CHAPTER 9

TEMPORARY INTER-ORGANIZATIONAL PROJECTS

HOW TEMPORAL AND SOCIAL EMBEDDEDNESS ENHANCE COORDINATION AND MANAGE UNCERTAINTY

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INTRODUCTION

Inter-organizational projects, in which multiple organizations work jointly on a shared activity for a limited period of time, are increasingly used to coordinate
complex products/services in uncertain and competitive environments. This type of joint collaboration and coordination among two or more organizations has been observed in a wide range of industries such as advertising (Grabher 2002a), construction (Eccles 1981; Winch 1989), biotechnology (Powell et al. 1996), computers (Gomes-Casseres 1994), film (Bechky 2006; Faulkner and Anderson 1987; Jones 1996), financial services (Eccles and Crane 1988; Podolny 1993, 1994) and fashion (Uzzi 1996, 1997), among others. In addition to the private sector, inter-organizational projects are common in the public sector, being the primary mechanism for initiating and completing significant public infrastructure projects (Altshuler and Luberoff 2003) and urgent responses to natural disasters and social crises (Moynihan 2005a, 2005b, 2005c).

Although inter-organizational projects are widely used across diverse industry and country settings, we have few frameworks for understanding the various types of inter-organizational projects (henceforth IO projects) and how these various types of IO projects facilitate coordinated activities among two or more organizations under conditions of uncertainty. In many cases, these projects involve multiple organizational actors with disparate goals, overlapping areas of responsibility, and differing levels of expertise. Moreover in the public sector inter-organizational projects are often carried out in crisis situations where there is a lack of central authority or even a formal hierarchy (Moynihan 2005b). In light of such high levels of uncertainty and interdependence in multi-organizational collaborative activities, we ask: What are the types of IO project used, and how do organizational actors coordinate their activities and contributions within these IO projects under conditions of uncertainty?

For some time project management researchers have examined the structures and processes within intra-organizational projects that lead to their success, and recently some outlines of a ‘theory’ of organizational projects have been offered (Lundin and Soderholm 1995; Packendorf 1995; Soderlund 2005). However, these scholars rarely address how multiple actors coordinate their collaborative efforts in a range of inter-organizational projects, nor do they assess how the expectation of limited duration shapes and modifies their interactions.

A key distinction of IO projects, in contrast to the more commonly studied forms of inter-organizational coordination such as joint ventures and alliances, is that projects by definition are temporary. IO projects exist for a limited period of time designated by a pre-established end point in order to carry out pre-specified goals; when these goals are completed, the project organization literally dissolves. Thus, temporality is a crucial quality of all IO projects. In contrast, joint ventures and alliances, at least in the literature on them, rarely specify an expected end date. Joint ventures and alliances are established with an expectation of ongoing and open-ended interactions, even in the face of high failure and exit rates of 50–70 per cent (Barringer and Harrison 2000). Within IO projects, temporality can vary widely from the short duration expected in a music video of two days (Bechky 2006) to
film production of six to eighteen weeks (Jones and DeFillippi 1996) to years of collaboration among firms in biotechnology (twelve years in pharmaceuticals to take a drug from discovery to commercialization—Gunz et al. 2000) to decades for large-scale infrastructure projects like the ‘Big Dig’ in Boston, an endeavour started in the 1970s that is still not finished.

The expected duration of organizations and collaborations are an under-studied phenomenon in management and organizations, even though there has been a recent emphasis on time and temporality in management studies (see Albert 1995; Ancona and Chong 1996 for reviews). As early as 1970, Palisi (1970) called for scholars to examine the transitoriness of organizing as an independent variable; however, to date there are no studies that explicitly address how the duration of inter-organizational projects influences the coordination of collaborative contributions among multiple organizational actors—whether in inter-organizational networks draped around projects (e.g. Powell et al. 1996) or in project-based organizing directed and coordinated by one key organization (e.g. DeFillippi and Arthur 1998).

We propose the term ‘temporal embeddedness’ to capture how the variance in the duration of projects influences what kinds of coordination techniques are used to manage uncertainty when multiple organizations collaborate to create a joint product/service. Specifically, temporal embeddedness refers to the expected duration of an IO project and how this expected duration creates mechanisms that shape the coordination of collaborative activities between organizations. With temporal embeddedness we examine techniques that organizations use for managing the pacing and mutual adjustment of their collaborative activities under different conditions of expected durations.

At the same time, inter-organizational projects are not only temporally embedded; they are also socially embedded. Social embeddedness refers to ‘the frequency, duration and pattern of dyadic interactions for an individual or organization’ (Granovetter 1985). We focus on how the pattern of inter-organizational interactions shapes whether understandings among social actors, called macroculture, are widely shared among organizations, how behaviour is enacted, and the propensity for inter-organizational tie formation, all of which guide exchanges within a project (Abrahamson and Fombrun 1994; Jones et al. 1997; Kenis and Knoke 2002; Phillips 1994). When exchanges evolve from one-off, single interactions to repeated and durable long-term relationships among many organizations, understandings become widely shared in a market or field and a rich project ecology emerges that facilitates coordination and guides collaborative activities among organizational actors (Grabher 2002a).

We begin our chapter by defining inter-organizational projects. We then describe how temporal embeddedness and social embeddedness provide specific mechanisms for managing uncertainty associated with projects, and facilitating collaboration amongst project actors. Next, we illustrate our insights by combining these two dimensions and exploring them across four contexts within which
Inter-organizational projects are the dominant form of coordination among organizations, including film, architecture, advertising, emergency response, and large-scale engineering infrastructure. Finally we offer suggestions for future research and conclusions.

**What is an Inter-organizational Project?**

Inter-organizational projects involve two or more organizational actors from distinct organizations working jointly to create a tangible product/service in a limited period of time. For our purposes these actors minimally refer to a client and a contractor—what Soderlund (2005) calls ‘business projects’. In some cases the contractor is a coordinator of multiple independent entities, as for example a construction contractor working with dozens of individual subcontractors in ‘quasi-firms’ (Eccles 1981), or large engineering firms that may employ hundreds of subcontracting companies in ‘mega-projects’ (Berggren *et al.* 2001). In a similar sense the client may represent multiple actors. In complex cases, multiple clients work with multiple contractors in large-scale infrastructure projects (Morris and Hough 1987).

Our focus and unit of analysis is the project—a nexus of activity that allows multiple organizations to collaborate to achieve their individual and collective goals. By focusing on the project we are free to pull from a larger range of relevant literature for our review, including some of the project management literature which provides unique insights into the core processes that are often unexplored in the traditional management literature. Much of the literature on industries that use inter-organizational projects has explored techniques for coordinating interdependent activities such as schedules, routines, mutual adjustment, and deadlines. Most of these techniques were described by organizational luminaries such as March and Simon (1958) and Thompson (1967) and have been integrated into organizational research for the last fifty years. Yet, few scholars have focused on IO projects specifically as a domain within which we can explore how temporal and social embeddedness influence coordination among organizational actors which are both interdependent and independent.

We distinguish inter-organizational projects from project-based organizations and project management within firms, and from projects that are internal to a single firm such as development or change projects (Bowen *et al.* 1994; Eisenhardt and Tabrizi 1995), even though all these may share certain management techniques such as schedules and deadlines or the use of projects as devices for coordinating
contributions from various actors (employees or organizations). Inter-organizational projects coordinate activities only for the lifespan of the project, which may extend five days or twenty years, whereas project-based organizing focuses on a durable organizational entity that uses projects to create its services and/or products (DeFillippi and Arthur 1998; Packendorf 1995). On the other hand, we will refer to insights generated in the study of single-organization projects, for example temporal pacing (Gersick 1994) and structuring (Brown and Eisenhardt 1994), and explore how they might apply to in the context of IO projects.

Most scholars who study project-based organizing (DeFillippi and Arthur, 1998; Hobday 2000) or inter-organizational collaboration in networks (e.g. Powell et al. 1996) ignore how the temporal dynamics of projects influence the collaborative activities among independent organizations. They also focus either on the organization or the network rather than the project. We believe that a deeper understanding of inter-organizational collaboration and networks can be gained by examining the project itself as a unit of analysis. A project can be construed as a sequence of events, the dynamics of which depend on certain qualities of temporality that are embedded in the process itself and the characteristics of the relationship such as the frequency, duration, and density of interaction between and among organizations. The resulting sequence of events is highly influenced by both the structure of relations and mutually shared rules of collaboration (Sewell 1992) that provide the resources for IO projects. Projects as events shape the network of collaborative activities among organizations in a field (Kenis and Knoke 2002) and how the network of collaborative activities evolve (Doreian 2002). By focusing on the two dimensions of temporal and social embeddedness, we are better able to distinguish among types of inter-organizational projects and how they are coordinated differently.

**How Temporal and Social Embeddedness Manage Uncertainty**

Inter-organizational projects are means by which organizational actors resolve pressing problems of uncertainty in demand and in transactions. Demand uncertainty accrues in markets with rapid shifts in customer tastes and preferences, as in the fashion (Mariotti and Cainarca 1986), music (Peterson and Berger 1971) and movie (Faulkner and Anderson 1987) businesses. Demand uncertainty occurs when competitors leapfrog one another with technological advances or new products which make obsolete existing products and services (Balakrishnan and Wernerfelt 1986), or when seasonality constraints make it hard to sustain production (Acheson...
manifestations of IOR

1985). These forms of uncertainty in demand spark the need for more flexible and adaptive organizational structures, which inter-organizational projects provide. Organizations that experience uncertainty in demand for products and services need decoupling (Aldrich 1979: 325–6) to enhance flexibility to start up, alter, or shut down joint activities. Inter-organizational projects provide this flexibility more so than in-house projects (Jones et al. 1997).

Transactional uncertainty is the uncertainty associated with the interdependent and interactive nature of co-producing products and services (Clark 1985; Glückler and Armbrüster 2003). Transactional uncertainty is due to specialized and complex knowledge arenas which drive the need for inter-organizational collaboration to innovate, such as biotechnology (Powell et al. 1996) or architecture and construction with a myriad of professions such as engineering, architecture, interior design, and quasi-professions such as electricians, plumbers, carpenters (Eccles 1981; Thornton et al. 2005). To reduce transactional uncertainty, exchange parties come to know one another’s preferences and procedures through repeated interaction (Eccles 1981; Levinthal and Fichman 1988). The degree to which multiple organizational actors repeat their interactions over projects defines their collaborative stability and change, ranging from promiscuous to polygamous (Gomes-Cassenes 1996; Jones, et al. 1998; Powell 1990). We also suggest that transactional uncertainty with knowledge-intensive and ambiguous activities is attenuated through social embeddedness, i.e. the shared understandings and relations that facilitate knowing what and how interactions are most effectively coordinated among participating members.

Demand uncertainty and transactional uncertainty also require techniques by which multiple organizations coordinate their interactions to manage this uncertainty and to achieve effective collaboration. We suggest that the temporal and social embeddedness of projects provide techniques for managing uncertainty while enhancing adaptability for collaboration.

Temporal Embeddedness: Pacing Techniques for Coordination and Uncertainty Management in Collaborative Activities

The temporal embeddedness of organizations (Clark 1985) refers to the time-oriented markers that organizational decision-makers use to demarcate and organize their activities. Both Clark (1985) and Gersick (1994) identified primary types of temporal markers: chronological pacing—based on the passage of clock-time or calendar time, event-based pacing—which is based on attaining key milestones toward a goal, and entrainment-based pacing—wherein organizations synchronize their activities through calendar or environmental influences.

Chronological pacing includes such techniques as deadlines, contracts, and timelines that mark off and coordinate who does what when. Deadlines are a tool
used by the project coordinator—whether the ad manager, the director, or the lead contractor—to maintain the expected duration of a project. An externally set deadline is a way of focusing attention and coordinating contributions, often creating a productive sense of urgency in the project. Especially in highly creative industries the deadline is not a problem; instead it provides a strict temporal benchmark that coordinates the team and helps control the process (Grabher 2002b).

*Event-based pacing* coordinates activities by setting milestones, which reduces environmental and transactional uncertainty by demonstrating through each completed event that the project is on track and appropriate to its market context. Event-based pacing demarcates a developmental cycle, for example, completing a design phase, or achieving an expected outcome such as gaining the Federal Drug Administration’s (FDA) approval for drug development or completing an initial public offering (IPO) (Gersick 1994). In order to reach final deadlines, predefined milestones are a common coordination mechanism that involves a specific target date by which a certain amount of work on the project must be accomplished. Milestones represent one kind of event-based pacing (Gersick 1994) in that once the project has completed a certain stage of work (i.e. an event), the project moves forward to the next stage (Cooper 1990; Davies and Hobday 2005).

Chronological and event-based pacing may be combined in rapidly changing and highly competitive industries because new information about market needs and technical opportunities is likely to arise after a particular product concept is supposed to be frozen, thus requiring product development to occur before the initial concept is fully specified (MacCormack et al. 2001). At the limit, event-based and time-based pacing become fully intertwined (e.g. Lindkvist et al. 1998) such that what was sequential pooling becomes reciprocal pooling of tasks (Thompson 1967). In such high-uncertainty demand markets as semiconductors, computers, construction, film and fashion, the combination of task complexity with time pressure induces team coordination, where ‘diversely skilled members work in a parallel fashion through mutual adjustment to reduce the time to complete complex tasks’ (Jones et al. 1997).

In addition to chronological and event-based pacing, IO projects are often affected by *entrainment-based pacing*, which occurs when joint activities of projects are coordinated to match the temporal dynamics of their environment, thus synchronizing collaborative activities. For example, organizational actors often align their contributions and activities based on external markers such as seasons (e.g. Christmas, summer travel) or field configuring events such as conferences, trade-shows, or award ceremonies. Moreover, place-specific industry networks may operate at a different pace than the broader industry network in other geographic regions. Grabher’s (2002a: 254) analysis of the advertising project networks in London provides an excellent example:
Soho is associated with a certain pace of action and a certain attitude towards work practices that are driven by extraordinary time pressures. An agency owner-manager illustrates: ‘Here when we are busy, there is an atmosphere, there is an urgency about it… and people will work to get the job done.’ And a film director [said], ‘The pace;… there is a certain pace here, things move incredibly fast.’

Such entrainment-based pacing affects all actors in a project network—clients, project specialists, and the team leader or manager—although not necessarily equally. For example, to the degree that project networks in other industries operate at a faster pace in London or New York than they do in other cities, the city itself will be known as a magnet for a certain kind of individual, thus shaping the labor pool of multiple industries within those locales. In addition, the temporal embeddedness of a region’s pace may become the basis for decisions that affect the social embeddedness of those within and outside of the region, which we discuss next.

**Social Embeddedness: Coordination Through the Pattern and Structure of Relations**

Social embeddedness refers to the *relational embeddedness* and the *structural embeddedness* of organizational actors, which generates the likelihood of shared understandings between and among organizations. Variance in structures and patterns of relations tends to facilitate or impede the flow of communication and knowledge-sharing among organizations (see also Kenis and Oerlemans, Chapter 11) this volume. For example, a dense market or field in which all organizations interact with one another is more likely to have widely shared assumptions than a market or field within which only certain groups of organizations interact with one another.

We draw from Granovetter (1992: 33), who defined embeddedness in terms of: ‘inter-actor ties and how economic action and outcomes … are affected by actors’ dyadic (pairwise) relations—typically referred to as relational embeddedness—and by the structure of the overall network of relations, referred to as structural embeddedness’. Social embeddedness incorporates relational and structural patterns of inter-organizational ties that facilitate or impede shared understandings.

*Relational embeddedness* captures the quality of dyadic exchanges—the degree to which exchange parties know of and consider one another’s needs and goals (Granovetter 1992) and the behaviours exchange parties exhibit such as trust, confiding, and information-sharing (Uzzi 1997). To create shared relational understandings, organizational actors must have clarity about their roles—who does what—as well as repeated collaborations with those other actors, either through multiple projects of shorter duration or through sustained interactions in a project of longer duration. Process models of inter-organizational collaboration also focus on dyadic interactions or relational embeddedness (Doz 1996; Ring and Van de...
Empirical studies show that relational embeddedness attenuates trans-
actional uncertainty as parties playing particular roles come to know and under-
stand each other’s preferences through repeated interactions in client-provider re-
lations (Levinthal and Fichman 1988), biotechnology collaborations (Pisano 1989),
client–agency interactions (Grabher 2002a), and supplier–designer exchanges
(Uzzi 1996).

Structural embeddedness is the extent to which a ‘dyad’s mutual contacts are con-
nected to one another’ (Granovetter 1992: 35). When IO projects involve complex
tasks that require many parties to interact to complete a product or service, this
enhances the likelihood of structural embeddedness (Jones et al. 1997). Because
projects are temporary, social actors must move among collaborative partners.
Markets or fields with projects with shorter duration are more likely to enhance
movement among a greater portion of organizational participants, increasing the
density of a field or market. Thus, organizational actors not only have direct
relations but also are linked indirectly by third parties, who are likely to have
future interactions and talk about their interactions with one another. Since these
collaborative choices are being enacted and discussed among industry participants,
repeated interactions among players permit exchange partners to learn each other’s
systems (Eccles 1981; Faulkner and Anderson 1987: 892), to develop communication
protocols, and to establish routines for working together (Bryman et al. 1987: 280),
all of which enhance coordination. Whether these shared understandings become
institutionalized and taken for granted among organizational actors (Berger and
Luckmann 1967) depends to some degree on the age of the market or field. We
should expect to see differences among fields with different durations such as con-
struction, which came out of guilds established in the medieval period, architecture,
which became a profession distinct from building trades in the mid-nineteenth
century and biotechnology, which is a new and evolving field, established in the
late 1900s.

Structural embeddedness facilitates shared understandings and rules for collabor-
ation that distinct organizations bring to their joint activities, reducing trans-
actional uncertainty and facilitating coordination. These shared rules and under-
standings provide a macroculture, which is a ‘toolkit’ (Swidler 1986) that actors use when coordinating their collaborative activities (Abrahamson and
Fombrun 1994; Jones et al. 1997). These institutionalized understandings which
evolve out of prior interactions between and among organizations create ‘trust’,
whereby organizational actors know that they rely upon institutional mech-
anisms to ensure that exchanges and interdependent activities will be carried
out as expected (Zucker 1986) (see also Bachmann and Zaheer, chapter 20 this
volume).

Given that such ‘trust’ evolves out of prior relations, it is unclear how its de-
velopment can be ‘swift’ (Meyerson et al. 1996). Participants in the temporary
system who do not know one another are most likely operating according to
shared collaborative rules contained in the industry macroculture, rules which have evolved over long periods of time. Since shared understandings are taken for granted as the obligatory way of behaving and interacting with others, they coordinate actors engaged in collaborative activities (Berger and Luckmann 1967).

The holistic outcome of these patterns of relational and structural embeddedness within a specific market context has also been referred to as a ‘project ecology’ (Grabher 2002a, 2002b). That is, when relations are recurring across projects and there are several potential partners with whom one interacts, a rich or dense project ecology develops among organizations that interrelate to produce complex products or services (Grabher 2002a). The depth of a network’s project ecology reflects the degree of social embeddedness within it.

Next we provide empirical examples of four prototypical IO projects focusing on the mechanisms of temporal embeddedness—chronological, event-based, and entrainment-based pacing, as well as on the mechanisms of social embeddedness—relational and structural embeddedness—and how all of these combine to facilitate coordination of project activities between and among organizations.

**Using Temporal and Social Embeddedness to Explain Four Prototypical Inter-organizational Projects**

These two dimensions, temporal embeddedness and social embeddedness, can be used to define how multiple organizational actors coordinate their joint activities, and the degree to which these actors are embedded in shared relations and understandings that evolve over time. Using these two dimensions, we show how the various mechanisms of embeddedness influence collaborative activities within IO projects. Specifically, temporal embeddedness—defined by the expected duration of a project—shapes what kind of pacing mechanisms may be effective, whereas social embeddedness—defined by the frequency, duration, and structure of relations—shapes whether market or field organizational actors share understandings and how they coordinate their collaborative activities within IO projects. By examining the interaction of temporal and social embeddedness, we identify four general types of inter-organizational projects, exemplified by film projects, architecture/construction projects, crisis response, and large-scale infrastructure projects (see Table 9.1). Each of these utilizes specific mechanisms to manage demand and transactional uncertainty.
Table 9.1 Four types of inter-organizational projects

<table>
<thead>
<tr>
<th>Social Embeddedness</th>
<th>Temporal Embeddedness</th>
<th>Shorter Project Duration</th>
<th>Longer Project Duration</th>
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</thead>
<tbody>
<tr>
<td>Relations unlikely to recur and endure across projects</td>
<td>Single Project Organizing</td>
<td>Exemplar: Film</td>
<td>Multi-Party Organizing</td>
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<td>Who coordinates:</td>
<td>Specific role—e.g. director, Gen. contractor</td>
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<td>Who coordinates:</td>
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<td>How they coordinate:</td>
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<td>Temporal embeddedness</td>
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<td>Temporal embeddedness</td>
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<td>Temporal pacing with deadlines encoded into contracts (e.g. pay or play)</td>
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<tr>
<td>Event-based pacing: sequences of project (pre, production, post)</td>
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<td>Event-based pacing—phases of crisis efforts</td>
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<td>Social embeddedness</td>
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<td>Relational embeddedness—low for industry; high for a few key players</td>
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<td>Relational embeddedness</td>
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<td>Structural embeddedness: Dense but fleeting relations for most organization due to people working across projects</td>
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<td>Structural embeddedness</td>
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<td>Use of hierarchical roles</td>
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<td>Network Alliances</td>
<td>Lead firm: provides product/services</td>
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<td>Constellations</td>
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<td>Who coordinates:</td>
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<td>Lead firm or government agency</td>
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<td>How they coordinate:</td>
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<td>Temporal embeddedness</td>
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<td>Temporal embeddedness</td>
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<td>Temporal pacing: deadlines and roles encoded into contracts (penalties)</td>
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<td>Event based pacing: sequences of project (programme, design, build)</td>
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<td>Event pacing—milestones</td>
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<tr>
<td>Social embeddedness</td>
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<td>Relational embeddedness: recurring relations between some partners across projects</td>
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<td>Relational embeddedness</td>
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<td>Structural: intermediate density due to repeated relations among groups of partners</td>
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<td>Structural embeddedness</td>
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- Constellations
  - Exemplar: Large-scale engineering design and construction
  - Who coordinates: Lead firm or government agency
  - How they coordinate:
    - Temporal embeddedness
      - Event based-project phases
    - Temporal pacing—milestones
  - Social embeddedness
    - Relational embeddedness among large firms; low with govt clients and local firms
    - Structural embeddedness: fragmented—constellations of key organizations, little repetition among those in market or field
Single Project Organizing: Film Projects

At one end of the projects spectrum are one-time projects that are relatively short-lived, enacted by organizations or self-employed freelancers who have rarely interacted before and who are unlikely to interact again. The film industry is an exemplar of this type of project, which assembles a remarkably rich set of resources to accomplish a complex and meaningful one-time task. In film these projects are very short—typically six to twelve weeks for feature films and as short as two days for music videos (Bechky 2006; Jones and DeFillippi 1996). This combination of short duration and temporariness of the project leads to challenges in inter-organizational coordination. Bechky (2006: 3) provides a wonderful example of this in her introductory story about a film shoot for a commercial:

It is 6 a.m. when I arrive in Rittenhouse Square for the first scene of the shoot…A day later they have finished filming the commercial, and I comment to the location manager, ‘Yesterday morning seemed amazingly orderly for the first day of shooting.’ ‘We only have two days to do it,’ she replied, ‘We need to get things done right away.’

The location manager’s quote insightfully reveals the importance of temporal and social embeddedness in achieving the goals of this project, and by extension, all film-related endeavours. With only two days to accomplish the on-site filming, temporal embeddedness provides several mechanisms for coordinating activities under tight timelines. For example, chronological pacing is used to demarcate strict and specific timelines for each aspect of the shoot; most of this has been designated beforehand through planning and scheduling processes directed by the production manager. In addition, industry participants agree contractually to work exclusively on that project for its duration, which imposes chronological pacing on participants to minimize coordination problems. When one project goes over time allocation, it disrupts other projects in which participants are scheduled to participate. When a project goes over its scheduled time, the production company and director are sanctioned with enormous fines to provide strong incentives to adhere to project schedules and minimize such disruption in the industry. At the same time event-based pacing is crucial to each scene, which must be done at a high level of quality designated by the director; project actors cannot substitute speed for accuracy since the film requires that each component must be completed before moving to the next. These two mechanisms give rise to an overall entrainment pacing, through which the entire group begins to operate at a collective rate that reduces the transactional uncertainty inherent in one-time projects.

Event-based pacing is also used to manage transactional uncertainty by coordinating who should interact with whom when. A film project is demarcated into three well-defined sequences of activities, each involving distinct organizational actors. In pre-production, a film studio and a production company negotiate key components for the project including the script, funding, the distribution
agreement, and talent for key roles. Once funding is secured and a production timetable set, the project is ‘green lighted’ which initiates the production phase. During this six to twelve week period (or the two-day period in the commercial example) the physical filming occurs, involving an array of organizations including special effects, catering, costumes, and cinematography, and whose activities are coordinated and controlled by the director and various heads of units. Finally, the post-production phase involves the editing, marketing, and distribution of the film. Since each phase requires a different set of key actors, the number of interactions within each phase is dramatically reduced through event-based pacing.

More important than temporal embeddedness in the film industry is social embeddedness, because the vast majority of personnel in key roles such as director, producer, screenwriter or music, composer, have rarely worked together. For example, from 1965 to 1980, 57 per cent of directors and 64 per cent of producers made only one film, whereas just 7 per cent of directors made 40 per cent of the industry’s films (Faulkner and Anderson 1987). Moreover, although films are one-time, short-duration events, they require a high degree of in-depth coordination across multiple organizations and individual contractors. Given that these organizational actors have rarely if ever worked together, they likely exhibit very low levels of relational embeddedness. How then can the location manager ‘get things done right away’, and at such a high pace, with people who have neither formal basis for trust nor knowledge of each other’s working styles?

The answer is structural embeddedness. Since many organizational actors have worked with many others over time, they have gained a shared understanding through their prior roles and interactions, which is passed on from one freelancer to another through these interactions (Jones 1996). As one insider said: ‘We are a big industry but a small industry because we talk to one another’ (Jones 1996). In addition, the film industry was established in the early 1900s; thus, specific roles, including what duties constitute these roles and with what other roles and how they interact, have evolved and been defined through an apprenticeship system and through film schools. Each role on a film project, including the ‘gaffers, gofers, and grips’ of Bechky’s (2006) film teams, is enacted by individuals who have a clear understanding of their specific duties gained through their socialization into the industry (Faulkner 1987; Jones 1996). Each individual is also well aware of the scope and goals of all the other roles represented on the shoot, through a shared logic-of-action that has evolved within the film industry. These shared understandings include an acceptance of one’s place in the formal ‘hierarchy’ of personnel on the project, allowing the director and his/her unit heads (e.g. photography, sets, costumes) to coordinate the activities of the film as a single project organization. Even more than temporal embeddedness, these shared understandings from structural embeddedness coordinate organizational actors in one-time, short-term projects, and in longer-term projects as well (e.g. Winch 1989). These mechanisms, embedded in the macroculture of the industry, provide the basis for trust
between all project actors, especially those who have never before worked with each other.

**Network Alliances: Architecture and Construction Projects**

Toward the middle of the projects spectrum are projects that are relatively short-lived, enacted by organizations or self-employed freelancers who interact repeatedly. Architecture and construction industry are exemplars of this type of project, which also assembles a remarkably rich set of resources, including a wide range of diverse professionals and crafts, to accomplish a complex and meaningful project. In architecture and construction projects vary from eighteen months for the design and construction of a building to several years for major urban planning projects (Jones and Lichtenstein 2000; Mintzberg et al. 1988). This combination of shorter duration, complex projects requiring multiple organizations, and repeated interactions leads to challenges in inter-organizational coordination. Often the crews or organizational partners that one desires are engaged in other projects, since most organizations need to enact many projects simultaneously to generate a viable revenue stream; this increases the challenges of temporal coordination among multiple organizations with competing projects and demands.

Event-based pacing is used to manage demand by coordinating when and whether a building project should proceed. If market demands such as interest rates or funding shift dramatically, a building that has been programmed may not yet be designed or constructed until a later date. Event-based pacing also manages transactional uncertainty by specifying who should interact with whom when. A building project is demarcated into well-defined sequences of activities that trigger who should provide contributions when. For instance when a new building or renovation is undertaken, architects work with their engineer consultants and clients to specify the needs of the buildings’ users. As one example of this interaction, planning an office building typically involves creating a certain physical layout for workflow, as well as infrastructure issues such as heating and ventilation for the number of computers used in a space. This is called the programme phase. Once the user needs and building functionality are identified then the architect focuses on design-integrating functionality, cost, codes, and aesthetic issues into the proposed building. Architects, engineers, and other specialists communicate in a reciprocal and team fashion to iron out how the various space, heating, air conditioning, electrical, and structural issues will be resolved. After the building design construction begins and a host of tradespeople are brought in to erect the building. Throughout all of this blueprints communicate and record what needs to be done by whom and where for the building project to unfold as planned.

Temporal embeddedness provides several techniques for coordinating these diverse activities under the demands of multiple projects. For example, chronological pacing in the form of schedules is used to demarcate strict and specific timelines for
each aspect of the project—who gets a blueprint when, which tradespeople make their contributions on which days and for how long. This planning and scheduling process is directed by the lead firm—often an architect or sometimes a general contractor in design-build projects.

Social embeddedness comes into play to enact a complex and highly reciprocal building project. Relational embeddedness—recurring relations with the same partners—is desired since projects last from eighteen months to several years and require some understanding of one another’s contributions and work styles. For example, Eccles (1981) found relational embeddedness in home building construction. General contractors preferred to use the same set of subcontractors whose work they knew and could rely upon. Architecture and construction also have structural embeddedness. Because architects and contractors have multiple projects, they must have multiple organizational partners—that is, several potential structural engineering firms they use or several possible plumbers in case their preferred partner is engaged in other projects. The use of multiple partners by a lead firm structurally embeds relations within a market or field—both lead firm and partners have not only repeated relations but dense relations—relations with many others in the market.

In addition, knowledge of practices and roles is well institutionalized. Architectural and consulting engineering professions require intensive training and apprenticeship about who performs which roles and how to coordinate these roles (Boyer and Mitgang 1996; Gutman 1988; Woods 1999). Construction trades are also licensed and based upon a historical legacy inherited from the Middle Ages. Thus, specific roles—what duties constitute these roles and with what other roles and how they interact—have evolved and been defined through an apprenticeship system. Each individual is also well aware of the scope and goals of all the other roles represented on a building project. These shared understandings provide knowledge of one’s place in the formal ‘hierarchy’ and one’s decision-making role. For example, the lead firm for building construction in the United States since the mid-1900s has been the architectural firm (Woods 1999). However, these relations are in transition and may be contested, as with the shift to design-build in the building industry, which often places the contractor as the lead firm (Boyer and Mitgang 1996; Thornton et al. 2005). The designation of a lead firm is critical because it allows that firm to coordinate the activities of the partnering firms. These relations are often encoded into building contracts—specifying who is the lead firm and which firms as partners provide what services, as well as the timeline for a project to unfold.

**Multi-Party Organizing: Emergency and Crisis Response**

The third type of IO project within this continuum, exemplified by Crisis Management, has a relatively long duration—from many weeks to dozens of months in some cases—yet involves organizations and their representatives who rarely if
ever work together repeatedly. Crises have been defined as ‘epochs of profound uncertainty and urgent challenges to the problem-solving capacities of the socio-political order in which they occur’ (Brandstrom et al. 2004: 191). This lack of social embeddedness is magnified by the temporal urgency of the situation, which further constrains participant interactions to only the most critical communications. The disastrous response to the Hurricane Katrina crisis reflects the challenges inherent in this kind of organizing effort.

The key temporal issue in crisis is urgency, the need to move very quickly, sometimes before there are any plans or a project-organization in place. Due to the urgent nature of this kind of IO project, chronological pacing is not based on pre-designed deadlines, but on emergent and often spontaneous short-term situations that must be handled almost immediately. Thus in the initial period of response, entrainment pacing is the primary coordination mechanism: The urgency of saving life, property, and other critical resources can bring people together in unique and meaningful ways, allowing teams to spontaneously emerge and disband as specific issues and needs become known. Below we discuss how this sense of urgent coordination is facilitated by participants’ structural embeddedness and the duration of organizations that respond repeatedly to crisis like the Red Cross, which has been in existence for over 125 years, even though they rarely work with the same country or agency partners.

In certain large-scale emergencies, event-based pacing can provide an additional coordination mechanism. As the scope and impact of the situation becomes better understood over time, distinct phases of the effort may arise, creating decision points that can be moments of reorganizing that support the overall project effort (Moynihan 2005a). For example, what initially was a more local situation may, due to environmental circumstances, be reframed into issues which are far broader in scope than first thought. These exogenous shifts in perception can trigger decisions that increase resources, as when a governor declares an ‘emergency’ that triggers access to federal funds, or when the initial force of rescue workers is overwhelmed by the previously unknown extent of damage. These decisions produce an event-based temporal marker which organizes the next stage of the project. The last of these temporal markers is a final internal milestone, reflecting the shift from crisis organizing to activities that can be managed by local, pre-existing organizations. This leads to the decommissioning of the temporary inter-organizational team, whose members revert back to the original network (Moynihan 2005b).

The existence of this network reflects a measure of social and structural embeddedness that supports the coordination efforts of organizations in the field. First, although the contingencies of a crisis make it impossible to define ahead of time who will participate in its response, the key players tend to be already connected in a web of loosely overlapping networks (Moynihan 2005a), engendering structural embeddedness. Moreover, for certain natural disasters there are models in place that help guide the project effort, for example, the National Incident Management
temporary projects. These networks and models provide social structures and shared understandings which are important for the coordination of the responders. Further, in cases where the crisis response project extends to dozens of organizations across multiple levels of government (i.e. local, county, state, and federal), organizing hierarchies often emerge that are more formally coordinate physical resources and communication networks (Moynihan 2005a).

Finally, as mentioned above, many people share an innate drive to help people during a crisis; this shared concern, in addition to the emergency-response training that key personnel often bring to a crisis, provides additional coordination during the event.

In an unexpected way, the entrainment pacing required in crisis response directly affects the social embeddedness of project actors. On the one hand, any large-scale crisis dominates the work of all of the organizations involved; however, this does not usually reduce the ongoing, day-to-day responsibilities those organizations have to their home agencies (Moynihan 2005a). This is especially true if the crisis requires key managerial personnel to be away from their family, performing difficult and stressful tasks for weeks on end. The result can be a rapid turnover of key staff in a crisis unit, thus decreasing the overall effectiveness of the response, while at the same time creating an increasing pressure to deal with the ongoing operational issues whose importance is far less dominant. Thus, as the duration of the crisis response extends, new sets of problems emerge that themselves must be dealt with. The flip side of this problem is that greater learning is often the result of greater duration projects, this increasing the efficiency and effectiveness of crisis teams as they do their work in the field (Moynihan 2005c).

**Constellations: Large-Scale Engineering and Construction Projects**

Perhaps the most studied type of project involves a single client—often a public agency responsible for solving a social challenge—who contracts a large engineering firm to manage the resulting design and construction effort. We include in this category the large infrastructure projects in industries like energy, aerospace, and telecommunications. The first formal study of such ‘mega-projects’, an in-depth analysis of the NASA Apollo missions (Murphy et al. 1974), catalyzed the field of project management (Wideman 1985); recent studies have shown that up to 80 per cent of these major capital-intensive projects are neither completed on time nor within budget (e.g. Altshuler and Lubero 2003; Morris and Hough 1987). Since ‘time = money’ to a large degree in these endeavours, we concentrate first on how organizational actors utilize the mechanisms of temporal embeddedness to effectively (or ineffectively in many cases) coordinate activity in these large-scale projects.
In some measure the entire field of project management is designed around a series of mechanisms for improving chronological and event-based pacing (Wideman 1985; Cleland and King 1988). The complexity of large-scale endeavours is reflected in their poor success rates; although ‘improved’ methods and models continue to appear (e.g. Shenhar 1994; Davies and Hobday 2005), the use of temporal embeddedness mechanisms to coordinate multiple actors across multiple scales of work has not been consistently successful.

Event-based pacing through sequences or ‘life-cycles’ of episodes has been used extensively in the shaping of public infrastructure projects (Miller and Olleros 2000), and the project-management implementation of engineering projects (Davies and Hobday 2005). Specifically, Miller and his colleagues have shown that large-scale social infrastructure projects are organized in two very distinct temporal regimes (Miller and Hobbs 2002). In the first phase of public ‘mega-projects’ when neither the problem nor its solution is well defined, temporal embeddedness occurs through event-based pacing. That is, as the nature of the problem and its possible solution become worked out—sometimes over more than a decade—the institutional field for the project is itself created through a series of accomplishments: the endorsement of key participants, the creation of a political coalition, the passage of specific legislation, and the contractual agreements made by anchoring institutions (Miller and Hobbs 2005). With the completion of this phase, the temporal embeddedness of the project shifts dramatically to incorporate the well-known dynamics of large-scale engineering projects. Miller and Hobbs (2005: 45) describe this important juncture:

In most major projects, a time can be identified when most of, if not all, the pieces come into place, and when significant and irreversible commitments are made....This point marks the end of the strategic structuring phase and the beginning of the design and execution phase. From this point, the management of the project is [based on] conventional project management theory and practice…

Once this second phase begins, the internal dynamics of the mega-project are designed around engineering milestones within a contracted deadline (which itself may evolve over time). This endogenous shift from event-based pacing to temporal pacing reflects a difference between the cultural, political, and institutional frameworks that got the project off the ground and the specific engineering-based project network that is retained to construct and commission the project.

On the surface, social embeddedness should also provide mechanisms for coordinating transactional uncertainty in large-scale projects. For example, these construction-based endeavours tend to operate within large firms (e.g. Bechtel), and are directed by formal project managers who are usually accorded high degrees of formal power to direct planning efforts and allocate and manage resources across organizational actors. Numerous studies on determinants of project management success (Pinto and Slevin 1988) have shown the important role played by relational
embeddedness, for example in the quantity and quality of communication in the project (Allen et al. 1980; Katz and Allen 1982) and in the type of project management structure used (e.g. Larson and Gobeli 1989). However, these studies do not differentiate between intra-organizational projects and IO projects.

Since large well-established firms dominate in mega-projects (e.g. Bechtel and others), these firms repeatedly interact with one another, with different government agencies and also with smaller, local firms. Thus, relational embeddedness tends to be high between the client and firms (e.g. repeated interaction over years) as well as fragmented into cliques because of the concentrated effort of firms and agencies on a few mega-projects. Duration of the project restricts how many players can feasibly interact with one another, reducing structural embeddedness or density in the overall field or market to create cliques or sub-groups of firms formed around that work together and are formed around key rival organizations. In addition, in our view, coordination in IO projects can become muddled due to relational overlap that generates conflicts between individuals’ relationship to the firm (as their employer) versus their relational embeddedness within the field or industry (i.e. as a member of a profession or industry). In some cases these two types of embeddedness may be based on differing logics-of-action, and thus may result in very different expectations (Thornton et al. 2005). Unfortunately, there is no research we could find that examines this issue.

**Discussion and Conclusion**

Our research and exploration shows that relations and understandings evolve over time to create macrocultures that function as resources and rules for participants. Thus, we see ‘swift trust’ in projects of very short duration and strict deadlines (Meyerson et al. 1996) as evolving out of established social structures and longer processes. We suggest that swift trust is possible only because transactional uncertainty has been reduced through shared understandings that clarify knowledge content, roles, and role behaviours needed for effective coordination. These shared understandings result not only from the history and duration of the market or field, but also from the pattern of interactions—the structural embeddedness—of organizational actors within the market or field. We also suggest that transactional uncertainty is attenuated through social embeddedness-shared understandings and relations that facilitate knowing what and how interactions are most effectively coordinated among participating members. This set of temporal and social embeddedness mechanisms provides shared understandings about the pace, process, and potential range of interactions in an IO project. Since interdependence and collaboration are central to IO projects, trust may not be based primarily
on interpersonal attraction (e.g. swift trust), but rather reflects Zucker’s (1986) notion of institutionalized trust. Due to the importance of institutional trust in these highly interdependent collaborative activities, we question whether such a formidable quality is built on the spot, i.e. ‘swiftly’. Instead, these mechanisms are not swift as much as they are embedded in the collective experience of market or field participants who carry them from one project to another, using these shared understandings to coordinate their joint activities in projects.

Overall, we have tried to show that chronological pacing, event-based pacing, and entrainment pacing are each useful mechanisms for coordinating action in IO projects. We extend our analysis to suggest that there are regularities between the duration of a project and the temporal pacing mechanism that is most useful for coordination. Specifically, the shortest-duration projects—in film, advertising, and so on—often rely on chronological pacing that is guided by the external needs of the deliverable. As projects extend in length, event-based pacing becomes increasingly important as a coordination mechanism. At the far end of the continuum—for example, in large-scale infrastructure projects—event-based pacing is ubiquitous, while chronological pacing itself has virtually no effect given the need to complete every intervening aspect of a project. Finally, when projects are surrounded by great urgency, as occurs in the first moments of crisis relief, and in extremely short duration projects like the commercial shoot described earlier, entrainment-based pacing provides an additional measure of coordination, as organizational actors match their energy and contributions with external markers.

A similar regularity may be found in the ways that social embeddedness reduces transactional uncertainty in joint activities. Specifically, shorter duration projects facilitate movement among organizations by opening up the possibility of new tie formation, creating a dense network of weak ties (e.g. many actors gain relations across a wider group of partners with few repeated ties). This influences coordination in important ways. For example, projects where relational embeddedness is low, including film and emergency response, are also more likely to use hierarchy to facilitate coordination. In contrast, projects of longer duration, with repeated ties but more fragmented structural embeddedness, are more likely to rely on team or reciprocal processes among partners, because the shared understandings of the industry macroculture can substitute for formal control mechanisms like hierarchy. That is, when structural embeddedness and thus density of relations is higher, shared knowledge about how to perform roles and who should coordinate with whom is more widely dispersed among field or industry organizations, obviating the need to formalize these relations.

IO projects are a critical and important arena for research. IO projects enhance an organization’s ability to initiate or eliminate projects, providing the organization with flexibility to respond to demand uncertainty. They also facilitate learning that allows organizations to leapfrog competitors in the speed to market. Temporal and social embeddedness provide techniques for managing transactional uncertainty
within a fluid and dynamic environment. Yet few comparative studies exist on IO projects across industries or fields. Our insights are a first step at trying to provide a comparative analysis. These insights need to be tested empirically across domains to assess how temporal and social embeddedness provide mechanisms for coordinating exchanges under demand uncertainty and reducing transactional uncertainty.

Note

1. Our own 'big dig' in Boston started as an innovative idea in the 1970s to open up green space through downtown Boston; the original $2.6 billion estimate has ballooned into a $14.6 billion project which is (still) five years behind schedule, and as of this writing experiencing severe systemic construction problems.

References


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