much 'we do one job and then we do the next'.'* Here, it is clearly the case that the benefit of an explicit account is perceived by members themselves.

This comment by the same speaker suggests a highly proactive attitude towards the form in which work is represented: *'I've had a look at this and it may be of some use to us. However, I must say—I'm not critical of this—it's an attempt and I give it all its credit that it's due. But it's only a diagram. It isn't a process. For us, process means understanding why things are happening when they are happening and why they are not happening.'*

The emphasis on specification in the research proposal implies that people are invited themselves to participate in a process in which they are the judge of how far the representation of reality captures that reality. No theoretical model however complex can describe the actual

methodic reasoning that members engage in. Members, themselves, therefore are the only judge if an account is adequate.

### **SPECIFYING ORGANISATIONAL STRUCTURE**

As noted, specification is an act of communication. Work mapping, as in the above example, requires people to specify what they do, enabling them, thereby, to reach a common understanding. The following example represents a largely failed attempt to specify how roles, rights, responsibilities, authority and so on were to be allocated on a partnered project. I take it to be an example of how intentions, plans, strategies, etc are framed and communicated. The purpose of the example is to raise the simple ethnographic question: what is going on here?

A ‘bubblegram’, rather than a standard organisation chart, was devised to describe a structure where responsibilities were to be shared and where collaboration and teamwork were to be encouraged across members of the different firms that were in the partnership and regardless of formal status. By having a ‘flatter’ organisation structure, it was intended to reduce paper work, speed up communication and decision making. It was recognised to have been only partially successful in communicating the intention. A manager who had been instrumental in devising it commented:

*‘The upper echelons bought into it but those on the lower tiers, especially the people that didn’t know me, who I’d not worked with before, didn’t know I really meant it—if you want to come to me with a problem or a suggestion you can.’*

However, the bubblegram was not universally welcomed. Many people on the project said that because it blurred their authority it undermined their ability to get things done or, rather, to get other people to do them.

*‘There’s no logical hierarchical link...this job has been hindered by rather lame attempts at being friends.’* [the reference here is to the fact that efforts were made to realise the intention of the ‘bubblegram’ through out-of-hours social events].

*‘I would say we need to revert to the old traditional approach where we do design, managing, construct and we have engineers, senior engineers, assistant engineers, section engineers, contracts managers, site agents, subagents, project managers.’*

*‘There are gray areas and people don’t have defined tasks. There have been times when you’ve wanted to grab a few guys and really fire a shot into them, but here you feel handcuffed.’*

This illustration, though relatively trivial in itself, highlights some important questions addressed by an ethnographic approach and attention to empirically available material, which seeks to specify organisational conduct. For example, it sheds some light on what exactly is contained in a term such as ‘mental model’—even the speaker who wishes to introduce non-hierarchical organisation talks of ‘upper echelons’ and ‘lower tiers’; it illustrates the way people organise the world in the categories they use ‘being friends’ (as opposed to being colleagues or fellow employees); ‘those that know me’ and ‘those that don’t’, (what Sacks (1963) calls Category Membership Devices) different behaviours and expectation being attached to others depending on how they are categorised. Is the bubblegram the application

of a theory, as, for example, those of Ouchi and Daft and McIntosh described earlier? How could any such theory have been framed so as to give clearer guidance as to whether they were applying the theory or not? Are the latter speakers offering counter-theories? In their view, in contrast to the conventional organisation chart, it did not adequately specify required behaviour. Similarly, in their view, it blurred contractual relations and deprived them of the sanctions they expect contracts to provide. What does one make of the fact that the intention of the 'bubblegram' was understood and complied with by those that knew the first speaker and those that didn't know him did not? Is it a matter of shared assumptions and understandings that no theory could ever spell out without having recourse to them? Would one be offering a theory if one suggested that the dissenters would have been more receptive to the bubblegram if they had been involved in its preparation? What rules can theory provide about what to specify and how to specify regarding, say, the allocation of roles, responsibilities and required conduct? How does one go about teaching people how to apply these rules? and so on and so on.

## CONCLUSION

The purpose of this paper has been to outline a research strategy and agenda for finding out what is needed at the level of systems and organisation to facilitate LC. It has raised the question of what any findings may look like. In common with Schon and Argyris, I have queried the epistemological assumptions of conventional organisational theory and proposed, in addition, that LC thinking and practice doesn't need to share them. I have argued, therefore, that findings from the proposed research will not look like what conventional organisation theory in the rationalist tradition has sought to provide. They will look more like those from the political tradition, insofar as a major concern there has been with how action can be influenced by providing the categories in which reality is defined. Accepting a practical implication from this latter body of work, the need to recognise the constraining effects of the 'old' epistemology and the need to gain acceptance of a new one has been highlighted. In recognition of having to work within the existing situation, thorough understanding is needed of how it is constituted through the methods used to describe it—documentation, charts, maps and other kinds of representation. Care must be taken not to confuse descriptive and prescriptive purposes. Thus, while it is perfectly legitimate to collaborate with managers, to share their frames of reference or schemes of relevance and at the same time to try to change them by getting them to 're-frame' them, such a risk is incurred. Attention to specification—the way ideas and intentions are expressed and the way these are used—seems to me a promising way to understand the mental models in terms of which people define situations and to provide a useful basis to help frame an alternative.

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*Seymour*