

THE CO-ORDINATIVE PRACTICES OF COMPLEX TEMPORARY NETWORKS: EVIDENCE FROM THE UK CONSTRUCTION INDUSTRY

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Abstract

'Temporary organizations' are situations where individuals from different organizations collaborate on a task for a defined period of time. Temporary organizations are different to other forms of corporate collaboration (such as projects and joint ventures) as they have characteristics such as institutionalized termination and conflicting loyalties and tensions as participants have 'home' organizations. The popularity of temporary organizations would appear to stem from the risks (attributable largely to costs) associated in a single firm developing a product or new technology in isolation and the need to draw on the competencies of external partners. The study outlines the necessary mechanisms for co-ordination in temporary organizations – referred to as 'scaffolding practices' – which ensure project consistency (stability in terms of thinking and action), consensus (agreement) and co-constitutiveness (personal pledges and commitments), based on an in-depth study conducted in the UK construction industry.

Key words: Temporary Organizations; Co-ordination; Construction.

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INTRODUCTION

This study examines the mechanisms that facilitate co-ordination in temporary industrial organizations (major collaborations between organizations that are traditionally competitors). Drawing on parallels with temporary organizational forms across diverse initiatives – such as film crews (Bechky, 2006), SWAT teams (Bechky and Okhuysen, 2009; Okhuysen, 2005), and NASA engineers (Mark, 2002) – we outline what we term 'scaffolding practices.' Scaffolding practices form the necessary conditions for co-ordination in complex temporary industrial organizations with blurred organizational boundaries; this comprises a triumvirate of factors (consistency, consensus and co-constitutiveness) that help facilitate temporary network effectiveness². The study provides a novel first-hand account of co-ordination in a temporary industrial network and advances our understanding of complex temporary modes of industrial organization.

The present study is based on an in-depth 24 month investigation of a group of traditional industry competitors in the UK who undertook two construction projects for an

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institutional client. Attendance of regular project meetings was supplemented with 45 in-depth interviews and two focus groups with key organizational actors. The prevailing conditions in both projects of temporariness, heterogeneity (multiple partners and work practices), uniqueness, and a lack of prescribed organizational routines to complete both projects at the offset, created a backdrop of inherent project complexity (*cf.* Pauget and Wald, 2012). The scaffolding practices uncovered highlight how actors are able to overcome these challenges to foster co-ordination in major temporary organizations. The study concludes with implications and presents avenues for future research.

DISPOSABLE INSTITUTIONS? TEMPORARY ORGANIZATIONS AND NETWORKS

An extensive corpus of work on industrial projects of all hues exists, with in excess of 1000 articles having been published on the subject including related topics (such as new product development and innovation studies, product management, sales force automation, customer-perceived value, purchasing and sales integration, to name but a few). Arguably a weakness in this line of project-based inquiry in industrial marketing has been to overlook the phenomena of *temporary industrial networks and organizations*, where in order to reduce risk, accelerate learning opportunities and pool organizational competencies, companies temporarily collaborate on major initiatives. As such, “...*classical definitions of projects are not wrong, just incomplete*” (Turner and Muller, 2003: 1).

Growing in prevalence in both private and public sectors (Janowicz-Panjaitan, Bakker and Kenis, 2009), temporary organizations (TOs) refer to “...*a set of diversely skilled people [from different ‘home’ organizations] working together on a complex task over a limited period of time*” (Goodman and Goodman, 1976: 494), similar to ‘intermistic’ relationships; short-term relationships defined as a “...*close, collaborative, fast-developing, short-lived exchange relationship in which companies pool their skills and/or resources to address a transient, albeit important, business opportunity and/or threat*” (Lambe *et al.* 2000: 212). TOs

Although not new forms of organization or organizing, scholarly interest in the topic of TOs is a relatively recent phenomenon (Janowicz-Panjaitan, Bakker and Kenis, 2009). Early work on TOs was undertaken in the 1960s and 70s, which examined diverse temporary forms of organizing in spanning education and theatre production (Miles, 1964; Bennis and Slater, 1968; Goodman and Goodman, 1972). Warren G. Bennis (1969: 45) was among the first to anticipate the importance of TOs when he predicted that: “[o]*rganizations of the future...will be adaptive, rapidly changing temporary systems, organized around problems-to-be-solved by groups of relative strangers with diverse professional skills*” (emphasis in original). Although research on TOs can be traced from the 1960s to 90s, these studies are few in number and it is only relatively recently that research on the topic has gathered any scholarly momentum (Janowicz-Panjaitan *et al.* 2009), evidenced by special issues in the management journals *Organization Studies* (2004) and the *Scandinavian Journal of Management* (1995). In contrast, Janowicz-Panjaitan *et al.* (2009: 60) argue that rather than being few in number, studies of TOs are actually dispersed, and “*often disguised under a variety of labels such as temporary systems, temporary groups and, most notably, projects and project teams that do not include the word ‘temporary’ in their labels.*”

The ultimate purpose of the TO is to eliminate itself through the successful completion of a task, hence the designation ‘the disposable organization’ (March, 1995). Recent years has witnessed major industry collaborations between firms such as HP, IBM, Eli Lilly, Boeing, Sony, AMD, IBM, and Toshiba, across diverse industries including advertising, engineering and construction, consulting industries, projects in the high-tech industries (such as semiconductors and chip fabrication), as well as in the performing arts, theatre production, film crews (Bechky, 2006; Goodman and Goodman, 1976), where organizations have collaborated temporarily to create new products or services. These organizations have, in effect, constituted temporary industrial networks in order to meet short- and medium-term organizational goals. This can give rise to new business models. For example, for the first time in its corporate history Boeing took the unprecedented step of commissioning an extensive network of partner firms (with approximately 50 global supply partners) to manufacture almost all components for the 787 Dreamliner programme initiated in 2003, making Boeing a *de facto* airframe assembler rather than its traditional role of manufacturer. This led Boeing staff to refer to the Dreamliner as their ‘*Lego airplane*’, with all that was required to assemble the final aircraft was ‘*a place to keep the rain off.*’ It is with collaborations of this type that idioms such as ‘project’ fail to adequately capture the magnitude and complexity of TOs and hence diminishes their explanatory power.

The literature on industrial project management has in recent decades begun to draw a distinction between projects and TOs (Turner and Muller, 2003; Packendorff, 1995; Cleland and Kerzner, 1985), although the notion of temporary, transient and transitory systems and organizations have been viewed as legitimate modes of organization for some time (Miles, 1964; Palisi, 1970). Despite the rise in popularity of temporary industrial networks, however, “...few organizational scholars have systematically examined the internal functioning of temporary organizational forms” (Bechky, 2006: 4), while Pauget and Wald (2012: 2) observe that “Although temporary forms of organizing are constantly gaining importance, little is known about how work in complex projects is actually accomplished and coordinated.” Hence, we are left with a paucity of research that examines temporary industrial networks and particularly the coordinative practices of temporary organizational and network forms. This study seeks to redress this situation by reporting on a major study undertaken in the UK construction industry.

A BRIEF HISTORY OF CO-ORDINATION

The notion of temporary forms of network organization is by no means a contemporary phenomenon. Historically, examples of mass-industry co-operation and co-ordination abound. For example, the adoption of Railroad Standard Time in the US and the advent of the printed timetable in the 1880s witnessed one of the first examples of mass-industry collaboration (albeit that became permanent) with the implementation of a temporal standard across a fragmented railway network with some 500 ‘local times’ in place in 1883 to form four time zones across the continental USA (Daniels, 2000; Stover, 1970; Chandler, 1962).

In his historiography of 18th century railroads in the United States, Alfred D. Chandler Jr. (1962; 1965) posited that the railroads were one of a new type of organization. Chandler (1965) noted that from the late 1840s the railroad boom was instigated “...between the start of the California Gold Rush and the opening of the Civil War, the basic railroad network east of the Mississippi was laid down” (17); some 30,000 miles of track had been laid down by 1860 in a network spreading across the continental USA. Such complexity and scale was

unprecedented, even with the growth of agriculture, mills, canals, and steamship network. The day-to-day operations of the railroad network was characterised by its complexity; highly geographically dispersed and “...included a wide variety of activities and facilities such as shops, terminals, stations, warehouses, office buildings, bridges, telegraph lines, and so forth. Weeks would be required to view all its men and equipment” (*ibid*, 19). The railroads hence were a new form of major modern organization never before seen.

Chandler argued that due to their complexity and scale the existence and growth of the railroads was only possible if companies co-ordinated in order to achieve diverse tasks (such as delivering passengers and cargo in a timely fashion, avoiding accidents with rival railroad companies, and loading goods) efficiently across a quickly expanding network. As he notes:

“The railroaders were innovators not because they were necessarily more perceptive, energetic, or imaginative than other contemporary businessmen, but rather because they were the first to face the challenge of handling efficiently large amounts of men, money, and materials within a single business unit” (*ibid*: 16).

Although such coordinative practices may seem trivial at the present remove, as Okhuysen and Bechky (2009: 466) note: “*While the system of time zones has become ubiquitous and is rarely remarked upon, it is an early example of a standardization mechanism that enabled coordination.*” Scholarly interest in co-ordination practices, however, waned after early landmark studies in large-scale manufacturing in the early 20th century by the likes of Frederick Taylor, Henry Fayol and Lillian and Frank Gilbreth. These perspectives (that were heavily focused on the manufacturing industries) slowly fell out of fashion and favour as Western societies moved away from such a dependence on manufacturing to the service and knowledge-based economies (Davis, 2003). Further, this formative work on co-ordination appeared further dated due to the blurring of organizational boundaries in contemporary organizations, where “...*what lies at the technical core of the organization and the periphery has become ambiguous*” (Okhuysen and Bechky, 2009: 468).

After a number of years of relatively limited interest and scholarly activity, the last two decades has witnessed a resurgence of scholarship on organizational co-ordination (Okhuysen and Bechky, 2009). Okhuysen and Bechky (2009: 469) observe that: “*Recent research in coordination has extended beyond organizational theory into a variety of disciplines such as computer science, information systems, and sociology of work.*” This ‘new wave’ of research on co-ordination has seen studies on co-ordination outside of the organizational theory literatures, including information systems, computer science, and sociology of labour practices (Okhuysen and Bechky, 2009). In a business-to-business context, other than research on co-ordination, such interest is also analogous to the stream of research in network and relational competence, as a prerequisite to manage networks and actors’ capabilities (Ritter and Gemunden, 2003; Walter *et al.* 2006; Carter *et al.* 2009; Lorenzoni and Lipparini, 1996, all cited in Pauget and Wald, 2012).

TOs face a number of challenges that may inhibit co-ordination including the absence of familiarity with other actors’ working practices, finite time to complete (often novel) tasks and actors with diverse skills and capabilities. As Lindner and Wald (2011: 877) note: “*After a project is finished the constellation of people working together is resolved, fragmenting the project knowledge. In contrast to permanent organizations where departments and divisions act as knowledge silos, in temporary organizations routines and organizational memory hardly emerge. There is a lack of mechanisms for knowledge capturing, storing and*

disseminating and for organizational learning.” Therefore, each TO is unique – it has no past to draw upon and limited future to anticipate. TOs therefore share many of the same issues that Chandler (1962) observed the early railroads faced when they collaborated to create Railroad Standard Time against a backdrop of a fragmented network of actors co-ordinating to achieve a series of complex tasks. Co-ordination, however, has largely been overlooked by scholars within the TO literatures, as Janowicz-Panjaitan, Bakker and Kenis (2009: 69) observe: “*Although there are some notable exceptions, few studies’ primary focus is on coordination within temporary organizations. Instead, most authors have dealt with coordination as a subtheme of inquiry.*”

As a consequence, the practices that members of TOs draw on to achieve their tasks would appear a central question to understanding the functioning of TOs. Against this background, the present study seeks to examine the mechanisms for co-ordination in TOs.

METHODOLOGY

CASE STUDY SELECTION AND CONTEXT

We base our study of coordinative practices in TOs through the exploration of two case studies of networks formed for the delivery of large scale construction projects. Sampling of these construction projects was theoretical (Yin, 1994) based on the opportunities they provided to observe coordination in a TO. These cases were chosen for three main reasons. First, because of the scope and significance of the projects; in both cases they were substantial new-build projects (as opposed to the renovation, repair, or extension of existing buildings). Second, both included levels of innovation that challenged existing practices and technologies requiring new and innovative solutions to both construction processes and operational outcomes. Third, the nature of the contractual arrangement between the client and the build team was an important factor, as both were two-stage tenders. In a two-stage tender process, the technical proposals are separated from the fixed price which reduces the risk to the contractor. It also allows the contractor to engage with the design team at an earlier stage in the design process, and therefore provides learning opportunities that would normally not take place in a one-stage tender process.

Case study one, *OfficeProject*, was a project creating office space and conference and training facilities. The second case, *PowerProject*, related to the construction of a combined heat and power plant (CHP) for a large-scale institutional user. In Table 1 we summarise the key features of each case. The management teams were of approximately equal size on each project, and details are provided in Table 2.

TABLE 1
CASE SUMMARIES

	Case 1 <i>OfficeProject</i>	Case 2 <i>PowerProject</i>
Value	£8.5 million	£8 million
Purpose	Office accommodation and conference/training facilities	Combined heat and power generation
Supplier	A leading construction, development and services group in the UK. The group employs 11,400 people worldwide and has annual revenue of £2.1 bn.	A leading construction and regeneration group in the UK. The group employs over 8,500 people and has annual revenue of over £2,548 m.
Customer	Training and Education Provider	Large-scale site with district heating system to approximately 30 buildings.
Level of Risk	Medium, new variant of energy efficient construction technology previously used by this client in other buildings.	High, if successful this will be the first working CHP plant utilising this form of energy production technology in the UK.
Planning time frame	9 months in planning, this data was collected over the 24 month construction period.	3 years in planning, this data was collected over the 24 month construction period.

TABLE 2
RESPONDENT DEMOGRAPHICS

	Client Team (e.g. Project Director, Project Administrator)	Client Team Representatives (e.g. Project Managers and their Quantity Surveyor)	Design Team (e.g. Architect, Mechanical and Electrical Engineers, Structural Engineers)	Other Specialists (e.g. Clerk of Works, Landscape Specialists, Acoustic Specialists)	Contractor Team (e.g. Project Managers, and their Quantity Surveyor)
<i>OfficeProject</i>*	3	3	4	5	3
<i>PowerProject</i>	3	1	5	5	4

* Some team members participated on both projects.

While the role of the client and other members in the wider network (e. g. sub-contractors and external stakeholders such as planning authorities) are no doubt important, we chose to focus our data collection and observations on the managerial and specialist designer TO members only (i.e. those on what is known in the construction industry as the design team). This provided a useful boundary in terms of coordination practices as these are the TO members who met on a regular and frequent basis, both formally and informally, and who dealt directly with the practical issues and problems that arose in relation to the project design and construction.

DATA COLLECTION

The data collected for this study consists primarily of 45 in-depth semi-structured interviews and two focus groups conducted with design team members of two UK construction projects over a period of twenty four months. In addition, 14 design team progress meetings were attended (eight for *OfficeProject* and six for *PowerProject*). In each meeting official progress documents were collected and field notes were made. Together with the interview data these meeting observations allowed for a deeper understanding of the data and provided evidence of validity through triangulation. The interviews were conducted at the offices of the respondents and at the construction sites with respondents. The interviews lasted on average 90 minutes and the focus groups lasted two hours or more; all were digitally recorded. The data were transcribed and coded using AtlasTI v6 software, following the coding procedure outlined by Strauss and Corbin (1998). The theme of the discussions focused on coordination practices and mechanisms within the temporary organization, following the work of

Okhuysen and Bechky (2009) and Bechky (2006). A coding scheme was constructed based on these key aspects of coordination practices. Open coding was used to identify data relating to coordination within the two teams; the data were then examined for co-occurrence of coordination-related activities which results in three ‘themes’ or major categories of findings which were labelled by the researchers as (i.) consistency, (ii.) consensus and (iii.) co-constitution.

In addition, during the course of the project we frequently drew on the expertise of a senior executive in the construction industry (who was not a member of either project team and was thus impartial) to help understand the issues arising from the data and our interpretations of them. This industry expert held a management board level position in a major UK construction company and had over thirty years’ experience in the industry. Thus the observations of the researchers, together with the triangulation of data and the steps outlined below regarding validity and reliability, help give the analysis and conclusions greater legitimacy.

FINDINGS AND DISCUSSION: ‘SCAFFOLDING PRACTICES’ IN TEMPORARY ORGANIZATIONS

The definition of co-ordination the present study draws on is provided by Faraj and Xiao (2006: 1156), where “...*coordination is about the integration of organizational work under conditions of task interdependence and uncertainty.*” This is a particularly pertinent definition given that many TOs (such as construction) are undertaken in an atmosphere of uncertainty. In order to mitigate against this uncertainty, TOs must rely on the co-ordinative efforts of actors. We draw on the metaphor of ‘scaffolding’ proposed by Okhuysen and Bechky’s (2009: 474 for activities that are “...*created by groups to impose order...or structure for activities.*” Put simply, these relate to what needs to be done and by whom, and how the task will be completed. Three practices inductively derived from the data are explored, which we label as follows:

- i. *Consistency*: “(a.) ‘A settled condition’ The condition in which matter coheres so as to ‘stand together’ or retain its form; viscous or firm condition; thickness, stiffness, firmness” (Oxford English Dictionary);
- ii. *Consensus*: “(a.) Agreement in opinion; the collective unanimous opinion of a number of persons, accord, sympathy, common feeling” (OED) and
- iii. *Co-constitutiveness*: “(a.) The action of constituting; making, establishing” (OED).

Collectively, we propose that three simple (and conceptually overlapping) elements comprise co-ordination (scaffolding) mechanisms in TOs. The remainder of the study examines these preconditions for co-ordination illustrated with data from an examination of two construction projects.

Consistency

Consistency refers to mechanisms that ensure solidity, substance, and stability in terms of thinking and action in order to avoid task duplication or failure. The traditional view of TOs maintains that they lack the formal mechanisms and normative structure that ‘permanent’ organizations have (Keith, 1978; Meyerson *et al.* 1996). For example, Meyerson *et al.* (1996) argued that TOs lack stability and structure – a view contested by Beth Bechky in her 2006

Organization Science paper focusing on film production crews. There are numerous examples, however, from the organization studies literature to highlight practices where organizational members create mechanisms for TOs to ensure a coherency in group practices. For example, NASA engineers share data spreadsheets to ensure consistency across teams (Mark, 2002), film crews and SWAT teams utilize maps and schedules (Bechky and Okhuysen, 2009), while teams on naval vessels share a variety of navigational information (such as data logs and algorithms) so that colleagues are cognizant of activities performed by others (Hutchins, 1995). These simple tools highlight “...conflicts, discrepancies, and other difficulties in performing the work” (Okhuysen and Bechky, 2009: 474).

In the construction projects we studied a variety of ‘living’ documents (plans, reports, charts, maps) were employed. These were observed to be open to interpretation and were debated throughout the life of both projects:

“...you’re picking up a report that you’ve written and anyone can pick holes in any document because there’s always of thinking round it. Now when you look at it and you think “Well, that’s not necessarily right. I wouldn’t have done...” You might read it, now you’re reading it from the contractor’s point of view and you’re seeing people question it: “Well that’s not necessarily right”.”

“...with the best will in the world, [name removed] cannot get his words and his drawings one hundred percent in the time and stage he’s at, so there’s always opportunities for a contractor to be able to manipulate that.”

“They do a cost plan so they know how much that building’s going to cost within reason you know so when we came in at £2 million over budget either their cost plan was vastly wrong or they already knew that they were going to be over budget so why did they not trim that, why did they not before we got involved with it, down spec the designs so that it could come within their cost plan.”

Boundary objects (Star and Griesemer, 1989) create a shared meaning across diverse professional groups, such as engineers’ use of objects, such as the use of prototypes and drawings, can offer a simple solution to create understanding across groups (Carlile, 2002; Henderson, 1991). In the construction projects, engineers used technical drawings (translated into 3D models) that enabled them to envision the results of their actions. In meetings they often shared drawings and made impromptu sketches. Architects would draw sketches to illustrate their ideas, and the engineers would translate technical drawings into detailed solutions to specific problems. Technical drawings in particular were shared and discussed via email in order to ensure that the interpretation (or framing) of the information was understood correctly by those concerned and to provide an agreed blueprint for construction and an audit trail of design alterations.

Similar to boundary objects individuals – such as hospital workers (Gittell, 2002), film production crews (Bechky, 2006) and technicians (Barley, 1996) – can act as boundary spanners within organizations. For example, in Barley’s (1996) study of technicians, he observed that they acted as brokers between different professional groups to ensure that information is relayed between occupational groups. In the present study, one way that was utilized to ensure consistency was facilitated through the practice of novation – a largely overlooked phenomenon in the social sciences.

Novation is a legal term and refers to the act of replacing either an obligation or a party to an agreement with a new obligation or party. Novation is a common feature of network

management in the construction industry (Doloi, 2008), where it is used to transfer members of the original design team on earlier phases of a construction project (e. g. architects and engineers) from the client-centred design team to the contractor's build team for the later stages of actual construction. The act of novation in the construction projects helped maintain a consistency in knowledge throughout the life of both projects:

"It's also increased knowledge of both client interaction on different sides because now you have the novation process."

"They [the novated individual] then become part of our team almost. It's almost as if we are one big team because you are all working towards a common goal."

"...sometimes you don't even notice the change, sometimes it can be absolutely horrendous, you know, it can be horrendous but, touch wood, I would say 95% of the time it's a fairly smooth transition but you do get that odd glitch..."

One aspect of TOs that has been curiously overlooked is the point that its members belong to 'home' institutions that may typically be ardent competitors for much of the time – a form of 'coopetition' where *"...both the elements of cooperation and competition are visible"* between competitors at a fixed point in time (Bengtsson and Kock, 2000). The construction industry is a singular example in this regard as companies are frequently co-operating on projects whilst simultaneously competing to win business on other contracts. One respondent offered the following sporting analogy:

"This one reminds me a bit more, of like, the Ryder Cup, in golf. Where you have a game that's played by individuals, and suddenly they have to be a team, for the Ryder Cup. But after the Ryder Cup, they go back to playing against each other. And therefore, you've got this issue of "Who's on my team at this point in time? And how is that going to enhance the project? And then what happens when I'm not on their team, anymore?"..."

Against this, we offer the following:

P1: Consistency of knowledge and understanding is maintained in TOs through boundary objects (such 3D models, plans, reports), and boundary spanning individuals.

Consensus

Consensus refers to achieving a common or working agreement among members and *"creating a common perspective..."* (Okhuysen and Bechky, 2009: 475). Examples of these practices abound in the organization studies literatures; Faraj and Xiao (2006) report how health professionals share patient protocols in order to create *"a common mental model of patient condition and treatment options"*; similarly, police SWAT teams engage in frequent training sessions to engender accepted response behaviours for certain unanticipated events (Okhuysen, 2005).

One of the complexity of TOs (and felt to some degree in both construction projects studied), is that there was there rarely one 'correct' way to undertake what could often be novel tasks (such as the work of an acoustic engineer who had to ensure that combined heat and power plant in *PowerProject* did not exceed certain noise levels when active). Such conditions could be exacerbated when different trade professionals and engineers were called onto each project as their expertise was needed:

“And I think with engineering there’s no clear path to it. There’re so many different paths to do. It’s being able to take those and narrow it down, review it, narrow it down, review it. And then you come out with one that meets...”

“...people join half way through and so I do what I do and try and listen and compromise if I have to...”

Both construction projects studied were routinely faced with novel tasks that could not be easily anticipated practices. This required actors to demonstrate flexibility and to trust their fellow professionals’ competencies:

“...you might come up with a brilliant idea, and it takes times to nurture and develop that through the scheme of what you’re trying to do because it’s not a straight path. It’s not let’s create ... I need a window in a room and I’m going to draw the window there. It might mean that the window needs to be oblong. Or it needs to be at a certain angle. Or it needs some glazing on the outside. Or it needs something to do with it.”

“So there is time that needs to be done to develop and change that. And at the end it might turn out that you need a pipe rather than a window. So the initial concept is there is that you need daylight in the room. But the method of achieving that is that there’re various options to go through.”

This professional competency-based trust was frequently seen to be earned in part through actors’ defending their expertise, where several actors talked openly of *“...defending your expertise”* on both projects. The structural engineer on *OfficeProject* stated that: *“...you can only go so far as a team, but on site, and at a greater level of detail, decisions may be made by individuals.”* This was echoed by the mechanical and electrical engineer who observed that one of the most common problems in the temporary organisations he had been a part of was: *“...one which seems to come up is - I wouldn’t say it’s defending but it’s almost defending your expertise because a lot of people - yes, everyone’s got an expertise but they’ll always try and sway it from their point of view and it’s more a global one and it always comes in as an item.”* Thus personal integrity, both given and received, was a cogent feature in relations between team members. Therefore, we propose the following:

P2: Achieving a common perspective on design solutions was achieved in part through actors defending their expertise and exhibiting competency-based trust to other professionals.

Co-constitutiveness

The typical TO is thought to be less hierarchical (Miles, 1964; Palisi, 1970) and more reliant on interpersonal co-ordination (Bechky, 2006), than is the case in non-temporary organizational forms. To help understand the phenomenon of team working within TOs given these conditions we employ the concept of co-constitutiveness provided by Easton *et al.* (2012), which refer to commitments between actors to undertake certain tasks. We utilize this concept to illustrate how individuals ‘buy-in’ to TO goals and objectives; these effectively serve as the governance mechanisms for the planned termination of TOs, by completion of key tasks. For example, Lenney *et al.* (2007) draw on the phrase *“OK, I’ll get that to you by Friday”*, as an illustration of *“an agreement or pledge to do something in the future.”* Overcoming disagreements and attempts to define tasks actors’ responsibilities were frequently observed in both construction projects studied:

“We have a great deal of upfront thinking at a very early stage of other options, other people, what other things are doing and, you know, really trying to get their side of what can be delivered to the customer.”

“We have what we call Project Manager Review Meetings where we all get around the table once every four months. And that’s a sort of a knowledge sharing, brain storming, type exercise.”

“Who tells who how to do what? The contractor doesn’t really want to know. I said I want a bulkhead and they say “It is a bulkhead, it’s an ugly bulkhead but you didn’t say you wanted a pretty bulkhead.” Getting into the detail of that is the tricky bit. They want to price it first before I’m allowed to talk to them. If I talk to them and say I want a pretty one then they will say “Well, that is going to cost you more money”.”

Trust is particularly important in TOs (Grabher, 2002), as is premised in trusting an individual to perform a task. The problem most TOs will face, however, is establishing trust between actors that may be unfamiliar with one another. This situation is further exacerbated by the finite (and often limited) time TOs have to complete their task. As Meyerson *et al.* (1996: 167) observe, TOs have “[little] time to engage in the usual form of confidence building activities that contribute to development and maintenance of trust in more traditional, enduring forms of organization.” Why then, would most TOs not fail in the wake of mistrust and uncertainty between actors when deciding who should undertake what particular tasks? To help explain this, Meyerson *et al.* (1996) introduced the notion of swift trust in temporary groups, where “...swift trust involves the willingness to suspend doubt and import trust to a given situation rather than create it” (Janowicz-Panjaitan *et al.* 2009: 70).

In the two construction projects studied the absence of familiarity and potential distrust was largely overcome by a trust in the role and the professional training (and anticipated professionalism) and background of the individuals involved. This is consistent with studies on group performance where actors may lack familiarity with other team members. For example, Liang *et al.*'s study of teams building radios, found that actors had the belief that other team members would have the same competencies afforded to them. Therefore, trust is founded on the expectation that actors have certain role competence (McEvily *et al.* 2003; McAllister, 1995), which can be reinforced by actors' sharing their knowledge and demonstrating their competence (Reagans *et al.* 2005). In the present study, respondents made a number of salient observations:

“You have to keep checking and making sure that technologies are right. That you’re putting forward, checking that your training’s right to get it done. Making sure you’re using the right Regs. You’re up to date with the right methods.”

“...there is no real easy way about it. And a lot of it is born out of trying. Sometimes you won’t get it right. Sometimes you get it right. So you learn from that mistake and you move on to the next one.”

“Some cases, I have known cases where we’ve said to the architect “You’ve got it wrong” but normally at that stage you’re trying to impress the architect, you don’t want to go in and suddenly start, you don’t want to question his design because he’s obviously the professional at it.”

Time pressures to reach agreements and decision making may compromise both commitment and *commitments* between TO team members (Janowicz-Panjaitan *et al.* 2009). It is, in fact, these time pressures in construction projects that help foster commitment; the

failure to complete a construction project on time normally carries significant financial penalties and also may be taken into account by future clients when deciding which companies to award contracts. This led to the simple construction mantra often repeated on both projects that: *"You've got to build it all and construct it in the time."* Hence, a sense of common purpose pervaded both construction projects; this was the possibility of collective success but also the possibility of collective failure in terms of a significant project over-run:

"And you can form a contractual link but you don't necessarily get the trust and that way you're all sitting with your arms folded, learning back across the table. But if you're leaning forward as we are talking, getting closer and closer necessarily because of trust and understanding and that sort of thing that makes for a better project because you get this "Hang on a minute your problem is that. But actually what if I suggest this?" Rather than "Well it's your problem mate, get on with it"."

"...if you didn't have that trust and respect for the client, that you could bully, as a contractor, them down other roads. Changing the specifications, you know."

"[We have built] a 'Circle of Trust,' ... that we will get through it, which we have done. And it's not cost any of us any money or caused any of us any problems, which is a lovely way to work. The test probably is if you have a proper problem. [Laughter]. But hopefully we're professional enough not to have a proper problem."

The high levels of uncertainty in both projects encouraged significant levels of actor inclusiveness (Provan and Kenis, 2008), where attempts were made to ensure that no actor was left out of key decision making: *"We play together for the good of the team."* This was further endorsed by actors creating future pledges or commitments by offering favours to group members. This helped support trust between actors but also established a 'store' of favours to potentially call on if required:

"...the relationship of all working together, the acknowledgement of us, that [name removed] in places, was going above and beyond. So if he's a bit behind on a provisional sum or something, I can't hammer him too hard because I know he's helped me out over there. But we try and just keep people focussed. And I think we've got - well we have - we've got through it all in a timely manner."

Physical distance and proximity between actors impacts on the extent to which organizational members are able to communicate and interact (Allen, 1977). One final mechanism for facilitating commitments and 'buy in' between actors was co-location practices, which helped overcome the lack of familiarity between group members. This took the form of not just the usual practices of team meeting, but also social activities and team building exercises:

"He then took the step of organising a team building exercise which incurred at that particular time didn't incur a great deal of money other than people's, individual's time. But he is of the mind to do as I said earlier, take the team out of the working environment into a social environment and spend a bit of money in some form of entertainment whether it be a meal or something like that. Or whatever it is, doesn't really matter what it is but to help break down those barriers so that people get to know and understand each other. And then it becomes this better understanding and a trust thing."

"...the programme we'd been set by the [client] was very tight, I agreed with [anonymised] the project administrator that we would try and do something social with the team. And Andrew had an idea that we would do something a bit different, rather

than just going out for a drink and we would go to the City College and do a cookery class together! [Laughter].”

As Okhuysen and Bechky (2009: 479) note: “*Physical proximity creates lateral visibility to coordinate ... work.*” For example, Hutchins (1991) provides an account of naval navigation teams who rely on a “*horizon of observation*” where crew can observe the acts and behaviours of crewmates and can link and adjust their own co-dependent tasks accordingly. Similarly, replacement surgery teams working together (Reagans *et al.* 2005) and mining crews (Goodman and Leyden, 1991), allows members to establish ties that facilitate familiarity and visibility, but also *liking* between group members (Okhuysen and Bechky, 2009: 478). Given the foregoing, we assert that:

P3: *Commitments in TOs is partly established by trust in the role and the professional training (and anticipated professionalism) of actors, social relations, and co-location.*

P4: *Uncertainty in the tasks undertaken by TOs fosters actor inclusiveness.*

CONCLUSIONS AND IMPLICATIONS

“The boundaries of organizations have become blurred, the difference between what lies at the technical core of the organization and the periphery has become ambiguous” (Okhuysen and Bechky, 2009: 468).

Temporary organizations are not a new phenomenon, but each TO may be unique in terms of the problems they face; they may rarely encounter the same problem twice. Alfred Chandler arrived at a similar conclusion in his study of the early US railroads: “*There were few precedents to guide those groping to devise rational ways to supervise, coordinate, and plan for the use of far more men, money, and equipment than any other private enterprise had hitherto had to administer. Even the experience of the earlier railroads were of little help*” (Chandler, 1965: 21). Hence, providing an understanding how co-ordination is emergent in temporary organizations and networks would seem a useful line of enquiry.

In this study we have outlined what we refer to as ‘scaffolding practices’ – practices that facilitate co-ordination in complex temporary industrial networks with blurred organizational boundaries (comprising a multitude of factors including plans and rules, objects and representations, roles, routines, and actor proximity), and forward a triumvirate of factors (consistency, consensus and co-constitution) that help facilitate temporary network effectiveness. The study provides an account of co-ordination in a temporary industrial network and advances our understanding of complex temporary modes of industrial organization.

The scaffolding practices outlined emphasise how actors create *temporary organizational specific logics*. This ‘logic’ helps explain how actors are able to undertake tasks of finite duration where members lack familiarity and have competing loyalties. These factors create tensions that would seem sufficiently *ex ante* barriers to be seemingly insurmountable, but there are numerous examples of project-based industries and organizations producing both the intangible (such as computer programming and consultancy) and the tangible (such as construction) carried out by communities that appear to be “boundaryless” (Okhuysen and Bechky, 2009: 495). We have a number of temporary industrial marketing initiatives between competitors such as product collaborations, shared

technology and R&D investment, new market entry, and joint distribution and marketing investments (such as cobranding). These are more than just mere 'projects', and our understanding of them and discourse should reflect this.

As we have argued, TOs are not new or unique modes of organizing; although, as the quotation at the outset of this concluding section highlights, the boundaries of modern forms of organizations and networks are becoming blurred and permeable as actors may briefly collaborate against a backdrop of ongoing industry competition. There would appear, therefore, to be a need for empirical studies attempting to understand TOs across their many forms, particularly as Janowicz-Panjaitan *et al.* (2009: 80) argue: "...we contend that there is a lack of rigorous and systematic theoretical development in the literature on TOs." With the growth of the so-called 'knowledge-based economy', therefore, understanding such endeavours would seem pertinent and timely. A number of areas for future research merit specific exploration; challenges faced in TOs, what constitutes temporariness and degrees of 'temporary', a discourse to describe TO marketing initiatives, would seem sensible places to start. It may be that our understanding of networks and some of our widely accepted and established ways of explaining networks (in terms of 'Actors-Resources-Activities') may require revisions to incorporate the temporary and transient.

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