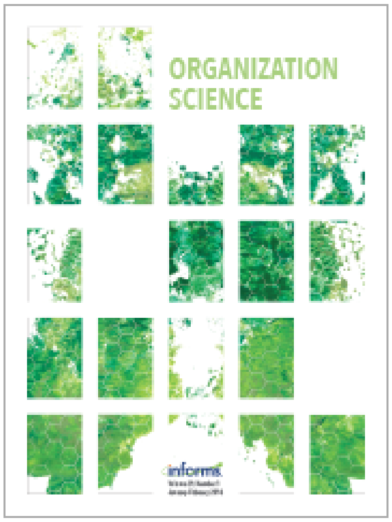

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How Coordination Trajectories Influence the Performance of Interorganizational Project Networks

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Abstract. This study examines how the joint use of integrators and contracts either enables or hampers coordination and, in turn, the performance of interorganizational project networks. Using extensive qualitative analyses and sociometric techniques, we investigated coordination among organizations during seven small- and medium-sized building projects. Our longitudinal study reveals how integrators develop connecting functions that, together with contracts' steering functions, largely drive coordination dynamics. Further data analyses provide insight into how coordination hinges on the prevalence of connecting or steering, which may more or less fit with coordination needs in various project phases. Given these findings, we theorize the contingent nature of the interplay between the use of integrators and contracts throughout projects. Our findings are integrated into a process model of how coordination trajectories lead to different performance levels of interorganizational project networks. Our study has theoretical implications for the literature on project-based organizing and, more broadly, the literature on interorganizational coordination.

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Keywords: coordination • interorganizational project networks • performance • longitudinal study • building industry

Introduction

Many of the world's largest industries (e.g., construction and biotechnology) are primarily organized around projects that involve temporary networks of organizations (Hobday 2000, Jones and Lichtenstein 2008, Miles 1964). Interorganizational project networks face acute coordination challenges. Pooling various resources and types of expertise requires that distinct organizations work together. However, the diversity of organizations and their interests often preclude coordination (Heath and Staudenmayer 2000). Coordination is both challenging and essential because organizations share high task interdependence (Thompson 1967) and high temporal interdependence (Masten et al. 1991). Each organization must perform tasks in a timely manner to avoid disrupting the work of other parties so that the project's objectives of delivery time, cost, and quality (i.e., performance) are met (Atkinson 1999, Pinto 2004).

The literature on project-based organizing (PBO) has extensively addressed the core mechanisms of coordination that support performance (Engwall 2003, Jones and Lichtenstein 2008). Prior researchers have emphasized project management firms and contracts as the most typical and fundamental ways to coordinate interorganizational project networks (Davies and Hobday 2005, Morris 1994). The joint use of these coordination mechanisms is especially common in small- and medium-sized projects, which represent many industries' mundane activities (Ligthart et al. 2016). Organizations whose core function is coordination have been called project barons (Gann et al. 2012), engineering consultants (Reve and Levitt 1984), and system integrators (Hobday 2000). We refer to such organizations using the generic term "integrators." Contracts entail sanctions and incentives that govern the relationships between organizations (Eccles 1981, Lumineau 2017) and influence how organizations collaborate (Gulati et al. 2012b, Lumineau and Malhotra 2011). Despite the extensive attention that has been devoted to the use of either integrators *or* contracts, theory is less clear about the *joint* use of these two coordination mechanisms to support coordination during projects (Ligthart et al. 2016, Reve and Levitt 1984).

At first glance, the use of integrators and contracts appears similar. Both integrators and contracts are coordination mechanisms used to achieve a project's objectives. As we explain, the use of integrators and the use of contracts are nevertheless clearly distinct and differ in several critical respects. Integrators and contracts also have specific strengths and limitations (Gann et al. 2012, Reve and Levitt 1984, Styhre 2006). In turn, because these two mechanisms are used simultaneously within a single project, a few researchers have started to examine the interplay between the use of integrators and contracts in promoting coordination in interorganizational project networks. Whereas some studies have indicated a complementary relationship in which the contract's limitations may be compensated by the strengths of the use of integrators and vice versa (Cao and Lumineau 2015, Woolthuis et al. 2013), others have suggested that the use of integrators and contracts may work in substitutive ways (Atkinson et al. 2006). That is, the use of one coordination mechanism can replace or even discourage the use of the other (Bakker 2010). We suggest that one way to revisit this debate is to go beyond the question of whether the use of integrators and contracts work as complements or substitutes to instead explore the contingent nature of their interplay. The key issue is to understand which coordination mechanism prevails at each phase of the project and where each phase entails distinct coordination challenges.

This study thus addresses the following research question: *How does the relative inter-temporal use of integrators and contracts influence the performance of interorganizational project networks?* By addressing this question, we aim to contribute to the PBO literature in two specific ways. First, we augment the literature on the interplay between the use of integrators and contracts by developing a contingent approach. We directly analyze the interplay of the use of integrators and contracts over time as a core element of the coordination process, specifically in small- and medium-sized projects. Second, it is particularly important to determine how the process of coordination relates to the evolution of interorganizational project networks (Cattani et al. 2011, Sydow et al. 2016). Specifically, we study how coordination in these networks develops based on the prevalence of specific coordination mechanisms, thus influencing performance. We are interested not only in why the prevalence of the use of integrators or contracts enhances or hinders coordination at each project phase but also in the transition across phases.

Given these opportunities to develop theory, we conducted a longitudinal, multiple-case study of seven social housing building projects in England. Building projects have a long-lasting tradition in studies of coordination between project organizations (e.g., Eccles 1981, Stinchcombe 1959). Our findings provide several insights on how the evolving prevalence of the use of integrators or contracts enables or hampers coordination and, in turn, performance. By examining the interplay between these two coordination mechanisms, we uncovered how the specific functions of integrators and contracts influence key characteristics of interorganizational project networks during the project. We refer to these processes as "connecting" and "steering" processes, respectively. We further specify when the use of integrators and contracts work largely as either complements or substitutes and develop theory on the contingent nature of the interplay between integrators and contracts during projects. Our study contributes to the literature on temporality (Jones and Lichtenstein 2008) by showing that the timing of the prevalence of connecting or steering functions throughout projects—which we theorize as coordination trajectories—influences performance.

Interorganizational Project Networks: Coordination Mechanisms and Temporality

Many innovation and production activities are organized in projects. A project is "a temporary endeavor undertaken to create a unique product or service" (Duncan 1996, p. 4). The extant research has addressed the relationships among project organizations under the labels of *project networks* (Windeler and Sydow 2001), *interorganizational project networks* (Maoret et al. 2011), and *project coalition networks* (Pryke 2004). We use the term *interorganizational project networks* to refer to relationships among organizations that have an input in the project[1] (DeFillippi and Sydow 2016, Jones and Lichtenstein 2008). Organizations come together to attain a specific project's objectives—the most common being delivery time, forecasted costs, and projected quality (e.g., Atkinson 1999, Pinto 2004). The extent to which organizations meet the project's objectives defines the level of performance. However, high performance requires the attainment of multiple and often diverging objectives—for example, building a housing development at a low cost and high quality—and requires coordination of the interorganizational project network.

The project-based organizing (PBO) literature has long focused on how interorganizational project networks influence performance (Cattani et al. 2011, Mehra et al. 2013, Pryke 2004). Drawing on social network theory (Granovetter 1985, Jones and Lichtenstein 2008, Uzzi 1997), past research shows that interorganizational project networks foster shared norms and values (Coleman 1986, Jones and Lichtenstein 2008), tacit knowledge (Lipparini et al. 2014, Soda et al. 2004), and cross-understanding among various parties (Bechky 2006, Heath and Staudenmayer 2000). Repeated interaction in past projects also enables coordination in the current project (Gulati 1995, Ebers and Maurer 2016). Such relationships provide novel information (Burt 1992) that enables problem solving during the project (Lipparini et al. 2014, Tushman and Katz 1980). A project can be conceptualized as an information exchange network among organizations (Jones et al. 1997, Pryke 2004).

Researchers use sociometric analyses ("social network analysis") to map the patterns of ties among project organizations (Mandell 1984, Pryke 2004).

However, research on interorganizational project networks has overlooked the use of coordination mechanisms (see Jones and Lichtenstein 2008 for an exception). By overlooking the use of key coordination mechanisms, our current understanding of the role played by ties in actually coordinating interorganizational project networks remains incomplete. These networks do not develop in isolation from the use of core coordination mechanisms in projects (Ligthart et al. 2016, Reve and Levitt 1984, Stinchcombe 1959).

The Interplay Between the Use of Integrators and Contracts as Mechanisms of Coordination

Coordination is fundamental for PBOs (Bechky 2006, Hobday 2000, Jones and Lichtenstein 2008). The importance of the use of integrators and contracts as two distinct coordination mechanisms in interorganizational project networks is supported by core conceptual frameworks (e.g., Reve and Levitt 1984, Winch 2001), project management textbooks (Duncan 1996, Morris 1994), and PBO literature reviews (Bakker 2010, Cattani et al. 2011).[2] Some works have focused on the use of integrators (Gann et al. 2012, Hodgson 2004) as these have the flexibility to make decisions about project coordination. The client requires these integrators so that the project can be coordinated (Styhre 2006).[3] The use of integrators presents specific advantages and disadvantages in attaining project performance. Integrators have specialized expertise in project management that allows them to anticipate the coordination needs in the project (Heath and Staudenmayer 2000, Reve and Levitt 1984). However, using integrators can be expensive, for example, because of consultancy fees and costly administrative procedures (Styhre 2006). It is time-consuming to gather accurate information about all of the tasks performed and the relationships among project organizations (Pich et al. 2002). Because the client's mandate is not fully explained, ambiguity about integrator actions can also undermine the relationships between project organizations (Woolthuis et al. 2013).

Other studies have emphasized the role of contracts entailing sanctions and incentives to govern the relationships among organizations (Reve and Levitt 1984, Eccles 1981). In contrast, the use of contracts has different advantages and disadvantages. Contracts set clear expectations and obligations between parties (Lumineau and Henderson 2012, Masten et al. 1991). They create safeguards and reduce the likelihood of opportunism. Studies have shown that contracts not only promote cooperation but also enable coordination and adaptation between parties (Malhotra and Lumineau 2011, Reuer and Ariño 2007). Nevertheless, because of their incomplete nature, contracts do not include provisions for all types of contingencies (Hart 1988). This incompleteness is likely to undermine both the quality of the parties' relationships and ultimately performance (Meng 2012).

Although integrators and contracts are often used within the same project—particularly in small- and medium-sized projects (Ligthart et al. 2016, Reve and Levitt 1984)—only a few researchers have attempted to explain the interplay between these two dissimilar coordination mechanisms. On the one hand, some studies have suggested a complementary relationship. The limitations of contracts may be compensated by the strengths of the use of integrators and vice versa. Because contracts often remain unchanged during projects, they can introduce rigidities in coordination and adaptation (Jones et al. 1997, Morris 1994). Integrators' flexibility would thus compensate for the rigidity introduced by contracts (Stinchcombe 1959). Scholars have also argued that the incomplete nature of contracts can be counterbalanced by integrator mandates for coordination (Reve and Levitt 1984). Although specific contracts between organizations often result in a patchwork of contracts in a project (Gulati et al. 2012a), the use of integrators may be able to minimize potential coordination problems by connecting all parties. Furthermore, integrators themselves experience limitations that can be compensated by contracts. Although integrators might have a limited influence to encourage coordination between a supplier and a client, the presence of supplier–client contracts can work as a legal and framework-creating tool that integrators can use to promote coordination. For instance, contracts can be invoked by integrators to ensure that project deadlines are met (Lindkvist et al. 1998). On the other hand, several studies have suggested a substitution logic between integrators and contracts in overcoming coordination challenges that might undermine performance (Atkinson et al. 2006, Meng 2012). A preference for detailed contracts may indicate low-quality relationships between organizations, which can create further obstacles for integrators as they attempt to fulfill their coordination mandate (Atkinson et al. 2006). The emergence of ailing relationships among parties can become a destructive cycle that ultimately results in a less effective project (Meng 2012). Furthermore, integrators can create procedures entailing an extra burden that, together with contractual rules, might be detrimental to coordination (Woolthuis et al. 2013).

Prior research has focused on the conditions under which the use of integrators *or* contracts are more or less effective. However, prior research presents dispersed, mixed evidence of how the use of integrators and contracts interact with some studies suggesting and finding evidence for a complementary relationship and others supporting a substitutive relationship between these two coordination mechanisms.

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A sharper theory would discern the conditions under which the interplay between the use of integrators and contracts either enables or hampers coordination. Although the use of integrators and contracts usually co-occurs in a project, an examination of which mechanism is the most important is required to understand their working and influence. More specifically, because coordination needs change throughout a project, it is theoretically relevant to understand this interplay of coordination mechanisms throughout the project's various phases.

Temporality in Projects

The temporality perspective in the PBO literature addresses the role of time and time orientation (Ballard and Seibold 2003, Hernes et al. 2013, Janowicz-Panjaitan et al. 2009). For the purpose of our research question, we reviewed the linkage between temporality and coordination during the project.

Project management literature typically stresses that projects pass through a set of predefined phases (Duncan 1996, Morris 1994). Morris (1988, p. 19) observed that "to achieve the desired project objective one must go through a specific process. There is no exception to this rule. The process is known as the Project Life Cycle." In contrast to this sequential view, others have argued that projects often undergo moments of stability and change (Bakker and Knoben 2015). Rooted in the punctuated equilibrium model developed for team dynamics (Gersick 1989), a few PBO studies have followed this model as a critique of the linear view of projects (Bryman et al. 1987, Eisenhardt and Tabrizi 1995, Ford and Sullivan 2004).

A related body of literature has addressed time-based structures intended to fulfill coordination needs over time (Humphrey et al. 2004, Van de Ven et al. 1976). Time-based structures include, for example, schedules and deadlines (Grandori 1997, Hassard 1991). These structures specify time frames characterized by clear start dates, milestones, and end dates for the project (Janowicz-Panjaitan et al. 2009, Simon and Tellier 2016). Each project organization performs different tasks at a specific point in time during the project, but each organization also pursues different interests, thus making the interorganizational project network prone to a misalignment between organization time frames and the project's time frame. Thus, some studies have examined the temporal orientations of the parties that are interconnected with the coordination activity (Ballard and Seibold 2003, Hassard 1991, Stjerne and Svejenova 2016). Humphrey et al. (2004) reported that although the parties commit more effort to a project when a deadline is approaching, the quality of their contributions decreases when the deadline is near.

While drawing on insights from these two research strands, researchers have only begun to analyze how organizations coordinate across phases in projects. On the one hand, phases are largely unique in terms of tasks and thus entail different coordination needs (Morris 1994). On the other hand, up-front time-based structures (e.g., schedules) are helpful, but they do not provide practical information about how to operate the transition between phases. One notable exception to the dearth of research in this area is Olson et al. (2001), who reported various levels of coordination across phases of R&D projects. Nevertheless, scholars have noted that further research should help explain "how the temporal dynamics of projects influence the collaborative activities among organizations" (Maoret et al. 2011, p. 235; also see Burke and Morley 2016 for a review). An examination of the temporal dynamics is instrumental to shed light on the transition across phases (i.e., inter-temporal aspects) that entail distinct coordination needs.

Bringing together the open issues in these two strands of research, we ask the following question: *How does the relative inter-temporal use of integrators and contracts influence the performance of interorganizational project networks*? We aim to extend prior research on the use of integrators and contracts by examining the interplay between these two coordination mechanisms as the thrust of coordination in small- and medium-sized projects. By jointly studying these two distinct coordination mechanisms and examining the nature of their interplay across the phases of a project, we aim to extend current theory suggesting that coordination is "activities set in motion" (Van de Ven and Gordon 1984, p. 598) by capturing how these actions come to influence performance.

Methods

We conducted a multiple-case study (Eisenhardt 1989) because this approach allowed us to investigate questions of "how" the use of integrators and contracts influence coordination among organizations, and this method yielded multiple observations of complex processes over time (Golden-Biddle and Locke 2007). All seven cases were treated as a series of experiments in which cross-case comparisons yielded more generalizable findings (Leonard-Barton 1990).

Research Setting and Case Selection

We chose the building industry for our case study. This industry has long attracted the attention of researchers interested in coordination among organizations (e.g., Ebers and Oerlemans 2016, Eccles 1981). According to the World Bank development indicators, the building industry adds value equaling approximately 10% of the gross domestic product (GDP) in most developed countries. However, the building industry has a long-term history of time and budget overruns (Smyth and Pryke 2008).

To become familiar with the building industry, we interviewed 22 experts, and the duration of each interview was between 35 and 80 minutes. We interviewed 17 practitioners (e.g., architects, policy makers, and clients) and five frequently published scholars in the areas of management and project management who have studied the United Kingdom's building industry. Our open questions focused on interviewees' experiences with coordination in the building industry. We recorded the interviews digitally when permission was granted, and we transcribed them within 48 hours to maintain the integrity of the information, retaining pauses, and intonations (Miles and Huberman 1984).

We selected social housing projects in which coordination is critical because of the pressure from clients to control costs. Low construction costs can be directly reflected in more affordable rents for low-income tenants. One of the authors approached UK-based main contractors and social housing providers at London's Ecobuild 2009 trade fair. Ecobuild is the world's largest event for sustainable design and construction with more than 850 exhibitors annually. We secured unconditional data access from the head of development with one of the United Kingdom's largest social housing providers (collaboration and confidentiality were agreed upon between the coauthors and this social housing provider). This provider managed a property portfolio of more than 13,000 homes with an annual turnover of £61 million as of 2011.

We selected seven projects completed between 2008 and 2011 in East Midlands, a county affected by a long-term social housing shortage. We defined a social housing building as a project. All seven cases (i.e., projects) met several important criteria: a client's agent (i.e., project management consultancy) was appointed to oversee the project, the organizations had distinct expertise, and every organization's input required integration to add value to the project (Cattani et al. 2011, Duncan 1996). Our selection criteria minimized extraneous variation (e.g., project design specifications) and maximized cross-case variation (e.g., how organizations coordinated) for theory-building purposes (Eisenhardt 1989, Yin 1994). Following prior research (see Ness 2009), we sampled cases that were comparable projects (i.e., social housing construction at a low cost for clients). These criteria enhanced the internal validity and reliability by controlling for the systematic variation (Eisenhardt 1989, p. 537) that differences in project types can introduce (Ebers and Oerlemans 2016).

First, we confined our population to a geographical area to minimize random error (Eisenhardt and Graebner 2007). Second, we selected projects of a similar size. The average construction cost was £1.8 million (mean = £1,849,481; SD = £900,627). On average, the design–build life cycle lasted 15 months (mean = 14.57; SD = 5.62), involving an average of 40 organizations in each project (mean = 39.43; SD = 13.46). Third, all projects were of the same building typology: social housing. Social housing is a rental accommodation that is owned and managed by the state, owned by non-profit organizations, or owned by a combination of the two. Finally, all seven projects followed a design and build procurement, and a joint contracts tribunal (JCT) contract was used. Additionally, the client's agent did not appoint subcontractors. These features were confirmed in the project documentation (e.g., board papers) for all seven cases. Table 1 presents a summary of the background and data for our building projects.

Data Sources

We gathered retrospective data that afforded an efficient collection of multiple episodes of coordination (to strengthen external validity). We also performed real-time data collection for three projects that were ongoing when we entered the field in 2009. This approach enabled us to deepen our understanding of how events evolved (to enhance internal validity) (Leonard-Barton 1990). Our data collection strategy minimized retrospective biases (Golden 1992) and reverse causality problems that often arise in cross-sectional studies. Table 1 shows a breakdown of the data sources accumulating to more than 2,600 pages.

Meeting Minutes. The primary data source was more than 1,700 pages of minutes of monthly meetings held among project organizations (e.g., main contractors and architects' practices). Open access to meeting minutes enabled a unique examination of coordination and a socio-metric study of interorganizational networks over time because of the richness and detail of these data (Van de Ven and Poole 2005). These meeting minutes provided detailed information on a monthly basis. The meeting minutes were written by the client's agent and then approved by the project organizations. This evaluation and acceptance process of the meeting minutes among the key organizations ensured the validity of our data.

Diverse Archival Data. We accessed other "unobtrusive" documentation (Webb and Weick 1979), such as monthly progress reports and memos. These data provided detailed accounts of interactions among managers as well as their interests and complemented the information obtained from meeting minutes. Project phone directories also proved useful in identifying the key organizations working on site.

Emails and Phone Calls. Emails and phone calls provided data complementing the meeting minutes and project reports. Such a triangulation of data sources was critical to address information discrepancies (Jick 1979). In the Dale Lane project (Case #1), for instance, because the Secured by Design (SbD) certification was recorded as "back and forths" among the parties, we

Table 1. Overview of the Cases and Data

1. Case background	2. Building project	3. Data sources	4. Interorganizational network
	Dale Lane Road (Case #1)		
The site is in a residential area that has a mix of late 1980s and 1990s newly built houses together with a range of semis and terraced properties from the early 1900s. There is mixed tenure housing ranging from local authority housing stock, privately rented dwellings, and owner-occupied properties.	*Project specifications*: 6 × 3 bedroom 5-person houses, 3 × 2 bedroom 3-person apartments, 3 × 3 bedroom 5-person houses, 3 × 2 bedroom 3-person apartments, 3 × 1 bedroom 2-person apartments *Building Cost*: £1,449,363 *Design–build life cycle*: April 2008–May 2009 (14 months)	*Diverse archival data*: Meeting agenda, site meeting notes, cash flow map, project team directory, board paper, and construction contract *Meeting minutes*: 12 *Emails and phone calls*: 8	*Longitudinal data*: 12 observation points *Missing data*: Jun ’08, Aug ’08 *Size*: 40 organizations
	Fulmar Road (Case #2)		
A former Air Cadet Force base, which was purchased by the main contractor for an affordable housing development in 2008. Because of claw-back provisions for any uplift in site value, it was deemed only suitable for affordable housing delivery.	*Project specifications*: 2 × 4-bed 6-person houses, 6 × 3-bed 5-person houses, 14 × 2-bed 4-person houses *Building Cost*: £2,263,532 *Design–build life cycle*: June 2009–February 2011 (28 months)	*Diverse archival data*: Meeting agenda, cash flow map, project team directory, board paper, construction contract, and environmental sustainability certificates *Meeting minutes*: 18 *Emails and phone calls*: 6	*Longitudinal data*: 18 observation points *Missing data*: Sep ’09, Oct ’09 *Size*: 55 organizations
	North Wingfield (Case #3)		
North Wingfield is a large former colliery village in the county of Derbyshire, situated southeast of Chesterfield and northeast of Clay Cross. This was a two-plot development. This first site, a former residential site, is located in a residential area.	*Project specifications*: 30 × 2 bed 3-person bungalows, 100% parking provision, two bungalows with carports *Building Cost*: £3,087,711 *Design–build life cycle*: January 2008–December 2009 (24 months)	*Diverse archival data*: Meeting agenda, cash flow map, project team directory, board paper, construction contract, and planning approval document *Meeting minutes*: 19 *Emails and phone calls*: 5	*Longitudinal data*: 19 observation points *Missing data*: Apr ’08, May ’08, Jul ’08, Oct ’08 *Size*: 58 organizations
	Rowlett Road (Case #4)		
The site is in an established residential area of public woodland adjoining a local school. Served by regular bus service, the site is within walking distance of local amenities, including a post office, small precinct of shops, and churches. The Local Council team was closely involved in establishing the scheme mix, which reflects a demand for affordable housing.	*Project specifications*: 2 × 2-bed 3-person apartments, 2 × 2-bed 4-person houses, 1 × 3-bed 5-person house, 4 × 4-bed 6-person houses, 4 × 2-bed 3-person apartments, 1 × 2-bed 4-person house, 1 × 3-bed 5-person house, 3 × 4-bed 6-person houses, 2 × 2-bed 3-person apartment, 1 × 3-bed 5-person house, 6 × 4-bed 6-person houses *Building Cost*: £2,780,000 *Design–build life cycle*: August 2008–August 2009 (14 months)	*Diverse archival data*: Meeting agenda, cash flow map, project team directory, board paper, and construction contract *Meeting minutes*: 8 *Emails and phone calls*: 2	*Longitudinal data*: 8 observation points *Missing data*: Aug ’08, Nov ’08, Dec ’08 *Size*: 23 organizations
	Blyth Court (Case #5)		
Blyth Court was a 3-story complex containing 35 dwellings; the tenants were mostly older persons. Refurbishment works were requested to include the conversation of the bedsits into larger accommodations and a consequent reduction.	*Project specifications*: 18 × 1-bed apartments 10 × 2-bed apartments *Building Cost*: £1,715,234 *Design-Build life cycle*: October 2008–September 2009 (12 months)	*Diverse archival data*: Meeting agenda, project team directory, board paper, and construction contract *Meeting minutes*: 12 *Emails*: 4	*Longitudinal data*: 12 observation points *Missing data*: None *Size*: 44 organizations

Table 1. (Continued)

1. Case background	2. Building project	3. Data sources	4. Interorganizational network
	Oakley Road (Case #6)		
The plot of land on Oakley Road was brought to the client by the Local Council. The Environment Agency (EA) objected the project twice because of a high risk of flooding. Final approval was granted after the client raised the building's ground floor levels. This project fills in the gap for social response for women fleeing domestic violence.	*Project specifications*: 6 self-contained apartments with communal facilities, and one staff sleepover facility 1 × 1 bed 2-person mobility apartments 2 × 2 bed 3-person apartments, 3 × 2 bed 4-person apartments *Building Cost*: £925,527 *Design-Build life cycle*: February 2008–April 2009 (8 months)	*Diverse archival data*: Meeting agenda, project team directory, board paper, construction contract, planning approvals, and contractor's reports *Meeting minutes*: 8 *Phone calls*: 3	*Longitudinal data*: 8 observation points *Missing data*: None *Size*: 24 organizations
	Washbrook Road (Case #7)		
The site is in a semi-rural location and is adjacent to a pleasant park. The site falls within an established residential area, with a small area of woodland to the immediate east of the site. The site was introduced to the client by a local building company.	*Project specifications*: 24 × 2-bed apartments *Building Cost*: £725,000 *Design-Build life cycle*: April 2009–January 2010 (10 months)	*Diverse archival data*: Meeting agenda, project team directory, board paper, construction contract, planning approvals, environmental sustainability certificates and contractor's reports *Meeting minutes*: 10 *Emails and phone calls*: none	*Longitudinal data*: 10 observation points *Missing data*: None *Size*: 36 organizations

contacted various informants to establish what actually occurred. Project participants may have had difficulties recalling specific episodes because they were working on various projects simultaneously. We minimized such potential biases by providing the context to our informants; for instance, we created both visual and verbal timelines of key events (Miles and Huberman 1984). Accuracy checks through triangulation improved the validity of the study (Jick 1979).

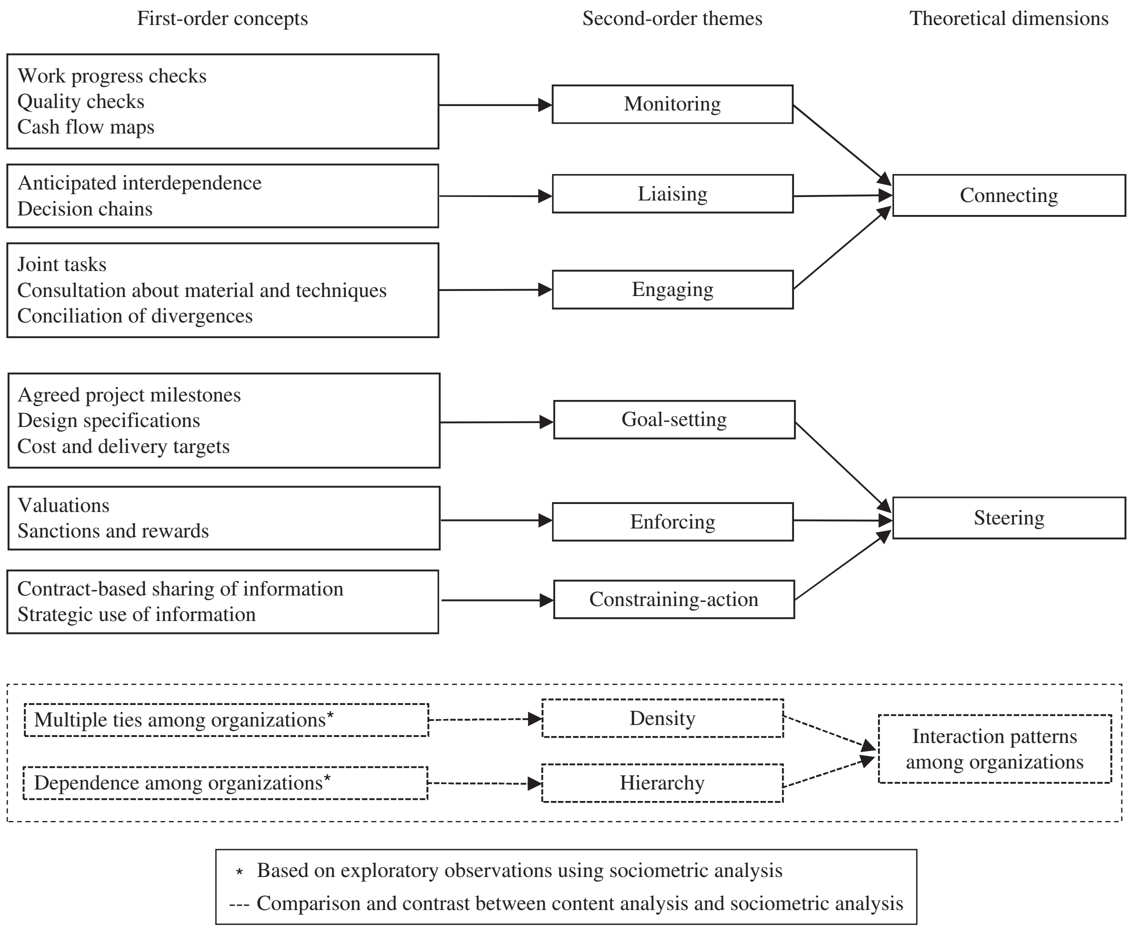
Data Analysis

We began our empirical analysis with the constructs of integrators, contracts, interorganizational project networks, and performance that we identified in our literature review. Consistent with the inductive methodology (Golden-Biddle and Locke 2007, Strauss and Corbin 1990), we observed the analytical opportunity to further understand the relationships between these constructs to address our research question. From this conceptual starting point, we compared and contrasted these initial constructs and the emerging codes and themes. Our data analysis largely aimed to thoroughly explore the linkages among these four concepts to develop theory on the coordination process in interorganizational networks.

Our data analysis procedures entailed both content analysis and socio-metric analysis. For the content analysis, we followed grounded theory (Strauss and Corbin 1990) in manually coding our data line by line. We began coding with the analysis of the use of integrators and contracts as primary coordination mechanisms. Our coding focused on how these two coordination mechanisms influenced coordination among organizations over time. Figure 1 presents the general data structure that we used to progressively develop these insights. In Online Appendix 1.A, we provide a detailed example of our content analysis procedure.

As for the sociometric analysis, we analyzed the meeting minutes following a coding scheme based on social network analysis (SNA) (Wasserman and Faust 1994). We manually extracted text segments of the recorded relationships among organizations (i.e., ties) with nouns representing organizations and relationships representing ties among organizations (Carley and Palmquist 1992). Ties referred to interactions between organizations within the project (Borgatti et al. 2013, Jones and Lichtenstein 2008). The project provided us with a clear criterion for the inclusion of organizations and thus allowed us to avoid the problem of boundary misspecification that frequently weakens sociometric analyses (Laumann et al. 1989). Online Appendix 1.B provides a detailed description of our analytical procedures. To check the reliability of our coding procedures, they were independently verified by two researchers unaware of our study objectives. The measure of inter-rater reliability showed high agreement between raters with Cohen's kappa (k) = 0.857 (confidence interval = (0.804; 0.910); *p-value* < 0.001; N = 2,600).

Figure 1. Model of Data Structure Across Cases



We used sociometric measures to systematically capture patterns of interaction between organizations while content analysis proved useful in capturing underlying processes and the context to the interaction between organizations. Online Appendix 1.C details our combination of content and sociometric analyses.

Performance of Interorganizational Project Networks

We characterized the extent to which organizations attained performance as a network-level outcome in each building project. We focused on capturing the multidimensionality of performance (to enhance construct validity) and suitability of our measure to our industry setting (to enhance face validity). Table 2 shows how we measured performance across several dimensions. We built on the "iron triangle" of measuring performance in the context of building projects (Atkinson 1999, p. 337): cost, quality, and time. First, we captured cost and time aspects under the dimension "on time and on budget." This dimension is the primary indicator of performance in the building industry. This dimension was relevant in our setting where the clients have limited resources and there are prespecified deadlines for incoming tenants to move in.

For quality, we used three dimensions. One dimension was building certifications, that is, the confirmation by an accredited body that the building met certain legal requirements. This dimension was particularly relevant because missing a building certification resulted in funding penalties to the client. Environmental sustainability standards were another dimension of quality. This type of certification refers to the extent to which the building met key characteristics of environmental sustainability (e.g., energy efficiency). Environmental sustainability is not only a funding requirement but also a key challenge for this industry (Herazo and Lizarralde 2015). Finally, we included building faults as an indicator about quality (Pinto and Prescott 1988). Building faults are particularly relevant for housing associations. For example, faulty roof insolation will increase buildings' maintenance costs. Overall, our measure of performance followed prior research—by focusing on cost, quality, and time (Atkinson 1999)—and was valid in our empirical setting—by observing industry practices and specificities.[4]

Next, we developed an overall measure of performance that enabled cross-case comparisons since these were an important feature of our theory development process (Eisenhardt 1989). Table 2 shows the levels of performance across cases. We found that three projects exhibited high performance (Cases #4, #6, and #7), two projects exhibited low performance (Cases #1 and #3), and the two remaining projects displayed medium performance (Cases #2 and #5). These cross-case differences in performance motivated us further to examine issues of coordination in interorganizational project networks.

Findings

Overview: A Process Model of Coordination Trajectories

We first introduce the three core elements of our proposed model of coordination in interorganizational project networks: coordination dynamics, phases, and coordination trajectories.

Coordination Dynamics. Whereas the use of integrators and contracts are a necessary backdrop for coordination, the term "coordination dynamics" refers to the relationships between the use of integrators and contracts and the evolution of interorganizational project networks. Following our data analysis, we identify the *integrators' connecting functions* and the *contracts' steering functions* as two drivers of coordination dynamics.

Integrators' connecting functions involve how the use of integrators influence the development of interorganizational project networks. In our industry context, integrators are project management consultancies appointed by the client to coordinate the project (Reve and Levitt 1984). As summarized by one project manager, integrators "manage the building project and information among all parties during the project." We progressively developed insights into how the use of integrators promoted coordination in projects through a content analysis of multiple project documents. (Our data structure is illustrated in Figure 1.) By focusing on integrators' actions, we specifically determined how integrators performed their monitoring, liaising, and engaging functions (Figure 2; upper area). Monitoring referred largely to integrators' actions intended to ensure other organizations' fulfillment of predefined obligations. For example, during the installation of a biomass system in North Wingfield (Case #3), the manager with the client's agent (i.e., an integrator organization) reiterated that "the completion is also determined by the works commencing to fit out the biomass house from October 22, 2009 [...], which need to be monitored by [manager with the client's agent and the environmental sustainability consultant]" (Meeting minutes #7, p. 4). This quotation illustrates the integrator's (in this instance, the client's agent) focus on monitoring specific works to ensure that the project completion date is met. Another key connecting function of integrators was liaising with other organizations to reconcile divergences that, if unresolved, could prevent work progress. Finally, our data suggested engaging as a connecting function of integrators. Engaging involved bringing organizations together in agreed-upon solutions and making individual organizations commit to a course of action. Online Appendix 2 provides additional representative evidence in support of these mechanisms.

Furthermore, the use of integrators appears to have aided coordination by creating multiple ties among organizations. We gained this insight by combining qualitative observations with a quantitative analysis of the relationships among organizations using UCINET 6 (Borgatti et al. 2002). Specifically, we adopted a density measure because it captured the number of observed ties out of all possible network ties (Wasserman and Faust 1994). To ensure clarity and, more importantly, to make unbiased comparisons across months (i.e., our observation points), we decided to use z scores as standardized values (i.e., a value x subtracted from the average of x, divided by the standard deviation of x) to capture variation in density throughout the project. Positive z scores indicate above-average variations whereas negative z scores suggest below-average variations as measured in standard deviation units. (Table 3 presents a detailed example of how we computed the z scores.) We provide a detailed discussion of these measures and their implications as follows.

Contracts' steering functions capture how the use of contracts influenced the development of interorganizational project networks. Contracts are written agreements between organizations (Eccles 1981, Reuer and Ariño 2007). Our data analysis enabled us to identify the following supporting functions of contracts: setting goals, enforcing, and constraining action. We refer to this set of functions as contracts' steering functions. (Our data structure is illustrated in Figure 1.) Goal setting primarily entailed specifying design features, materials, and the completion of work within timescales. For example, a key goal for the client of Rowlett Road was that "the scheme will achieve an Eco-Homes rating of Very Good, as required on all 2006–08 schemes" (Project Brief, p. 6). The record also indicated "the original brief from [the Local Council] asked for a distinctive modern design with a significant street presence" (Meeting minutes #3, p. 5). The goals of both an Eco-Homes rating and a "distinctive modern design" were written into the contract between the client and the main contractor. Enforcing involved organizational actions based on formalized terms

Table 2. Performance of Interorganizational Project Networks

Case study	On time and on budget (1)		Building certifications (2)	Environmental sustainability standard (3)	Building faults (4)	Illustrative quotes	Level of performance
	Time overrun	Budget overrun					
Dale Lane Road (Case #1)	3 weeks	On budget (costs supported by the main contractor)	Building Control, Considerate Contractor, Gas and Electric Test Certificates Failure to achieve a key project goal: SbD certification	Level 3 of the CSH	Grass areas and "spotting" on the walls and ceilings were raised as severe concerns by the client.	*"Unfortunately with this site, the developer failed to apply for the Secured by Design Award until after the building was almost complete, the roof was on at the time of my first visit request."*	Low
Fulmar Road (Case #2)	3 weeks	Over budget (£17,000)	SbD, Building Control, Energy Performance Certs, Considerate Contractor, Gas and Electric Test Certificates	Level 3 of the CSH	Access to roof and windows, gutter maintenance, cleaning of windows, maintenance and assistance of gas boiler, rainwater harvesting, and access to manhole. There were also design mis-specifications and poor compliance with planning permission	*"Extension of time associated with the delay due to the additional gas monitoring works.* (Main contractor) *to issue costs for overrun to* (clients" agent) *for review"* *"Previously 13 tanks had been recommended. This was an error as a result of incorrect Engineer calculations."*	Medium
North Wingfield (Case #3)	2 weeks	Over budget (£155,000)	Building Control, SbD, Considerate Contractor, Gas and Electric Test Certificates	Level 4 of the CSH	Energy supply costs and maintenance, toilet flush rate, heating costs, operability of doors, right of way, costs of the biomass system for the tenants	*"*(Main contractor) *issued project programme indicating current progress and a completion date of* 21*st September* 2009*."*	Low
Rowlett Road (Case #4)	On time	On budget	Building Control, SbD, Gas and Electric Test Certificates	BRE Eco-Homes rating "Very Good"	Roof durability (and maintenance), maintenance of amenity areas, landscaped areas, and access to the communal areas of the apartments by staff members	*"*(Client's agent) *have confirmed that a tender not exceeding £2,780,000 will represent value for money in the current tendering market…"*	High

Table 2. (Continued)

Case study	On time and on budget (1)		Building certifications (2)	Environmental sustainability standard (3)	Building faults (4)	Illustrative quotes	Level of performance
	Time overrun	Budget overrun					
Blyth Court (Case #5)	2 weeks	On budget	SbD Building Control, Considerate Contractor, Gas and Electric Certificates	Ecohomes Pass	Maintenance and water supply, shower bases and pumped wastes, maintenance of the boiler on the second floor, cistern flush, glazing of external windows, water-saving taps, site safety, and external lighting.	*"After the last site meeting the site inspection showed that the proposed light fitting in the shared ownership kitchens did not meet the requirements of the Code (CfSH—Code of Sustainability Homes)."*	Medium
Oakley Road (Case #6)	On time	Over budget (£13,000)	SbD, Building Control, Considerate Contractor, Gas and Electric Certificates	Ecohomes Pass	No particular concerns reported	*"The project is currently 10 days behind programme." (Yet, the project was completed on time because the main contractor intensified collaboration with several suppliers and integrated work shifts on-site)*	High
Washbrook Road (Case #7)	On time	On budget	Gas and Electric, EPC's, Considerate Contractor, Building Control, SbD Certificates	Level 3 of the CSH	Casement and windows, walls in the bin store area, floor areas (e.g., vinyl and carpets)	*"The project was currently 3 weeks ahead of programme taking into account good internal progress and the roofing and external walling not being on the critical path."*	High

Table 3. Monthly Analysis of Interorganizational Project Networks (Standardized Values, *z* Scores)

		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	Performance
Rowlett Road (Case #4)	Density	0.258	−0.764	−0.571	−1.035	1.848	−0.239	−0.571	1.074												High
	Hierarchy	−0.950	0.885	−0.163	0.885	−1.213	0.885	0.885	−1.213												
		Density/ Hierarchy 50%(*)				Hierarchy 80%			Density 100%												
Oakley Road (Case #6)	Density	−0.502	0.017	1.152	−0.85	−0.326	−1.043	−0.296	1.848												High
	Hierarchy	0.775	0.260	−1.212	0.641	1.248	−0.042	0.03	−1.70												
			Density 66.7%			Hierarchy 100%			Density 100%												
Washbrook Road (Case #7)	Density	−0.002	1.732	−0.443	−1.327	−1.349	−0.692	−0.339	1.070	0.806	0.543										High
	Hierarchy	−0.124	0.203	0.332	1.368	1.098	−0.599	0.986	−0.574	−1.932	−0.759										
		Density 100%				Hierarchy 100%				Density 100%											
Fulmar Road (Case #2)	Density	−1.236	−0.576	−0.187	0.564	−0.050	0.013	−0.546	2.401	−0.385	−0.298	−0.708	−0.990	0.871	−0.616	−0.071	−0.071	−0.294	2.380		Medium
	Hierarchy	1.337	0.112	0.024	1.203	−0.116	−0.569	1.272	−0.986	−0.780	−2.015	−0.299	−0.353	−1.501	0.996	1.028	1.143	−0.028	−0.470		
			Hierarchy 100%							Density/Hierarchy 50%(*)							Hierarchy 75%				
Blyth Court (Case #5)	Density	−0.578	−0.636	−0.552	−0.356	−0.415	−0.802	−0.688	−0.106	2.455	1.309	−0.415	0.785								Medium
	Hierarchy	0.340	−0.142	−0.205	0.120	1.168	1.225	0.378	0.468	−1.547	−2.17	0.635	−0.27								
			Hierarchy 100%				Hierarchy 100%				Density 75%										
Dale Lane (Case #1)	Density	−0.222	0.227	−0.315	−0.214	−0.137	−0.672	0.469	−1.501	−0.415	−0.267	0.321	2.725								Low
	Hierarchy	0.848	−0.334	−0.334	−0.994	0.138	0.769	−0.334	1.447	1.447	−0.234	−0.434	−1.985								
		Hierarchy/ Density 50%(*)				Density 60%					Hierarchy 60%										
North Wingfield (Case #3)	Density	0.558	−0.771	1.148	−1.06	−1.06	1.94	0.52	−0.72	0.71	−0.738	−0.154	−0.137	0.189	−0.341	1.213	−0.415	−0.423	−0.876	0.032	Low
	Hierarchy	0.201	0.323	−0.046	0.361	0.179	−2.450	−0.547	1.122	−0.679	0.008	0.354	−0.184	0.135	0.595	0.112	1.213	0.562	−0.867	0.640	
				Hierarchy 60%							Density 60%							Hierarchy 100%			

Phase I—Mobilization (start on site) | Phase II—Turn in coordination dynamics (structure and partitions) | Phase III—Delivery push (fittings and handover)

Notes. This table illustrates our process of data analysis. First, informed by qualitative analysis, we computed density and hierarchy scores using routines implemented in UCINET 6. We then computed the average and standard deviation of these two sociometric measures for each case study. For example, in Blyth Court (Case #5), the average density was 0.310 with a standard deviation of 0.199. The average and the standard deviation were used to compute the standardized *z scores* reported in the table. The *z scores* were computed as follows: month 1 = (density of month 1 − average for this case)/standard deviation for Blyth Court (Case #5) = 0.195 − 0.310/0.199 = −0.578, the value reported in the table (variation below average by 0.578 "standard deviations"). *Z scores* are positive for values above the average and negative for values below the average. We followed the same procedure for hierarchy. Second, our sociometric analyses helped us to move from monthly analysis to phase-by-phase analysis. Phase I in Blyth Court (Case #5) was characterized by the prevalence of hierarchy 100%. This is a ratio of the count of the most salient interorganizational network characteristic (i.e., density and hierarchy) and the total number of months in the phase. For Blyth Court's (Case #5) Phase I, this ratio is given by 3/3 = 100%. Finally, the phase-by-phase information was used to move toward more robust explanations about the patterns of coordination across the seven cases.

(*)Because hierarchy and density were equally salient, we defined the prevalent characteristic of the interorganizational network as follows. First, we looked at the highest variation. For example, for Dale Lane, the first month experienced a sharp increase in hierarchy (0.848). In Fulmar Road (Case #2), Phase II, we followed the same approach in which density had the highest positive variation, 2.401, in month 8. Second, we also considered the qualitative analysis to support our choice. For instance, our qualitative analysis supported the critical role of integrators leading us to report "Density" as prevalent in Rowlett Road's (Case #4) Phase I.

aimed at achieving agreed-upon targets. The EcoHomes rating is an example of enforcing. Finally, constraining action encompassed organizations' "degrees of freedom" given the enforceable aspects of contracts. Online Appendix 2 provides additional raw data on contracts' steering functions.

Our qualitative study of coordination between the organizations in each project indicates that contracts between organizations influenced how they developed ties over time. Further analysis of the seven building projects showed that a strong importance of contracts' steering functions, in contrast to integrators' connecting functions, led to patterns of relationships that resemble formal authority between organizations (i.e., hierarchy). Consistent with this insight, we supported our qualitative analyses with the sociometric measure of hierarchy because it captures the extent to which relationships are ordered and reciprocated (Krackhardt 1994). This measure is comparable to the measure of centralization of interorganizational networks used in prior research (e.g., Provan and Milward 1995).[5] Table 3 presents our longitudinal analysis of hierarchy. For density, positive *z* scores indicate above-average variations whereas negative *z* scores suggest below-average variations as measured in standard deviation units.

Phases. Each project phase presents distinct coordination needs. We examined three phases of a project: Phase I—Mobilization (start on site); Phase II—Turn

Table 4. Prevalence of Connecting and Steering

		Phase I—Mobilization (Start on site)	Phase II—Turn in coordination dynamics (Structure and partitions)	Phase III—Delivery push (Fittings and handover)
Dale Lane Road (Case #1)	Connecting	12 (10.7%)	**24 (21.4%)**	15 (13.4%)
	Steering	**24 (21.4%)**	14 (12.5%)	**23 (20.5%)**
		Chi-Square = 7.483 (*df* = 2); *p-value* < 0.05		
Fulmar Road (Case #2)	Connecting	16 (6.2%)	**75 (29.1%)**	18 (7.0%)
	Steering	**38 (14.7%)**	71 (27.5%)	**40 (15.5%)**
		Chi-Square = 11.492 (*df* = 2); *p-value* < 0.05		
North Wingfield (Case #3)	Connecting	15 (7.4%)	**69 (34.2%)**	10 (5.0%)
	Steering	**29 (914.4%)**	55 (27.2%)	**24 (11.9%)**
		Chi-Square = 10.882 (*df* = 2); *p-value* < 0.05		
Rowlett Road (Case #4)	Connecting	12 (23.1%)	9 (17.3%)	**6 (11.5%)**
	Steering	**5 (9.6%)**	**17 (32.7%)**	3 (5.8%)
		Chi-Square = 6.276 (*df* = 2); *p-value* < 0.05		
Blyth Court (Case #5)	Connecting	20 (10.8%)	40 (21.6%)	**26 (14.1%)**
	Steering	**43 (23.2%)**	**46 (24.9%)**	10 (5.4%)
		Chi-Square = 15.088 (*df* = 2); *p-value* < 0.05		
Oakley Road (Case #6)	Connecting	**33 (37.1%)**	11 (12.4%)	**6 (6.7%)**
	Steering	16 (18.0%)	**20 (22.5%)**	3 (3.4%)
		Chi-Square = 8.278 (*df* = 2); *p-value* < 0.05		
Washbrook Road (Case #7)	Connecting	**17 (18.7%)**	14 (15.4%)	**11 (12.1%)**
	Steering	14 (15.4%)	**31 (34.1%)**	4 (4.4%)
		Chi-Square = 9.497 (*df* = 2); *p-value* < 0.05		

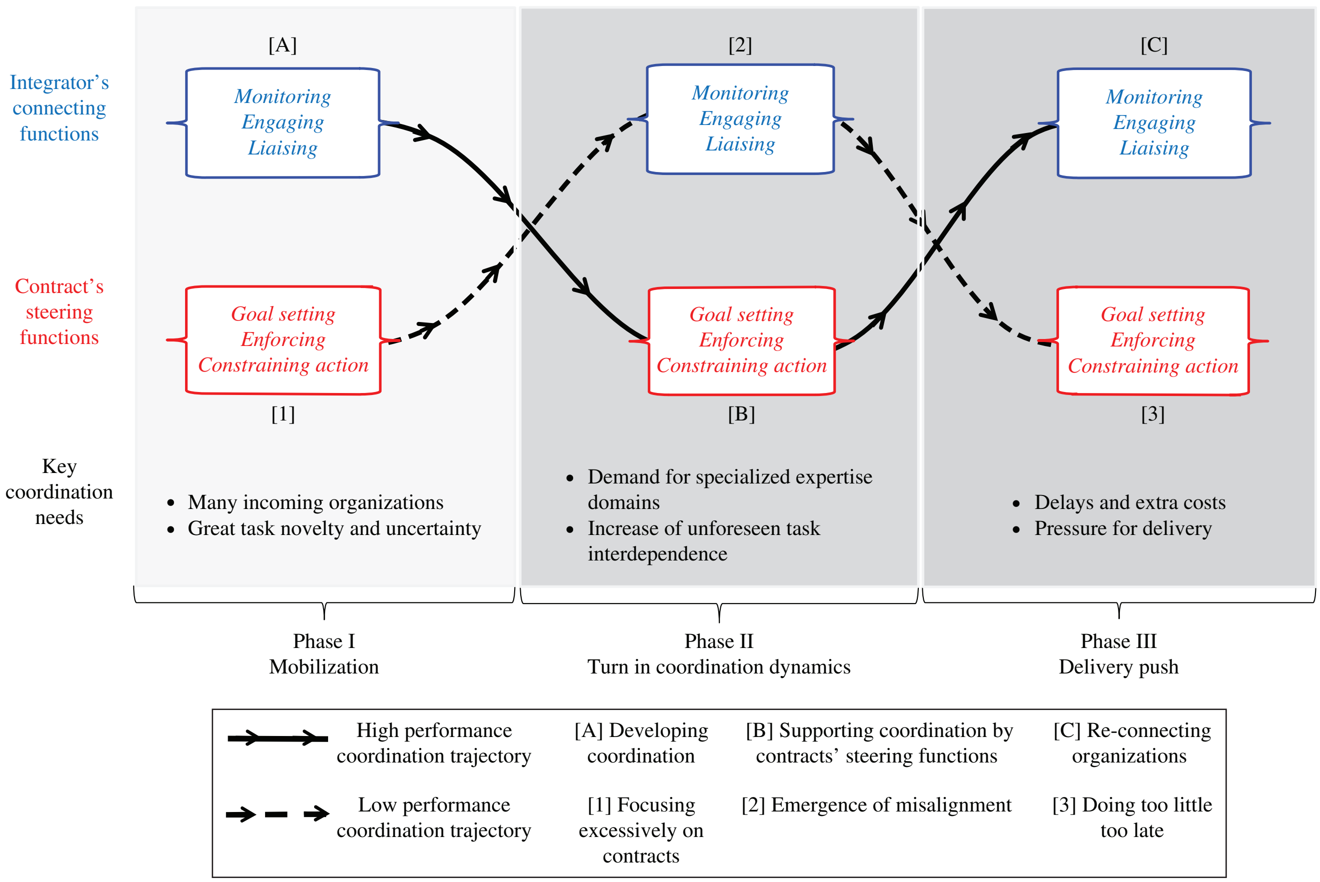
Notes. This analysis is based on the count of instances connecting and steering in the meeting minutes. Each supporting function was based on the data structure provided in Figure 1. The relative frequencies are more instructive than the absolute frequencies because the latter were influenced by the number of months in each phase. The text in bold notes the prevalent steering function. The percentages are computed in relation to the totals for each case. We have also checked whether the average use of steering and connecting functions varied between high-performance and low-performance cases. We found no differences for the average use of steering functions (t *value* = −1.466 (df = 3); *p-value* > 0.10) or the average use of connecting functions (t *value* = 1.466 (df = 3); *p-value* > 0.10). Because we coded each function as steering or connecting, the relative values add to 100%, which explain that the results of the t statistic are essentially the same but located on different sides of the normal distribution (which has a symmetric distribution). This check provides further assurance that differences in performance were related to the prevalence of supporting functions in each phase rather than the average use of these functions.

in coordination dynamics (structure and partitions); and Phase III—Delivery push (fittings and handover). These phases entail distinctive sets of works. First, we aimed to attain the face validity of phases by ensuring that these phases were recognized in the construction industry. We also ensured that these phases were consistent with each case's construction plan to which we had access.[6] Second, we ensured that the main mechanisms of each phase were also both internally consistent (within phase) and externally distinct (across phases). One of our main insights is that the complementary or substitutive nature of the interplay between the use of integrators and contracts varies substantially across project phases.

Coordination Trajectories.

We found that coordination trajectories develop based on the prevalence of either integrators' connecting functions or contracts' steering functions across the three phases. To be sure, our findings on coordination trajectories refer to whether integrators' connecting functions or contracts' steering functions are emphasized (that is, which one is relatively in the foreground and which is in the background); however, both types of functions are used simultaneously. There is one useful distinction between coordination trajectories and coordination dynamics: the latter refers to the linkage between core coordination mechanisms (i.e., the use of integrators and contracts) and the development of interorganizational project networks *in a specific phase* whereas the former refers to the arrangement of coordination dynamics *across the three phases* of the building project. By conceptualizing coordination trajectories, we became aware of the importance of the fit between the prevalence of contracts' steering functions or integrators' connecting functions and the specific coordination needs encountered by organizations in each phase. Our conceptualization of coordination trajectories is consistent with Strauss (1993, p. 53), who defines a trajectory as "a course of action, but [it] also embraces the interaction of multiple actors and contingencies that may be unanticipated and not entirely manageable." Accordingly, our notion of a

Figure 2. (Color online) Process Model of Coordination Trajectories in Interoganizational Project Networks



coordination trajectory is defined in relation to the prevalence of connecting or steering functions, the phase, and the pattern of ties throughout the project. Table 4 shows a count of the prevalence of connecting and steering functions across the three phases in the seven projects. In Dale Lane (Case #1), for example, the prevalent function at each phase is steering (Phase I), connecting (Phase II), and steering (Phase III).

Figure 2 depicts a process model of coordination trajectories in interorganizational project networks, and we focus on developing a parsimonious explanation. The solid and dashed lines are a stylized representation that highlights the prevalence of integrators' connecting functions or contracts' steering functions during the project. From our qualitative and sociometric analyses across the three phases, Figure 2 depicts two contrasting coordination trajectories based on the prevalence of connecting or steering. Next, we investigate these two contrasting coordination trajectories: "high performance" *versus* "low performance." This contrast between trajectories better reveals the mechanisms at work, thus giving further depth to our theory (Eisenhardt 1989).[7] We also use Figure 2 as a guiding structure to report our findings.

"High Performance" Coordination Trajectory

The high performance trajectory moved through three phases: developing coordination (Phase I), supporting coordination primarily with contracts' steering functions (Phase II), and reconnecting organizations (Phase III). We drew jointly on qualitative and sociometric analyses to examine why a specific coordination trajectory was found to attain high performance.

Phase I: Developing Coordination (Figure 2[A]). The context of Phase I was largely characterized by multiple incoming organizations and strong task novelty and interdependence. At the beginning of the building projects, not only were many contractors joining the muddy sites, but organizations were also facing great uncertainty. A key challenge for managers was to develop work relationships across organizations and familiarize themselves with the project drawings. Work arrangements had to be delineated and implemented.

The meeting minutes were written on a monthly basis, and they contained information regarding the specific dates of all events since the last meeting and the name of the parties performing specific actions. Considering highly effective cases, integrators' actions were prevalent in Phase I. To illustrate, we provide an example of the type of data we used to study the role of integrators in the unfolding of coordination:

> On the 14th of May 2009, the client's agent for Washbrook Road (Case #7) requested the pilling logs from the subcontractors on site; two days later these logs were received and commented by the client's agent.
> On the 18th of May, the client's agent emailed the cost breakdown to both the client and the main contractor. On the same day, the client's agent also emailed the timber supplier to liaise with the client and engineers regarding the timber specifications.
> On the 21st of May, the main contractor submitted the project report as per the "received on" stamp on the actual report. The client's agent had commented on it—over the weekend—and had sent his comments to other project members by the 25th of May.
> (Meeting minutes #2, pp. 1–13)

While prior research has focused on integrators as initiators of coordination (Gann et al. 2012, Styhre 2006), our findings provide insight into the specific functions performed by integrators, namely, monitoring, liaising, and engaging. Furthermore, integrators' connecting functions in Phase I directly influenced the pattern of ties among organizations. Sociometric analyses of the interorganizational project networks indicated the presence of multiple ties among organizations. These findings are reported in Table 3. These interorganizational project networks were dense (i.e., with multiple ties). More importantly, the emerging dense patterns of ties reportedly supported coordination. For instance, in the Oakley Road project (Case #6), the parties were quick to identify that the "carpets within units were excluded by agreement between the client and the main contractor. Stainless steel finish to white goods and pelmets/cornices in the kitchen units was also excluded, but a review will be carried out when kitchens are procured" (Meeting minutes #2, p. 5). As the meeting minutes showed, the integrators led the way for organizations to agree swiftly on the course of action. Comparing this information with our sociometric analysis for the same period, we found an above-average number of relationships (Table 3; month $2 = 0.017$; month $3 = 1.152$—the positive number suggests above-average variation, that is, particularly dense networks).

At first, it appears that coordination was enabled solely by integrators' connecting functions. However, a closer analysis showed that the integrators' supporting functions were complemented by contracts. The main role of integrators was supported by a minor emphasis on contracts to prevent localized interests between organizations. As in the example from Oakley Road (Case #6) shown here, the integrators' intervention was aided by the contract between the client and the main contractor. The integrators focused on liaising with other parties to communicate specifications (e.g., cornices), but contractual aspects appeared as a secondary aspect of coordination. In contrast to similar examples in the low-performance cases, the integrators' intervention was fundamental to work with the main contractor and relevant subcontractors in finding a solution instead of seeking to charge the client for omissions of materials from the contract.

Integrators also undertook regular "competency checks" of current and potential suppliers (e.g., Oakley Road; Meeting minutes #2, p. 6). These checks were conducted not only to evaluate the organizations' technical capacity but also to assess how well organizations would work together. Given these key concerns, the integrators were actively establishing working procedures to ensure that organization-specific differences would not pose an obstacle for task coordination (Van de Ven and Gordon 1984). For instance, the client's agent and the client (i.e., integrators) defined procedures for submitting project reports by the main contractor. The integrators required that all drawing files were in, or were compatible with, AutoCAD software (Washbrook Case; Meeting Minutes #1, p. 3). Coordination was largely based on the integrators' connecting functions, which enhanced information exchange. Again, the integrators' functions were complementary to the role of contracts. While contracts established the obligation to submit project reports, the integrators developed procedures to ensure that these submissions occurred smoothly. These types of actions had wider positive consequences, for example, for the adjustment of drawings. Table 5 synthesizes the positive consequences in Phase I.

Furthermore, the integrators' connecting functions contributed to developing common ground by engaging organizations in specific goals for the projects. Aware of the relevance of the specific coordination needs in Phase I, the integrators actively communicated key expectations to project organizations. For example, the project manager at Washbrook Road (Case #7) noted that "once we secured this project, we had a one-day workshop where we looked at the actual design and procurement of materials with our supply chain" (Interview, p. 2). This type of initiative minimized coordination problems. Although we found limited evidence of the development of "swift trust" as such (Meyerson et al. 1996, Atkinson et al. 2006), our data clearly indicated that the interplay between the use of integrators and contracts fostered good working relationships, which enabled adaptation and, to some extent, goodwill among organizations (Table 5).

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Table 5. Coordination Dynamics and Consequences of the Interplay Between the Use of Integrators and Contracts

	Phase I—Mobilization (Start on site)		Phase II—Turn in coordination dynamics (Structure and partitions)		Phase III—Delivery push (Fittings and handover)		
	Prevalent process	Consequences	Prevalent process	Consequences	Prevalent process	Consequences	Performance
Rowlett Road (Case #4)	Connecting largely drove the coordination dynamics due to the role integrators.	—Adaptability —Drawings met the target of "very good" certification	Steering was prevalent even if there were fluctuations over time.	—Delays of 5 weeks —Adaptability on site to new techniques and redesign	Connecting was prevalent wherein integrators intensified their actions.	—Recovery of 5 weeks of delays —Minor issues about the finishing	High
	Connecting	→	Steering	→	Connecting		
Oakley Road (Case #6)	Connecting was prevalent, referrals were used to appoint organizations.	—Adaptability to carry design changes —Goodwill among the parties	Steering was noted where the emphasis on contracts led to high hierarchy.	—Recovery of delays —Specification changes —Work rearrangements on site with subcontractors in order to recover delays	Connecting where integrators' action was targeted at task completion.	—Responsiveness —Agreement for minor extra works	High
	Connecting	→	Steering	→	Connecting		
Washbrook Road (Case #7)	Connecting was prevalent in the mobilization phase of this social housing project.	—Quality relationships among organizations —New layout solutions (e.g., parking spaces for disabled tenants)	Steering where an emphasis on the contracting blended in with relational aspects developed the previous phase.	—Redesign of work arrangements —Delays were recovered —Trust among parties	Connecting was sustained by integrators' monitoring and liaising responsibilities.	—Delays recovered (3 weeks ahead of program) —Trust among parties	High
	Connecting	→	Steering	→	Connecting		
Fulmar Road (Case #2)	Steering was the main driver of coordination dynamics since the start and throughput Phase I.	—Moderate dialogue among organizations —Operational issues	Connecting was observed following the emphasis of contracts in the start of the project.	—Failure to recover delays —Extra costs —Miscommunication	Steering was prevalent where organizations struggled to address arising challenges.	—Delays of 3 weeks —Over-budget —Several design misspecifications	Medium
	Steering	→	Connecting	→	Steering		

Table 5. (Continued)

	Phase I—Mobilization (Start on site)		PhaseII—Turn in coordination dynamics (Structure and partitions)		Phase III—Delivery push (Fittings and handover)		
	Prevalent process	Consequences	Prevalent process	Consequences	Prevalent process	Consequences	Performance
Blyth Court (Case #5)	Steering was prevalent. Initial ties occurred mostly between the main contractor and a pilling subcontractor.	—Prompt start on site, but delays with demolition works —Design misspecifications	Steering was sustained throughout Phase II. High hierarchy and the emphasis of contracting.	—Detailed discussion of specifications—after unexpected problems —Some misinformation about M&E services	Connecting was noted by higher density as integrators drove the coordination dynamics.	—Limited fluidity of information —Delay of 1-week recovered	Medium
	Steering →		Steering →		Connecting		
Dale Lane Road (Case #1)	Steering was central where integrators over-emphasized contracts.	—Unclear intent to collaborate —Design misspecifications	Connecting was prevalent, directed at ongoing challenges.	—Uncertainty (mystery) about the SbD certification —Slow information flow and responsiveness to requests	Steering was prevalent where integrators did not trigger density and contracts were breached.	—Failure to achieve SbD certification —Delayed handover	Low
	Steering →		Connecting →		Steering		
North Wingfield (Case #3)	Steering was prevalent and was noted by the emphasis on contracts.	—Specification of organizations to attend meetings —Delays on site	Connecting was prevalent where contracts were less emphasized.	—Misalignment among parties —Poor adaptability involving a biomass system	Steering was a key driver of coordination dynamics.	—Scaffolding issues —Slow information flow	Low
	Steering →		Connecting →		Steering		

Notes. The coordination trajectories identified in this table are the result of the analysis of key characteristics of the interorganizational network (Table 3) and the iterations with qualitative analysis about coordination among organizations. The "prevalent process" section is based on the relative values presented in Table 4. The combination of quantitative and qualitative analyses helped us to clarify the coordination trajectory in all seven building projects.

Phase II: Supporting Coordination Primarily by Contracts' Steering Functions (Figure 2[B]). The organizations began Phase II with the good working relationships developed in Phase I. For coordination needs, the main challenge in Phase II related to the entry of many new organizations with specialized expertise, such as plumbers, electricians, and roof specialists. These organizations had very specialized expertise, and their work was often limited to a few weeks. For example, the electricians completed their work at Washbrook in four weeks. While each subcontractor carried out small parts of the work, all the subcontractors had to be synchronized with the work progress on-site to prevent delays. The main challenge was to move from the coordination of a few organizations in Phase I to the coordination of many specialized and interdependent organizations to complete the task on time in Phase II.

Instead of finding a continued prevalence of integrators' actions, as prior research would predict (e.g., Gann et al. 2012), we found that coordination during Phase II benefited widely from contracts' steering functions. Integrators played a role but were less active in Phase II than in Phase I. We studied this change in the coordination trajectory. The use of contracts increasingly became the prevalent mechanism in all highly effective cases. During Phase II, organizations were distinctly drawing on contracts' steering functions. This result is depicted in Figure 2 (the curved solid line in the center). Contracts influenced how organizations sought to collaborate. A typical recurring example in the meeting minutes related to the relationship between integrators and subcontractors employed by the main contractor. Most of the subcontractors had a contract with the main contractor as confirmed by the project documentation and project participants. In the Oakley Road project (Case #6), the client queried about the CCTV (closed-circuit television) system that the main contractor was planning on installing. Following information from the main contractor, the client requested a design change. In contrast to the integrators' action working with the subcontractors as we observed in Phase I, the main contract directly informed the subcontractor. Further, the main contractor requested that "the revised CCTV and intruder alarm design were shown on the electrical sub-contractor's drawing and signed them off as approved" (Meeting minutes #5, p. 10). Later in the project, the main contractor confirmed to the client's agent and the client itself (i.e., integrators) that the changes had been made. Thus, contracts became the "blueprint" for coordination.

Following the prevalence of contracts' steering functions, our sociometric analyses also registered an increase in the hierarchy of interorganizational networks during Phase II for highly effective cases (Table 3). For instance, this insight was salient in the Oakley Road project (Case #6) during the period in which the CCTV episode occurred (Table 3; month 5 = 1.248). Another example is Washbrook Road (Case #7), where the greater emphasis on contracts also led to a highly hierarchical interorganizational project network. This finding is reported in Table 3 (month 3 = 1.368; month 4 = 1.098, where the positive numbers again show above-average variations). Although three weeks of delay were registered, one week was a result of inclement weather; otherwise, the organizations were making good progress in completing the work (Table 5). Coordination appeared to unfold smoothly under a highly hierarchical network.

This finding encouraged us to return to our data, largely because prior research has indicated that hierarchical networks can hamper coordination by concentrating information within a few organizations (e.g., Brass et al. 2004). We thus aimed to augment our understanding of why a greater hierarchy of interorganizational project networks appeared to support coordination in our study of building projects. Oakley Road (Case #6) provided an instructive example. In month 4, when asked by the client, "[the main contractor] confirmed that the landscaping queries from the local council were being addressed by architects" (Meeting minutes #4, p. 3). During the same period, in months 4 and 5, the network also became more hierarchical. This finding is reported in Table 3 (month 4 = 0.641; month 5 = 1.248). Meanwhile, the project documentation revealed a relatively limited use of integrators.

To better understand the prevalence of contracts' steering functions over integrators' connecting functions in Phase II, we must note that most contracts were for small "work packages." Notably, contracts were particularly advantageous because they encoded specific goals to be attained by every organization. In this regard, the project reports provided much contractual information in Phase II. For example, the "Contractor's report" for Washbrook Road (Case #7) on the July 17 outlines the different sections of work—ranging from scaffolding to roof tilling and kitchen work—all to be performed by different organizations. Each organization, such as the kitchen contractor, was provided with a breakdown of its tasks (e.g., ceiling finish and wall finish) and the days to complete those tasks (Contractor's report, p. 11). The main contractor would enforce the contracts while the integrators' intervention was limited to monitoring whether organizations were fulfilling their contractual obligations. Hence, the greater contractual clarity with regard to performance was linked to the relatively secondary role of integrators.

The following aphorism was shared among the managers: "If you have a good contract, things [i.e., relationships among organizations] will be fine" (Interviews). In fact, contracts did not necessarily cause coordination problems. In contrast to prior PBO research on contracts (see Winch 2014), the timing of using contracts during the projects emerged as an important aspect of the coordination trajectory, followed by highly effective cases. In other words, contracts were important, but to understand the sustainability of positive coordination dynamics, it was more critical to consider *when* contracts were used as the prevalent coordination mechanism during the projects (Table 5).

Phase III: Reconnecting Organizations (Figure 2[C]). Although subcontractors and machinery were leaving the site, many materials remained in the corridors, and cables were dropping from the ceilings. A key challenge was the recovery of lost time and the ability to rapidly problem solve among many organizations. Interestingly, high-performance cases were not distinct from other cases based on the lack of delays in the progress of work. Rather, high-performance cases differed in how organizations handled coordination in Phase III. While fewer specialist subcontractors were working on-site, recorded delays had to be quickly overcome. Another challenge was the need for information sharing across organizations. For example, material specifications and logs of the activities on-site had to be passed on to the local council. The completion of work was a necessary but not a sufficient condition for the client to start using the building.

We found that coordination was best achieved when integrators' connecting functions again became prevalent in Phase III. However, the reasons why the use of integrators and contracts worked in complementary ways differed from the reasons in Phase I. As a result of integrators' connecting functions, organizations developed multiple relationships throughout Phase III. For example, the Washbrook Road project (Case #7) had a dense interorganizational network during the last phase (month 8 = 1.070; month 9 = 0.806; month 10 = 0.543) as reported in Table 3. This insight further strengthened our findings that integrators' connecting functions fostered high density in interorganizational project networks. Such increased density allowed for information flow, which, in turn, greatly enhanced responsiveness to coordination needs. Although high density in networks enhanced coordination (e.g., Uzzi 1997), high density per se was insufficient. Rather, integrators' connecting functions were decisive in matching coordination dynamics with the specific coordination needs of Phase III, such as connecting organizations located on-site and off-site. Because much building work was yet to be completed in the last project phase, the integrators' connecting functions were important for aligning organizations to complete outstanding tasks (Table 5).

The ongoing work during Phase III and, more importantly, the recovery of delays (e.g., Case #4) also depended on coordination with off-site organizations. The integrators played a prevalent role by liaising with external organizations, such as a commodity supplier (e.g., electricity provider) and government departments with legal responsibilities for social housing. For instance, obtaining certification for the nearly built developments was a task that required reconnecting. Although certifications were contractual requirements and contracts were used to support coordination, a key part of coordination involved the active work of integrators engaging organizations in a set of tasks. On-site, the integrators continued to focus on project delivery. For instance, the client's agent (i.e., integrators) led the "snagging procedures"—an industry standard practice relating to the inspection of the building before it is signed off and handed over to the client. In the Oakley Road project (Case #6), the "[client's agent] agreed to co-ordinate back snagging with the Clerk of Works" (Meeting minutes #8, p. 2). Beyond simply conducting these procedures, integrators actively promoted collaboration among the parties to accelerate the entire process. The integrator (i.e., client's agent) indicated that "room area sign offs will be done jointly by the [the client's agent and Clerk of Works]. [The environmental sustainability consultancy] will liaise with both to agree on a date for client inspection" (Meeting minutes #8, pp. 2–3). This quotation illustrates how the integrators worked in the foreground to align other organizations toward agreed-upon deadlines.

Whereas past research has shown that organizations choose task completion over the safety and quality of the work when nearing project completion (Humphrey et al. 2004), we show that integrators played a primary role in ensuring both the speed of task completion and quality of work in the last project phase. Occasionally, integrators even seemed to prefer an informal approach to advance the work on-site. This approach was particularly observed with regard to remedial work. In the Rowlett Road project (Case #4), the client was satisfied with a verbal promise that the main contractor would improve the appearance of the "curling vinyl tiles in the flats after drying out for handover" (Meeting minutes #8, p. 5). When asked about his role in the last months of the project on Rowlett Road (Case #4), he essentially reinforced what is important: delivering the project, not adding more reasons to delay it. In fact, timely delivery was a key measure of performance in the context of the building projects we studied.

"Low Performance" Coordination Trajectory

Before we examine the low-performance coordination trajectory, it is worth reporting on our additional analysis of the antecedents of the emerging trajectories. Following the PBO literature (Engwall 2003, Manning and Sydow 2011), we considered whether prior relationships between organizations influenced the development of ties at the start of the projects. Surprisingly, we found that prior relationships played a marginal role in the appointment of the main contractor. For all projects, the appointment of the main contractors was based on the lowest lump sum. A client's internal brief from Rowlett Road (Case #4), a highly effective case, exemplified that "a number of contractors were initially approached to test their keenness to tender and provide the necessary input. The [main contractor], part of [name omitted] group of companies, submitted a price in line with our budget, and we are working to finalize their appointment" (Board Paper, p. 6). For cases with low performance, the "programme delivery officer" at Dale Lane (Case #1) wrote that "[the client] agreed to appoint [the main contractor]. Their offer met our budget target. The [main] contractor will be signing a contract, which will include all costs of construction to limit the group's exposure to build costs increases" (Board Paper, p. 2). We concluded that prior relationships had little, if any, bearing on the coordination trajectories. We also considered the project specifications as a potential influence on the choice of coordination mechanisms in Phase I. However, the project specifications are similar across all seven cases as we document in Table 2. In all projects—with both high and low performance—no clear systematic antecedent appeared to drive the initial conditions in Phase I. This finding further motivated us to explore the development of the coordination trajectory in low-performance cases.

In the following sections, we examine each phase with regard to the prevalent coordination mechanism to better understand the interplay between the use of integrators and contracts. The low performance coordination trajectory was characterized by an excessive focus on contracts (Phase I), followed by the emergence of misalignment (Phase II), resulting in doing "too late and too little" (Phase III). This coordination trajectory was consistently observed for both projects with low performance (i.e., Cases #1 and #3).

Phase I: Focusing Excessively on Contracts (Figure 2[1]). The initial challenges of Phase I in less effective projects were remarkably similar to the other projects. Many incoming organizations faced high uncertainty and great task interdependence. However, based on the analysis of the project documents for the first months of the low-performance projects, we learned that organizations were facing additional coordination challenges in regards to the development of high-quality working relationships. This finding was consistently observed for Dale Lane (Case #1) and North Wingfield (Case #3). Findings from these two cases suggest that dysfunctional coordination dynamics did not result solely from the contracts between project organizations (e.g., Winch 2014). Dysfunctional dynamics were deeply related to how organizations sought to develop relationships based on a strong emphasis on contracts from the start of the project.

In cases of low performance, the start of the projects was characterized by the prevalence of contracts. As an illustration, we present two ordinary episodes from a case of low performance:

> In North Wingfield (Case #3), an issue identified in the site layouts was "the easement of 10 meters from the back edge of the path into the site, which affected plots 8–13 on the Wayside Close development." It was agreed that "[the client] will progress in both matters with the solicitors so that they can resolve this issue" (Meeting minutes #2, p. 5).
>
> In addition, a section about "LEGALS" was added to the meeting minutes. As we read this section, much of the information was about contractual aspects. For example, the client's agent "requested that Collateral Warranties will be required in the format set by the client from architects, structural engineer, beam and block suppliers, truss manufacturers and the designers of the Biomass system" (Meeting minutes #3, pp. 4–5). It was further stressed that these were contractual requirements and that no subcontractor would be able to start on site before their collateral warranties are submitted and confirmed by the client.

Interestingly, the need to adjust the work and submission of collateral warranties also occurred in other projects. In fact, these are standard events in projects. It is precisely because of the ordinary nature of this type of event that the contract emphasis is notable. In contrast to highly effective projects, cases with low performance featured contracts as the prevalent coordination mechanism during Phase I.

The strong focus on contracts during Phase I affected how organizations sought to develop ties. The prevalence of the contracts' steering functions promoted highly hierarchical interorganizational project networks. This finding is reported in Table 3. For instance, North Wingfield (Case #3) began with a highly hierarchical interorganizational project network (Table 3; month 1 = 0.201; month 2 = 0.323). In fact, with the exception of month 3, the interorganizational project network for the remainder of Phase I exhibited a strong hierarchy (Table 3; month 4 = 0.361; month 5 = 0.179). This increase in hierarchy occurred when contracts were being emphasized. Although researchers have argued that an emphasis on contracts early on undermines the quality of relationships (e.g., Zaghloul and Hartman 2003), we found instead that the hampering role of contracts occurred first through the promotion of hierarchical networks.

In turn, great hierarchy among organizations hinders information sharing with incoming organizations although information was particularly important to overcome the high uncertainty typical of Phase I. When a borehole was found on site in North Wingfield (Case #3) during the excavation work, the main contractor promptly enquired with the client about possible delays and extra costs not included in the contract (Meeting minutes #2). The main contractor's manager was also concerned about the limited amount of information about progress regarding the borehole found on site. This manager was uncertain whether anyone was actually addressing this issue, and the information from the client was "scattered" (Meeting minutes #2 and #3).

The role of contracts' steering functions as the prevalent coordination mechanisms disrupted synergy development between organizations. For example, organizations became more cautious in handling design mis-specifications. Contracts also brought much rigidity to the relationships between parties and the ways in which organizations sought to develop coordinated action. The main contractor and the client for Dale Lane (Case #1) had an ongoing dispute about who was liable for the submission fees of the Code for Sustainable Homes application. When the client's agent (i.e., integrator) intervened, the main contractor simply acknowledged that he knew this issue. Managers across organizations began to scrutinize the contracts in an unusual level of detail.

Furthermore, the prevalence of contracts' steering functions hindered the work of integrators as negative coordination dynamics emerged. This substitutive relationship between the use of contracts and integrators is illustrated by Dale Lane (Case #1), where the integrators' recurrent checks of the work performed by the main contractor, especially work related to building certifications, were not helping the relationship between these organizations (Meeting minutes #2 and #3). In other instances, the meeting minutes recorded that the integrators actually opted to instruct the main contractor by letter. A key negative consequence of emphasizing contracts early in the building projects was that organizations overemphasized their individual objectives over the common goals established for the project. This overemphasis was problematic given the coordination needs in Phase I, where much work was yet to be performed. In sum, our findings corroborate Macaulay's suggestion (1963, p. 61) that "if something comes up, you get the other man on the telephone and deal with the problem. You don't read legalistic contract clauses at each other." This claim is consistent with what we observed in our study.

Phase II: Emergence of Misalignment (Figure 2[2]). The challenges faced in Phase II were related to the integration of tasks across a wide range of small subcontractors. While this challenge was common across all seven projects, we found that addressing this challenge was particularly cumbersome in low-performance cases. These cases also faced low-quality relationships transitioning from Phase I to Phase II. Therefore, in addition to task-related challenges, low performance cases faced relational-based challenges. Under relational-based challenges, the overall challenge for Phase II was to understand the project progress that, in some cases, was several weeks late (e.g., North Winfield (Case #3)).

By drawing primarily on contracts' steering functions (during Phase I) followed by integrators' connecting functions (during Phase II), the interorganizational project network failed to develop a "good team," according to an interviewee. In North Winfield (Case #3), the main contractor, the engineering firm, and the client's agent found themselves in a confusing situation when attempting to adjust the building specifications to the technical specifications of the biomass system. This example illustrates the difficulties faced by integrators. (Online Appendix 3 provides illustrations based on raw data.)

Integrators' connecting actions increased the number of ties among organizations as captured in the sociometric analysis (Table 3). Accordingly, Figure 2 shows the prevalence of integrators' connecting functions (the dashed line) in Phase II for our "low-performance" cases. In North Winfield (Case #3), for example, we found an increase in density sustained from month 6 (1.940) through month 9 (0.710) (except for month 8). However, the increase in recorded coordination problems was symptomatic of growing misalignment between organizations. At Dale Lane (Case #1), the main contractor was reportedly working against the overall project goal. Following a visit on-site, the integrator reported doubts that the laminated glazing was applied or the specifications of the windows were correct. The drawings being used by the main contractor were indeed those submitted when the contract was signed with the client. However, the main contractor failed to integrate updates—based on a site meeting—and to pass these on to the window supplier. This example reinforces the limited impact of the integrators' actions even if ties were developed in Phase II. Furthermore, organizations in the project became overly reliant on the integrators' functions. The meeting minutes frequently reported disruptions caused by organizations waiting for integrators' instructions as opposed to proactively coordinating. Delayed information to the local council about the materials and subcontractors were among the most frequently observed instances in our data.

As Table 5 summarizes, negative consequences ranged from slow responsiveness to miscommunication. Indeed, the integrators' connecting functions had a limited effect on coordination. This insight is illustrated by North Wingfield (Case #3), where the client's agent (i.e., integrator) developed multiple relationships among organizations as noted by the higher density (e.g., from month 6 through month 9; Table 3), but miscommunication along with poor adaptability among organizations was still ongoing. In Phase II, the integrators had limited impact. Despite the use of contracts, the integrators often lacked influence to promote coordination. We then attempted to further understand why the integrators' action did not succeed in bringing organizations back on track. Many demands for technical expertise appeared to be outside of the integrators' competency despite their extensive experience in managing building projects. The integrators struggled to manage coordination as many specialist organizations were conducting numerous interdependent tasks simultaneously. As a senior project manager noted, "we bypass the consultants, and we go to the installers. This option has got its problems, but we find that consultants were often helpless because they lacked technical expertise" (Interviews, p. 3). In contrast to prior research (e.g., Gann et al. 2012, Hobday 2000), our findings indicate that coordination by integrators might be greatly hindered by their shortcomings in expertise about specific technical elements in the project rather than expertise in managing projects. This was particularly observed regarding the installation of the biomass system at North Wingfield (Case #3). Perhaps more importantly, the main contractors resisted the integrators. The meeting minutes for Dale Lane suggest that the main contractor occasionally dismissed concerns raised by integrators (e.g., Meeting minutes #5). When we asked why control of some building projects was lost midway through the project, a senior project manager promptly noted that "a lot of the problem is that the project manager [i.e., the integrator] can easily overstep his mark in the project rather than just managing [the project]" (Interview, p. 7). Alongside the bureaucratization of integrators' functions (Styhre 2006), we found that the lack of confidence in the integrators may represent a major drawback for coordination.

Phase III: Doing Too Little Too Late (Figure 2[3]). During Phase III, the reporting of delays and extra costs put additional pressure on the relationships between organizations. Despite organizations' attempts, according to a client, these efforts seemed "too little, too late" to recover delays and extra costs. The main challenge was to minimize the impact of delays (e.g., by avoiding losses of government funding for the client). The ongoing dysfunctional dynamics in these projects were particularly problematic because the transition to Phase III was made more difficult. Organizations needed to ensure information flow, but this was being prevented by dysfunctional dynamics. Not only were works on-site being delayed, but so was the submission of relevant information to the local council.

The use of contracts, largely for enforcing purposes, again became the prevalent means of coordination of interorganizational project networks. At Dale Lane (Case #1), both the client's agent (i.e., integrator) and the main contractor fought over several aspects, from the window specifications to the quality of the coat of paint in the corridors. Table 3 shows the highly hierarchical interorganizational project network in North Wingfield (Case #3) between month 16 (1.213) and month 19 (0.640). Not surprisingly, this project was behind schedule when only two months remained before the agreed-upon deadline. This time frame coincided with Christmas, which caused further delay. At Dale Lane (Case #1), the last two months (month 11 = 0.321; month 12 = 2.725) witnessed an exceptional increase in the density of the interorganizational project networks as the integrators desperately sought project delivery. The local police denied SbD certification on the grounds of unsuitable window systems that were decided unilaterally by the main contractor.

In short, the low-performance coordination trajectory shows that contracts' steering functions weaken and substitute for integrators' actions when contracts are the prevalent coordination mechanism toward project completion. By foregrounding the use of contracts in Phase III, organizations focused their efforts on fulfilling contractual obligations rather than engaging with integrators' efforts to deliver the project goals. In North Wingfield (Case #3), the client's agent (i.e., integrator) repeatedly asked the main contractor to submit certifications and warranties from subcontractors (this instruction was restated three times), but the main contractor was much more focused on meeting its new deadline for completion after a two-week extension (Meeting minutes #17, p. 3). Notably, a delay in submitting the certifications and warranties prevented organizations from finalizing the project. At Dale Lane (Case #2), the surveillance of parking spaces needed to be changed because of integrators' efforts (i.e., the client's agent and the client) to obtain SbD certification, according to the contractual terms between the client and the main contractor. Despite the integrators' efforts recorded in the meeting minutes, the subcontractor charged with the surveillance of parking spaces had already left the construction site. As the contract between the client and the main contractor was emphasized, it contributed to the sustained negative dynamics between organizations. In fact, the main contractor refused to perform remedying work in the landscaping areas (Meeting minutes #11, p. 5). The project was completed under a tense atmosphere. A project manager explained it bluntly: "you feel like you just want [the project] to be over. You have other projects to get on with; the sooner you move out of this site, the better!" This quotation summarizes the tension that accumulated throughout the building projects with low performance.

Learning from "Medium Performance" Cases About Transition Between Phases

The cases of medium performance yielded additional insights into some of the processes identified in the two previous coordination trajectories. These cases were particularly instructive about the importance of supporting functions in the transition between phases. In this respect, the findings from the medium performance cases helped us sharpen the theory about cross-phase transitions. For this reason, we focus here on the transition from Phase I to Phase II and between Phase II and Phase III.

Transition from Phase I to Phase II. The two cases of medium performance reinforce the negative implications of the prevalence of contracts' steering functions in Phase I. The coordination challenges for the transition between these two phases were not limited to the increasing number of organizations. The dysfunctional dynamics between organizations associated with the prevalence of steering in Phase I also compromised the recovery of delays in Phase II as more subcontractors joined the project. In fact, a recurrent element in the meeting minutes was how the main contractor, for example, faced additional pressure to meet the milestones agreed upon at the start of the project while faced with the imperative to recover delays of the subcontractors (who might have already left the site).

Tables 3 and 4 show that in the two medium-performance cases, steering functions prevailed for most of Phase I. In Fulmar Road (Case #2), although reported delays forced the integrators to intervene, these delays resulted in an emphasis on contract-stipulated, time-based structures (e.g., schedules). A typical example in the meeting minutes recorded that "[the client agent] did reiterate that it was important that she receive a revised program indicating the earliest/worst case scenario about the completion of the fence" (Meeting minutes #2, p. 6). The formulation "did reiterate"—as opposed to simply "reiterate"—is noteworthy because that formulation aimed to stress the viewpoint of the client's agent.[8] In the two medium-performance cases, the prevalence of steering functions in Phase I became a liability to the transition to Phase II. This transition called for additional effort from the integrators.

Interestingly, these two cases followed different approaches to offset the negative impact of weak coordination dynamics between organizations. In Fulmar Road (Case #2), the transition between phases was headed by integrators with great emphasis placed on contractual aspects. The impact on coordination was modest with ongoing delays and poor coordination dynamics continuing into Phase II. Indeed, the main contractor blamed other subcontractors for the delays recorded on-site and further claimed that the contractual clauses (i.e., the contract between the client and the main contractor) were not enforceable as the cause of the delay was imputable to "external factors." The main contractor and the client entered into a major discussion about the contract, leading to an ongoing focus on contractual details in the subsequent months. In contrast, in Blyth Court (Case #5), the work of integrators focused on addressing specific problems instead of developing ties (thus, the density of the network remained low). To some extent, integrators at Blyth Court (Case #5) had to accelerate their intervention, which had not begun much earlier in the project (as in high-performance cases). Integrators managed to "patch up" the coordination trajectory by focused intervention and a weaker emphasis on contracts.[9] Integrators sought the opportunity to bring organizations on board and put past issues (Phase I) behind as the project was entering Phase II. The two leading integrators (i.e., the client and the client's agent) actively sought the main contractor's "assessment of alternatives" in terms of work arrangements to recover delays (Meeting minutes #3, p. 7). The main contractor provided several suggestions. While our data cannot provide decisive evidence why this approach was followed, this example shows that integrators seek repair strategies to patch up coordination trajectories.[10] This insight corroborates the broader finding that the development of ties among organizations early in the project largely operates as a precondition for the successful prevalence of the use of contracts in Phase II. Simply shifting to steering in Phase II did not enhance coordination as shown by the Fulmar Road (Case #2) case (see Table 5 for an overview of the consequences).

Transition from Phase II to Phase III. Blyth Court (Case #5) substantiates our observation that although dependence may develop across phases, organizations can still change the course of action. Nevertheless, Fulmar Road (Case #2) highlights that a mismatch between coordination needs and the prevalent coordination mechanism exacerbates the difficulties of transition between phases.

In addition to the typical challenges of these phases, the transition between Phases II and III also faced high time pressure combined with a need to remedy earlier work (a consequence of previous dysfunctional dynamics; see Table 5). When questioned by the local council, the client's agent (i.e., integrator) at Fulmar Road (Case #2) confirmed "the external light fittings to the bungalows have been installed by the electrical sub-contractor." This work followed the local council's reprimand that external light fittings "must meet the requirements of the Code of Sustainable Homes," and the integrator's agreement to visit the site "to confirm what has been installed." Simultaneously, as Table 3 shows, the interorganizational project network was highly hierarchical from month 13 (0.135) through month 17 (1.143). A close analysis of

Blyth Court (Case #5) showed that whereas the prevalence of steering functions in Phase II was consistent with the high-performance coordination trajectory, a shadow of past coordination dynamics (in Phase I) was undermining collaboration. This shadow of the past was counterbalanced as the transition to Phase III observed some companies completing the work—and leaving the project—and the integrators intensified their actions. Thus, we observed an increase in connecting functions (Tables 3 and 4).

In sum, the fit between coordination needs and the prevalent coordination mechanisms influences the "quality" of the transitions between phases. Organizations can devise repair strategies to "patch up" coordination trajectories but only through focalized action early in the project.

Alternative Explanations

The validity of our findings requires that we also address the main alternative. First, we checked for the characteristics of key organizations, namely, in terms of prior relationships (Gulati 1995). Based on the project documentation and information from key project informants, both prior relationships and personal relationships played much less of a role than often reported[11] (Engwall 2003). This might have been because our projects were small and standard, and low cost was one of the client's key goals. In this regard, our projects differ from large and complex projects in which the role of prior relationships has been found to be important (Ebers and Maurer 2016). The marginal role of prior relationships in our setting might also be related to changes in the industry. A recent study carried out in the shipbuilding industry—which has often been compared to the building industry in terms of project coordination (Masten et al. 1991, Stinchcombe 1959)—reports that the "project network structure has shifted from a more informal way of organizing work [...] to a more formal manner in interorganizational collaboration" (Levering et al. 2016, p. 291). We also examined the potential role of the training and experience of managers working for the integrator organizations (Styhre 2006). We checked the trade literature (e.g., magazines specialized in the building industry) and the managers' personal profiles (e.g., LinkedIn and corporate website profiles) to obtain information about training credentials (e.g., project management courses) and professional accreditations (e.g., from the Association for Project Management). We captured managers' experience as number of years working in the building industry. We found not only that managers' training was largely similar but also that the integrators across the seven cases were all well versed (i.e., more than five years of experience) in the United Kingdom's building industry.

Second, we studied project setup as a source of alternative explanations. Under this category, as shown in Table 6, we considered the procurement route, contract-project fit, coordination setup, and size (i.e., number of organizations). Prior research shows that the procurement route can influence how organizations work together on a project (Atkinson 1999, Winch 2014). All seven of the studied projects were procured based on a lump sum; accordingly, the procurement route was constant across projects. In all of the studied cases, the contractual framework was a JCT contract (joint contract tribunal), which is standard in small- and medium-sized projects in the United Kingdom. The coordination setup across the seven projects entailed the appointment of a project management consultancy, a JCT contract between the main contractor and the client, and typical time-based structures for coordination (e.g., monthly meetings). Indeed, a project management consultancy was appointed to oversee the project (this task was not performed by the client in any of the cases). There is always variation among the cases with respect to the procedures that characterize project-based activities (Hodgson 2004), but this variation was marginal across the seven cases. We also considered whether size (i.e., number of organizations) could have had an impact on coordination given that the presence of more parties increases coordination challenges. The results of the analysis of variance (ANOVA) test and Bonferroni post hoc tests showed no significant difference in size between high- and low-performance cases.

Finally, we considered sources of project uncertainty typical in our industry setting. Following prior research (Eccles 1981, Morris 1994), we focused on weather and geological conditions. We gathered official precipitation records (i.e., the amount of rain per square meter measured in millimeters) for the duration of the projects in the local area. As shown in Table 6, we found no statistically significant differences among the seven cases ($F = 0.300$ ($df = 6$); $p\text{-}value > 0.1$). We also checked the project documentation and found that geological conditions did not differ between high- and low-performance cases.

Discussion

In this study, we set out to examine how the relative inter-temporal use of integrators and contracts enables or hampers coordination, in turn, influencing performance of interorganizational project networks. We advanced the notion of coordination trajectory to show that the prevalence of contracts' steering functions or integrators' connecting functions across projects phases influences coordination and, in turn, performance. We now turn to the implications of our findings for deepening our understanding of the use of integrators and contracts in projects and extending current literature on the inter-temporal aspects of coordination in projects.

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Table 6. Alternative Explanations

	Dale Lane Road (Case #1)	Fulmar Road (Case #2)	North Wingfield (Case #3)	Rowlett Road (Case #4)	Blyth Court (Case #5)	Oakley Road (Case #6)	Washbrook Road (Case #7)	Assessment
					Key organizations			
Previous relation-ships	A landscap-ing firm was referred to the client	—	The client' agent had one job for the client	—	The structural engineers worked for the client in one project only (three years before)	Windows suppliers referred to the client	—	Prior relationships played a marginal role. There were only a few instances of prior relationships, but these are unrelated to the performance across the seven social housing projects.
Managers' training**	Professional accredited	Professional accredited	Professional accredited	Professional accredited	Professional accredited	Professional accredited	Professional accredited	We found no evidence that the integrators' training varied significantly across cases.
Managers' experience**	More than five years	More than five years	More than five years	More than five years	More than five years	More than five years	More than five years	We found no evidence that the integrators' experience varied significantly across cases. Integrators actively involved in the project had between five and 10 years of experience.
					Project setup			
Procurement route	Lump sum (lowest)	Lump sum (lowest)	Lump sum (lowest)	Lump sum (lowest)	Lump sum (lowest)	Lump sum (lowest)	Lump sum (lowest)	Across all cases, the main contractors were appointed to deliver the project based on existing drawings.
Contract-project fit	JCT contract	JCT contract	JCT contract	JCT contract	JCT contract	JCT contract	JCT contract	A JCT (joint contracts tribunal) contract and the building's specifications were similar across the seven projects.
Coordination setup	General project manager	General project manager	General project manager	General project manager	General project manager	General project manager	General project manager	A general project manager was appointed by the client. The minutes of monthly meetings were approved by all parties.
Size (# of organiza-tions)	Mean = 9.33 SD = 2.15	Mean = 13.06 SD = 3.84	Mean = 12.32 SD = 3.67	Mean = 9.00 SD = 1.78	Mean = 13.41 SD = 4.76	Mean = 11.13 SD = 3.04	Mean = 13.60 SD = 5.1	We ran an ANOVA test for the differences of the average number of organizations among cases ($F = 2.791$ ($df = 6$); *p-value* < 0.05). Further, we ran a *Bonferroni post hoc test*, but no pairwise comparison was statistically significant.

Table 6. (Continued)

	Dale Lane Road (Case #1)	Fulmar Road (Case #2)	North Wingfield (Case #3)	Rowlett Road (Case #4)	Blyth Court (Case #5)	Oakley Road (Case #6)	Washbrook Road (Case #7)	Assessment
Project uncertainty								
Precipitation*	Mean = 58.45 SD = 17.08	Mean = 56.41 SD = 25.68	Mean = 59.30 SD = 22.43	Mean = 59.35 SD = 20.54	Mean = 50.14 SD = 23.27	Mean = 61.95 SD = 20.49	Mean = 55.90 SD = 27.37	The mean precipitation among cases is not statistically significant (ANOVA, $F = 0.300$ [$df = 6$]; *p-value* > 0.1)
Geological conditions	Standard	Standard (contaminated soil found on site)	Standard	Standard	Standard	Standard	Standard (locals opposed to cut old trees on site)	Uncertainty as a result of geological conditions was similar across cases. We searched the project documentation and found no relationship between geological conditions and performance across cases.
Performance	Low	Medium	Low	High	Medium	High	High	Despite the similarity of cases, we observe salient performance differences

*Precipitation (in millimeters) refers to the amount of rain per square meter in one hour. We used the United Kingdom's official weather records (http://www.metoffice.gov.uk) for the geographical area of the project. We collected data for each month of the project.

**We refer to managers working for integrator organizations. In some instances, the integrator appointed more than one manager to the project. By checking the meeting minutes, we identified the manager (working for each integrator) that was more involved in making decisions in the project. We considered the training and industry experience of the managers more involved in the project as their actions were those that mattered the most to the coordination trajectory, and consequently performance.

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Theoretical Implications About the Use of Integrators and Contracts in Coordination Trajectories

The importance of the use of integrators and contracts in coordinating interorganizational project networks is extensively documented in PBO research (Morris 1994, Reve and Levitt 1984). Our study augments this literature by uncovering how specific functions of integrators and contracts when used jointly also influence key characteristics of interorganizational project networks. Our findings aided us in developing theory about how integrators' functions (called "connecting") and contracts' functions (called "steering") influence the interorganizational project networks and ultimately coordination dynamics.

Connecting functions refer to how the use of integrators specifically promotes coordination among project organizations. Although some studies have emphasized the use of integrators (Gann et al. 2012, Styhre 2006), we contributed to the literature by identifying how integrators influence coordination by performing specific monitoring, engaging, and liaising functions. More specifically, these three functions reveal how the prevalence of integrators' actions increases interorganizational project network density. Rather than thinking of integrators and contracts in isolation from ongoing interactions among organizations, we propose that coordination is a process of interconnection between coordination mechanisms and the pattern of ties among project organizations. Our proposal is further corroborated by our findings about contracts' steering functions, which we identify as goal-setting, enforcing, and constraining actions. Whereas much of the prior PBO research has advocated contracts to promote coordination in projects (Reve and Levitt 1984, Winch 2001),we add insights about *how* contracts actually promote coordination in projects by changing how organizations seek to develop ties in the project. The use of contracts has implications for the sociometric characteristics of interorganizational project networks. In particular, contracts' steering functions induce patterns of organizational ties that resemble a hierarchal structure (Kenis and Knoke 2002, Krackhardt 1994).

Theoretical Implications About Inter-Temporal Aspects in Coordination Trajectories

Building on past research on temporality in projects (e.g., Hernes et al. 2013, Janowicz-Panjaitan et al. 2009), our finding about the supporting functions of integrators and contracts is instrumental in developing theory on (a) the nature of the interplay between the use of integrators and contracts and (b) how this interplay influences the transition between project phases over time. The nature of this interplay is contingent upon the project phase such that it depends on (a) the fit with coordination needs and (b) temporal dynamics within coordination trajectories.

Fit with Coordination Needs. Our findings from a longitudinal analysis highlight several theoretical insights into how coordination mechanisms fit either well or poorly with project coordination needs. While it is challenging to ensure ongoing coordination in projects, much of the prior research has narrowly focused on the fit between a specific mechanism and coordination needs (e.g., Eccles 1981, Reve and Levitt 1984). Instead, we argue that whether organizations adjust to coordination needs largely depends on specific combinations of the prevalence of integrators and contracts across project phases. We, therefore, downplay the role of a particular coordination mechanism in explaining dysfunctional coordination dynamics. The implication for researchers is, we argue, to pay attention to coordination beyond the coordination mechanism itself and to study *the use* of the coordination mechanism to meet coordination needs. Although the focus on the coordination mechanisms is useful, it is likely to be insufficient because a project's coordination needs change at a faster rate than coordination mechanisms in small- and medium-sized projects (e.g., contracts remain unchanged, but the coordination needs at the start differ from those at the end of the project).

Organizations must satisfy various coordination needs throughout a project (Duncan 1996, Morris 1988). However, past PBO literature has yet to clarify how multiple organizations satisfy coordination needs over time given that the key characteristic of projects is the rapidly changing nature of tasks over time (Maoret et al. 2011). We extend this literature by showing that the extent to which organizations meet coordination needs hinges on the interplay between the use of integrators and contracts. In several instances, performing similar tasks resulted in substantially different outcomes. Rather than the task itself, such outcomes were rooted in variations in the nature of the interplay between the use of integrators and contracts. Our findings about the fit (or misfit) between coordination mechanisms and coordination needs add to the existing research, which has often provided only a limited analysis of dysfunctional coordination dynamics (see Okhuysen and Bechky 2009 for a review).

Temporal Dynamics. Whereas prior research has typically approached temporality issues both before and after the project (for exceptions, see Janowicz-Panjaitan et al. 2009, Jones and Lichtenstein 2008), we have extended this literature by addressing temporality issues *during* the project. We theorize how the timing of the prevalence of the use of integrators or contracts influences their interplay within coordination trajectories.

The relevance of "timing" has been noted in the literature on coordination, which has emphasized the role of time-based structures, such as schedules and *Gantt* charts (Grandori 1997, Hassard 1991). In contrast, we have directed attention to the timing of the prevalence of the use of integrators or contracts throughout the coordination process as time-based structures by themselves have limited influence to promote timely coordination among organizations. We drew attention to the timing of the prevalence of coordination mechanisms *in use*. For instance, we showed that the timing of the prevalence of coordination mechanisms within coordination trajectories influences whether organizations focus on task completion to the detriment of quality toward the end of projects (see Humphrey et al. 2004).

The complementarity between coordination mechanisms relates to either good timing or the extent to which the prevalent coordination mechanism fits well with the coordination needs of each phase. Further, substitution relates to poor timing or the extent to which the prevalent coordination mechanism does not fit well with the coordination needs of each phase. Thus, positive coordination dynamics cannot be attributed only to the choice between integrators or contracts but on the alternating prevalence of the use of these two coordination mechanisms throughout the project. Analyses of integrators or contracts alone provide largely incomplete explanations of performance without showing how managers and organizations use these mechanisms jointly throughout the project.

The current understanding of temporality in a project rarely considers the transactions between project phases (Hernes et al. 2013, Janowicz-Panjaitan et al. 2009). At most, prior researchers have focused on the role of time-based structures (e.g., schedules) to enhance phase transition (Burke and Morley 2016, Lindkvist et al. 1998). We show that although these structures are helpful (e.g., to provide a time frame of work to be completed), the transition between phases varies according to the coordination trajectory. Understanding the usefulness of time-based structures requires attention to the joint operation of social mechanisms (e.g., "information-processing"), which are found in specific coordination trajectories. Our study extends current research that thus far has suggested that the quality of cross-phase transitions primarily depends on "transition rituals" conducted among project members (Van den Ende and Van Marrewijk 2014). Furthermore, the misalignment between organizations' time frames and the project's time frame is a cause of project delays (Simon and Tellier 2016). For example, the completion date for the foundations contractor is much before the project's completion date, but these differences typically develop different temporal notions between organizations (e.g., one-week delays for the foundations contractor is not much, but such a delay compromises the delivery of the project on time). We argue that the alignment between time frames can be achieved largely by the actions of integrators, as these actively influence the coordination trajectories.

In sum, we advance an argument of temporal contingency in which the coordination trajectory quality hinges on the fit between coordination needs and both the prevalent coordination mechanism within phases and the quality of the transition across phases.

Boundary Conditions and Further Research

We closely examined small- and medium-sized projects that are typical in the building industry (e.g., Reve and Levitt 1984) and other industries, such as shipbuilding or mining (Ligthart et al. 2016, Reve and Levitt 1984). As such, our findings apply primarily to this set of projects. We expect that our findings will have moderate applicability to mega-projects (Davies and Hobday 2005, Flyvbjerg 2014), which are unique, politically embedded, and for which objectives change during the construction (e.g., Sydney Opera). We also call for further research into coordination trajectories across other settings in which interorganizational collaborations draw on coordination mechanisms other than the use of integrators and contracts.

The use of meeting minutes was advantageous to address our research question, but further studies that draw more on in-depth interviews with managers would be helpful to directly observe how individuals working for integrator organizations make decisions in the project. For example, individual-level factors (e.g., managers' heuristics about managing projects and the use of interpersonal ties) are likely to play a role in how coordination trajectories emerge. The emergence of coordination trajectories provides a fruitful area for further research. Further understanding of the emergence of coordination trajectories will also benefit from an examination of the influence of the content of contracts on the initial interactions between organizations (Lumineau and Quelin 2012).

By further focusing on the unfolding of coordination trajectories, we envisage opportunities for research on how individuals pursue different repair strategies to "patch up" coordination trajectories as endogenous and exogenous factors impact on these trajectories. Researchers should consider how managers allocate attention to—or overlook—elements of the coordination trajectories. In this regard, the attention-based perspective (Ocasio 1997) is particularly relevant to advance research on temporary organizations. We specifically invite further research on timing (e.g., when to emphasize the use of contracts), the ordering and sequencing of issues (e.g., the ordering of the use of coordination mechanisms influences the transition between phases), and the alignment of time frames (e.g., compatibility of organizations' and project's time frames).

The extant research has posited questions about which types of data and research methods are suitable to advance PBO research on temporality (Hernes et al. 2013). Our study illustrates how archival data can be used both to minimize the retrospective biases typical of interviews and to overcome typically high dropout rates in longitudinal survey research (Provan et al. 2007). In contrast with past PBO research using archival data (Berthod et al. 2016, Padgett and Ansell 1993), we adopted a distinctive methodological approach by analyzing meeting minutes through sociometric and qualitative analyses. Other researchers might find this approach useful to develop explanatory theory about network dynamics and the underlying processes that enhance or hinder outcomes in networks.

Implications for Practice

Our study has important implications for managing temporary collaborations. According to research published by the Project Management Institute (2014), organizations lose $109 million for every $1 billion invested in projects and programs. We showed that coordination trajectories not only have an impact on time and cost overruns, but also influence building quality (e.g., building faults) in small- and medium-sized projects. Our findings have therefore immediate implications for project management consultants by showing that monitoring, liaising, and engaging are relevant to understanding project performance. Monitoring, liaising, and engaging are descriptors of good project management, but these descriptors alone are insufficient to deliver high-performance projects. By building expertise in adjusting the prevalence of the main coordination mechanisms across phases, project management teams will be better prepared to address temporal aspects that have been described as "the root problem" in project delivery (Atkinson et al. 2006, p. 692).

For clients, we note that even standard project delivery can be derailed by misconceptions about PBO. We suggest that the building industry's long history of time and budget overruns cannot be attributed solely either to the contracts or to the professionals who oversee building projects. Instead, these problems largely stem from inadequate coordination trajectories. We thus hope that our findings draw managers' attention to the development of "trajectory awareness," which entails focusing their efforts on coordination mechanisms at the appropriate time and aiming to foster coordination trajectories that are consistent with coordination needs over time. Trajectory awareness requires that those in charge of projects develop the ability to adjust the prevalence of the use of coordination mechanisms in function of the coordination needs across project phases and develop tools and heuristics necessary to promote flexibility to address evolving coordination challenges that emerge during projects. Thus, we suggest that the client and their representatives also think through repair strategies to patch up coordination trajectories, particularly in the early months of the projects as coordination does not always have a smooth start. The medium-performance cases show that if there are delays after the first few months, the focus should be on intensifying integrators' efforts, not on emphasizing contracts.

We hope that our findings and proposed model will encourage further research to augment our understanding of coordination processes in interorganizational project networks.

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Endnotes

[1] The PBO literature distinguishes between interorganizational networks "across" (e.g., Engwall 2003) and "within" (e.g., Maoret et al. 2011) projects (see also DeFillippi and Sydow 2016). Our study focuses on "interorganizational project networks" within an individual project only.

[2] We also acknowledge the potential influence of other coordination mechanisms, such as professional roles (Bechky 2006), mesostructures (Valentine and Edmondson 2015), and routines (e.g., Obstfeld 2012). However, our analysis focuses on the core mechanisms typically used in small- and medium-sized projects. We return to this aspect in the discussion section.

[3] As we noted in the introduction, our notion of integrators refers to organizations in the projects whose main responsibility is project management. However, the notion of "project managers" refers to a specific job position that exists within, for example, contractors.

[4] Prior research on performance of interorganizational project networks discusses short-term versus long-term aspects. Our measure of performance focuses on short-term aspects. As Shenhar et al. (2001, p. 699) note, the importance of short-term versus long-term aspects varies according to the time and the level of technological uncertainty. In our empirical setting of relatively small and standard projects, dimensions such as "preparing for the future" did not directly apply.

[5] At this point, it is worth noting the relationship between density and hierarchy, which are the two sociometric measures used in our theorization. Density refers to the number of total ties in a network relative to the number of potential ties (Scott 2000) whereas hierarchy relates to the ordering of interactions, such as those dictated by formal authority (Krackhardt 1994, p. 97). We decided to choose these measures because they best captured our data patterns. Density and hierarchy are not orthogonal; in other words, it is not true that if density increases, hierarchy will decrease by the same proportion. We focus on the prevalence of either density or hierarchy. We use Krackhardt's indicator of hierarchy (1994) since it suited our empirical setting of small- and medium-sized projects and type of data. The

use of the dimensions of "connectedness," "efficiency," and "least upper boundedness" yield limited insight. The solo-use hierarchy had the advantage of enabling parsimony in our insights (further information is available from the authors).

[6] In all seven cases, the construction plan was modeled on governmental regulation and guidelines established by the Royal Institute of British Architects (RIBA). Thus, these phases can be found in other small and standard projects in the United Kingdom

[7] To further check the contrast between these two coordination trajectories, we run *t* tests to evaluate whether the average density and hierarchy varied for cases of high performance and low performance. We found statistically significant differences neither for density (t *value* $= -0.600$ ($df = 3$); *p-value* > 0.10) nor for hierarchy (t *value* $=$ 0.459 ($df = 3$); *p-value* > 0.10).

[8] We checked the meeting minutes for Fulmar Road (Case #2) and found that "reiterated" was used several times. Thus, we concluded that the formulation of "did reiterate" was not a random choice of words, but one that was intended. By reading the meeting minutes, the context of the interactions between organizations was marked by a firm approach from the integrators, and great emphasis was placed on contractual aspects (Meeting minutes #2, #3, and #4).

[9] Furthermore, we examined whether the medium-performance coordination trajectory was merely the result of a loss of momentum. This was not the case: like the low-performance projects, the two medium-performance projects began with the prevalence of steering functions. Indeed, medium-performance cases consolidate the finding that the prevalence of steering in Phase I is detrimental.

[10] We checked whether the pursuit of this strategy related to the integrators (e.g., expertise). As we detail later in the discussion of alternative explanations, this was not the case. We return to repair strategies to patch up coordination trajectories in the discussion section; specifically, we consider the importance to examine individual-level factors (e.g., heuristics).

[11] We focused our discussion on prior relationships between organizations to be consistent with our focus on interorganizational ties (nodes are organizations), which are analytically distinct from personal ties (nodes are individuals).

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