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More Cooks in the Kitchen: Why Does IPD Embrace What Megaprojects Dread?

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More cooks in the kitchen: Why does IPD embrace what megaprojects dread?

Colm Lundrigan¹ and Robert Leicht²

Abstract

Beyond scope and scale, megaprojects are different from other capital projects in the unique stakeholder engagement in decision-making. As large infrastructure projects are defined, they often require resources or permissions from landowners, public entities, or client groups that add to the organizational complexity of projects. It is this central group that has vast sway in the scope and deliverables of the project, often with little means for controlling creep in the cost and time that accompanies these growing demands. Counter to the negative connotation that naturally accompanies having more stakeholders and constituents that desire a say in project decisions, Integrated Project Delivery (IPD) approaches intentionally engage more project stakeholders, the design and construction service providers, in their decision-making processes. IPD is different from the many existing contracts and delivery methods in that a multi-party contract is used to engage the design and construction service providers on a project. The research explores the organization of the project team with regard to the structure, governance, and implications for how and why stakeholders are engaged.

Introduction

Mega-projects, typically defined as schemes costing over \$1bn, involve vast networks of public and private actors formed to develop capital intensive infrastructure. Their outputs include airports, railways, power plants and other long-lived assets that play an important role in the socio-economic development of societies. However, despite their importance megaprojects are often criticized for failing to meet performance targets (Flyberg, 2003). Researcher have suggested several reasons for megaproject failure ranging from inappropriate choice of contracts (Stinchcombe and Heimer, 1985) and poor upfront planning (Morris, 1994), to complex stakeholder relationships (Olander and Landin, 2005).

Beyond scope and scale, megaprojects differ from other capital projects in the unique stakeholder engagement in decision-making. As large infrastructure projects are defined, they often require resources or permissions from landowners, public entities, or client groups. It is this central group that has vast sway in the scope and deliverables of the project, often with little means for controlling creep in the cost and time that accompanies these growing demands (Gil and Pinto, 2018).

It has long been recognized that upfront engagement with stakeholders in the design stage is critical to project success (Morris, 1994). In recent years the Integrated Project Delivery (IPD) procurement method has become an increasingly popular way of delivering major capital projects. Counter to the negative connotation that naturally accompanies having more stakeholders and constituents that desire a say in project decisions, Integrated Project Delivery approaches intentionally engage more project stakeholders in their decision-making processes. IPD is different from the many existing contracts and delivery methods in that a multi-party contract is used to engage the design and construction service providers on a project

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(Kenig, 2011). In the process of developing the relational contract, these signatory firms are given access to decision-making authority, defined through the shared governance clause. Research into the performance of IPD driven schemes have shown to be promising with higher quality construction being delivered more quickly with little to no cost premium (Asmar et al, 2013). Despite these successes, the stakeholder engagement (Laurent and Leicht, 2018), procurement processes for signatory members (Leicht et al, 2017), and number of signatory partners in the shared contract (Seed, 2018) are still emerging areas.

There are strong parallels between IPD capital led projects and megaprojects. Both face similar challenges with regards to stakeholder engagement, leaders of these schemes must decide which stakeholders are involved in the decision-making process, in what capacity, and at what stage of the scheme's lifecycle? These questions give managers scope to try different governance structures for their project. Yet we know comparatively little about the structural patterns that underpin the development of these organizations.

The question we are exploring is whether there are lessons or practices that can be learned from IPD for megaprojects, and vice versa?

Background

The focus of this paper is to consider the changing paradigms, bordering on emerging archetypes, regarding stakeholder engagement in the governance and decision-making layers of infrastructure projects. Megaprojects have the unique challenge of extensive networks of entities that have influence in decision-making based upon the resources they bring to bear on large projects, that in many cases may not be able to advance without those resources. This often leaves the project management of the megaprojects with challenges in determining when and how to engage those stakeholders. In IPD projects, the entities engaged are typically less extensive in number of firms, though there are usually extensive users stakeholders (e.g. hospital staff and departments) that have input. Where IPD diverges from the typically project governance lies in the intentional engagement of the design and construction service providers early and with greater than usual decision-making influence through the multi-party contracts. Both approaches have overlaps in the challenges and mechanisms – when and how stakeholders wielding decision-making authority are engaged in the project development and delivery.

Megaproject governance

Megaprojects pose an interesting challenge from a governance perspective as the organization is made up of a network of legally independent actors who contribute resources (money, land, planning rights, etc.) in exchange for some decision-making rights within the scheme. Hence a mega-project is formed when a group of independent parties including governments, firms, regulators, interest groups, and communities endorse the venture in the early planning stage (Altshuler and Luberoff, 2003; Szyliowicz and Goetz 1995).

The network of these resource contributing stakeholders is characterized by interdependence; each actor provides an important resource that is often difficult to substitute, and no single actor has the power to acquire all the necessary resources to deliver the scheme. This dependency among actors results in a relatively flat egalitarian decision-making structure in which parties are forced into long drawn out multi-party negotiations (Lundrigan, Gil & Puranam, 2015).

Furthermore, this interdependency can result in complications where high rivalry over design choices, differing institutional perspectives, and debates of efficiency versus effectiveness, lead to fractious negotiations. At worst the lack of differentiation between stakeholder's decision-making rights can lead to freeriding behavior in which parties who are contributing relatively little may be able to make demands of those contributing far more with limited repercussions (Gil and Baldwin, 2014).

Making matters more complex from a megaproject perspective is the timescales over which stakeholders join throughout the scheme's lifecycle. It is unfeasible to expect all the necessary resource holders to be present from the outset of negotiations. Early stages of the megaproject's lifecycle are dominated by those contributing the most significant resources. As those early adopters agree on a high-level design, they seek to convince others to contribute. This piecemeal acquisition of key actors opens the potential for intense periods of renegotiation as newcomers may dispute prior design decisions. With no practical way to force a compromise, late comers can find themselves acting as powerful bottlenecks preventing the scheme from proceeding until their demands are met (Gil et al., 2017)

The contractual arrangements between the stakeholders evolves throughout the scheme's lifecycle. In the early stages of the design a core group of founding stakeholders may rely upon non-binding contracts to explore the potential of the scheme. As the design becomes more detailed it becomes necessary to strengthen the commitments of the members through formalized bespoke multi-party agreements (Lundrigan, Gil & Puranam, 2015).

A second important facet of megaproject governance derives from the porosity of the network's boundaries. Without a clear owner-operator acting as a gatekeeper a megaproject network may begin to sprawl as extant members of the network lobby for new elements of design which require the acquisition of yet more resources and commensurately the addition of those resource owners to the decision-making system (Gil et al., 2017). This politicized expansion can in turn lead to the emergence of rival factions who argue over the legitimacy of inviting in another set of actors into the negotiations.

To help facilitate negotiations between stakeholders' megaprojects create a new organizational structure – a delivery agent - to act as a mediator. These delivery agents may take the form of legally independent actors themselves or be an internal project team in one of the leading stakeholders. As the negotiations between stakeholders subside and the construction phase of the scheme can begin the delivery agents take responsibility for transforming the design decisions into work packages which they can tender to the construction supply chain.

IPD governance

Integrated project delivery (IPD) is differentiated from the array of other procurement and project delivery methods by three primary features: early involvement of key participants, a multi-party contract, and a reimbursement model that includes shared risk *and reward* (Kent and Becerik-Gerber, 2010). Early involvement of participants defines the change in timing associated with the design and construction service providers. Key participants vary across projects, but in addition to the owner, designer, and builder, this usually indicates specialist engineers or specialty trade contractors whose knowledge strongly affects the facility design, and whose cooperation is needed “for the project to proceed smoothly,” (Ashcraft, 2014). The shared risk and reward model often generates a great deal of interest, but in simple terms, one the target cost for the project is validated by the project team, including both the owner and the service providers, the contract defines a shared savings to the service providers if the project comes in less expensive than the target, but the service providers put their profit at risk, in a shared pool, if the project comes in over the target. The key mechanisms that makes both of these other two elements work is the multi-party relational contract. A relational contract defines the relationship between the parties, outlining the terms but focusing on creating the trust and behaviors of the parties. Relational contracts stem from relational contract theory, suggesting that in even the simplest transaction there is a network of social and economic relations that are often unstated and create extensive dependencies (Macneil, 1985). In the context of IPD contracts, the

framework the contract outlines should embody the project goals, then puts both the responsibility and the control for the project into the hands of those participants (Ashcraft, 2011).

The relational agreement defines the governance, specifically the decision-making process and authority for the development of the project design and construction. The definition of the decision-making process necessitates a method for making decisions amongst the heterarchical authority of the signatory contract members (Ashcraft, 2014). The signatory members have started to emerge as firms that have influence over substantial proportions of the facility scope, typically more than 15-20% of the project cost (Rhodes, 2019). However, there are cases of more than a dozen signatory members, potentially leading to difficulties with disproportionate influence. Challenges with problematic team members are often met with replacement of those team members, though usually in the rollover of the delivery team from one project to the next. In the decision-making process the shared reward pool from any project savings is used as the incentive for aligning the interests of the signatory members of the project team in terms of improving project outcomes.

One element of the adoption of IPD that the construction community is yet to clearly define is the timing and process for contracting the signatory members. IPD contracts usually engage a validation period in which the program for the facility is vetted by the design and construction service team, with the ultimate goal of defining the target cost.

Emerging themes and unresolved questions

The thread of governance amongst project stakeholders, as well as the ever-present schedule and budget challenges that accompany construction, appears to link these organizationally complex approaches. There are common opportunities in the continuity of the stakeholders that are engaged – whether through earlier onboarding or the selective timing at which they are engaged. The continuity in roles, in particular the shifting of responsibility from the owner(s) to a delivery team or special purpose vehicle nuances the governance scheme and methods for influencing decisions. Further, the array of engaged stakeholders involved in decisions creates new levels of interface management that are based on relationships and resources, rather than contractual terms and scopes.

Method:

In this research we look to unpick the patterns of organizational development in both megaprojects and IPD led capital developments take by exploring the emergent project ‘team’ with regards to the stakeholder composition, governance mechanisms, and decision-making processes. The research makes use of in-depth case studies into UK megaprojects and US based IPD schemes. Interviews, published cases study materials, and project documents are analyzed to extract the processes, procurement or engagement of stakeholders, decision-making processes and criteria, organizational influence, and team interaction. In particular, the emphasis will be on exploring the timing and engagement of these decision-making stakeholders into the network of project participants.

Sample

The sample for this study includes 3 UK based megaprojects and x IPD US based IPD schemes:

London 2012: The Olympic games in London 2012 was a £7.1bn scheme with the dual goal of delivering both an international game and the urban regeneration of a significant part of East London.

Crossrail: Crossrail is a 117km railway line running between London and the surrounding commuter towns. Costing £15.8bn its overarching goal was to increase London’s commuter railway capacity by 10%

Heathrow's Terminal 2: A £2.6bn scheme to rebuild an airport terminal to house Heathrow's second largest airline group the Star Alliance which is responsible for around 25% all of traffic passing through the site.

Akron's Children's Hospital: The hospital is a 365,000 square foot hospital in Akron, Ohio. The \$175 M facility is a 7-story tower dedicated to children's care and the first of a new master plan of expansion.

St. Anthony's Hospital: The hospital is a 105,000 square foot, \$75M new construction project in Pendleton Oregon. The remote location serves as a challenging context for finding partners for an integrated team.

Sutter Medical Office Building: This Sunnyvale, CA project by Sutter Health is one of a string of IPD projects delivered by Sutter Health. The 120,000 square foot facility was started early in Sutter's sequence with an emphasis on cancer treatment facilities.

Categories of Analysis

Our analysis rests along two broad categories reflecting important dynamics observed in the extant literature on project management.

Fluctuations in the membership of the organizational networks

We examine changes to the stakeholder membership of the project network reflecting the acquisition (and in some case loss) of key resources. The process of acquisition and integration of these resources is thought to have a significant impact on the overall success of the scheme.

Evolution in the governance mechanism of the networks

Commensurate to the growth in the project networks we examine how the system of governance evolves to orchestrate the use of these key resources in terms of both the contractual relationships and the decision-making processes within the projects.

Analysis

Fluctuations in the membership of megaprojects:

Following Lundrigan, Gil and Puranam (2015) we break our analysis of a megaproject organization into 3 stages of development; an *embryonic* phase of high-level design, a *gestation* phase of detailed design, and a *delivery* phase of construction. Table 1 summarizes the change in membership in both the core stakeholders and the supporting supply chain. While the IPD case studies cannot be mapped in exactly the same manner, the startup, design, and construction phases are studied, with the IPD embryonic phase not represented in the data available on the case study projects.

The Embryonic Phase

The embryonic phase begins when a small collective of organizations agree to investigate the feasibility of a megaproject. For example, in the case of London 2012 the British Olympic Association promoted the idea of a London Olympics to the Mayor of London and the National Government. These founding members of the megaproject network set up a project team to explore the idea. Similarly, Heathrow's Terminal 2 began when Star Alliance and the British Airport Authority (BAA) entered into negotiations about the potential to expand Heathrow's capacity. These early phase negotiations are loosely structured by non-binding memorandum's of understanding which acts as the first attempt at a high-level design document.

In the case of both the 2012 Olympics and Crossrail these early negotiations were aided by consultancy firms who were brought in to estimate potential costs and schedules for the scheme. In contrast BAA and

the Star Alliance held off on opening discussions with the supply chain. This difference in approach may have been explained by the level of knowledge of the founding actors with BAA having a history of megaproject development and having a long-standing relationship with the airlines and intimate knowledge of working with preferred suppliers.

The Gestation Phase

With the memorandum of understanding signed the megaprojects move to a detailed design phase in which all three of our cases increased their engagement with suppliers. Simultaneously efforts now began in earnest to recruit valuable resource holders who had the power to either support or block the proposed developments. In the case of Heathrow this involved getting the formal approval of the rest of the airline community and the regulator, whilst Crossrail and the Olympics sought out actors such as local governments and transport organizations. This influx of new organizations placed several demands on the design which in all cases was accompanied by an increase in cost estimates.

As the detailed design nears completion it becomes necessary for the stakeholders to formally commit their resources to the endeavor. Thus, all of our megaproject cases created legally binding multi-party agreements amongst the most critical resource holders. In the case of both the Olympics and Crossrail this resulted in the creation of special purpose vehicles (SPV) to act as delivery agents. These SPVs took on legal responsibility for the delivery of the schemes but their authority was limited by the terms agreed in the multi-party contract. Heathrow on the other hand chose to delegate authority to a delivery team which sat inside of BAA rather than creating a new legal entity to oversee the development.

The Delivery Phase

With the multi-party contract agreed and the high-level design in place the number of resource providing stakeholders remains relatively static in the delivery phase. The SPV takes responsibility for awarding supplier contracts to tier 1 contractors and coordinates and necessary design changes with the rest of the megaproject network.

Interestingly in the case of both London 2012 and Crossrail there was no guarantees that the suppliers who had worked on the scheme in the embryonic and gestation period would be involved in the delivery phase. Both schemes went under major redesigns during the early days of the delivery phase and in turn found that the original performance metrics were not feasible. Heathrow in contrast remained with a small pool of preferred suppliers and maintained a relatively stable set of performance metrics. Heathrow did however suffer a setback of another kind – the loss of a core stakeholder BMI a UK based airline which was to become one of the main operators of the terminal in the future. This would have severely damaged the operating efficiency of the building and BAA had to scramble into late stage renegotiations with other airline groups to fill the terminal's capacity.

Table 1 - Fluctuations in Megaproject Membership

Case	Stage of Lifecycle	Resource Providers	Contractors (Tier 1)
London Olympics	Embryonic	Founding members: British Olympic Association, National Government, Mayor of London's office decide to bid for the Olympics	3 firms
	Gestation	Expansion including:	10 firms

		Local Councils (4), Transport bodies, Funding agencies (16), Sporting bodies (35), International Olympic Committee	
	Delivery	Further expansion: Special Purpose Vehicles for the building and running the Games are created (ODA, and LOCOG) with long term (post Games) asset operators still being sought	1600 firms
Heathrow's Terminal 2	Embryonic	Founding members: BAA and Star Alliance have closed door negotiations	N/A
	Gestation	Expansion including: Airport regulator, National Government, Local Council and over 60 airlines join the negotiation	20 firms
	Delivery	Loss of a critical member BMI the key airline operator goes bankrupt resulting in renegotiations to fill the capacity of the terminal	150 firms
Crossrail	Embryonic	Founding members: National Government; Transport for London, and the City of London Corporation begin negotiations	2 firms
	Gestation	Expansion including: Local community members petition for changes to parliamentary bill (365); 37 local councils; transport agencies; and private funders such as the Canary Wharf group are brought in to the scheme	4 firms
	Delivery	Further expansion: Special Purpose Vehicle (Crossrail Ltd) is created and negotiations are held to decide on a railway operator.	1700 firms

(Based on Lundrigan, Gil & Puranam, 2015)

Project Startup

In the Integrated Project Delivery (IPD) terminology, Project Startup translates closely to the Gestation phase where the business case for advancing the project is clearly understood and agreed upon by the client agencies with the recruitment of the delivery team. In all of the cases this began with a qualification process, targeting the architecture firms first. In Sutter's case, they had a prequalified list of service providers, to streamline their project to project procurement process. In the case of the Akron Children's Hospital, knowing there was a lack of local IPD experience, they sought partnerships between local and national firms to link the IPD experience with the local community. In the case of St. Anthony's, the selection committee spend a day at the office and project sites of the proposed contractor team members, highlighting the importance of the people being selected, not just the firms.

Special to the case of the IPD contracts is the development and signing of the multiparty agreement. In each case, different contract forms were used, but with similar elements. Sutter Health was still in the early phase of refining their integrated form of agreement (IFOA), however, the core team members were familiar from their recent experience developing the contract on the El Camino project. The contract engaged the owner, architect, and contractor as signatories, with five trade partners and four consulting engineers tied to the shared risk and reward incentive pool. The Akron Children's Hospital used a five-way multiparty contract that signed the owner, the national contractor and local contractor, as well as the national architecture firm and local architecture firm. They chose to blend the standard form IPD contracts from both the American Institute of Architects (AIA) and the AGC's Consensus Documents. The St. Anthony's project used separate two-party contracts with the program manager, architect, and contractor, but each had

a contract IPD rider that tied the contracts together using a shared incentive pool. The incentives were not passed to the consultants or specialty contractors.

Design and Construction

The transition from the Startup Phase into design was milestones by the performance of the validation study. The validation, in essence, serves as the document for the project team to study and collaboratively define with the owner the initial design intent, and define the schedule, budget, and design requirements are appropriately with the owner's goals to ensure alignment throughout the design and construction processes. In the case of Akron Children's Hospital, the national architecture and contractors both highlighted the importance of developing and agreeing to this document as early as possible in the process.

The design was not linked to the signing of the agreement. The Akron Children's Hospital did not sign the agreement until nearly a year into design, and more than two months into construction. The St. Anthony's project was able to get the contracts signed earlier, roughly 5 months into the design process, and following an 8-month startup process. Critical to the signing is gaining agreement across the parties regarding the baseline and target costing numbers that are tied to the incentive pool. The more comfortable and experienced the owners are noticeably able to get these agreements developed and signed early. Sutter had theirs 4 months after starting a nearly 3-year design and construction process.

In the case of the Akron Hospital project, the team set up three levels of decision-making. The majority of the day-to-day project decisions were made by a project leadership team (PLT) that gave equal authority amongst the five signatory members, including the owner. To make a decision required consensus among all five parties. The decisions were primarily based upon analyses and recommendations developed by the cross-functional 'project implementation teams' that would develop inventive options and present how the decisions would influence value to the project as well as savings to the incentive pool. Interestingly, the Sutter Health team members commented that their project manager from Sutter rarely participated in decision-making, though he attended. They felt he was there to ensure that they were following an effective process to ensure project success. The St. Anthony's project diverged from these two, with the teams commenting on the complexity of decisions that came from the two levels of boards (local hospital and national organization) that at times chose to participate in decisions.

Discussion:

Early engagement of Contractors

The IPD literature suggests that early contractor engagement should lead to improved project performance. The advantages of early contractor engagement is recognized by the leaders of megaprojects. Our cases suggest that megaprojects do attempt early engagement with contractors which reflects the need for specialist skills to be brought in to advise non-technical stakeholders. As Davis, Gann and Douglas (2009) suggest early contractor engagement is more likely to be "more likely to result in reducing whole-life costs through the implementation of advanced, standardized, and efficient processes and sub-assemblies".

In recognition of the need for this early engagement of contractor's efforts have been made to develop guidance on the roles of contractors at the outset of megaprojects. To that end the UK government have begun developed a new Early Contractor Involvement (ECI) contracting methodology. This methodology suggests 2 phases; a design development phase in which contractors' costs are covered, followed by a second detailed design phase which incentivizes contractors with a bonus fee for optimization of the project costs. To date this new ECI method is being tried on High-speed 2, an on-going scheme to develop a

national high-speed railway but due to the protracted development time of megaprojects it may be decades before evidence of the efficacy of this new method comes to light.

Continuity of the organizational network

A key challenge for megaproject management are the long-time scales under which they are delivered. Indeed the length of a megaproject's lifecycle forces us to rethink the idea of projects as temporary endeavors (Brookes et al., 2017), as many megaproject organizations may exist for decades. Megaprojects must build and maintain a network of stakeholders which may last decades forcing them to adapt to ever changing contexts (Miller and Lessard, 2001)

Lundrigan, Gil, and Puranam, (2015) suggest a punctuated equilibrium model of megaproject development in which significant changes to the megaproject's network coincides with equally significant changes in performance metrics. As actors join, leave, or are replaced in a megaproject network it forces a period of redesign and renegotiation which may result in promises being reneged upon, and trust amongst actors being damaged.

Continuity of actors has long been associated with improved performance in megaproject context, as Merrow and Nandurdikar (2018) point out a change of leadership in a megaproject can lead to a significant performance drop, with failure rates (in terms of delivering within the original parameters) almost doubling. The importance of continuity stems, at least partially, from the ability for actors to develop trust. Developing trust in an organizational context has a well-established link to performance and can lead to the development more optimum practices (Brookes et al., 2017).

In many cases megaproject organizations will not have the ability to draw on a pre-existing relationship between stakeholders as the products they produce as too unique to be repeated, thus there will inevitably be periods in which the makeup of the organizational network is forced to change. But in other cases, changes to the network are done by design. For example, the project team that led the bid for the London 2012 Olympics was disbanded after the bid was successful and an entirely leadership team was installed to handle the delivery, this transition was associated with a significant surge in the budget as the new staff challenged the design they had inherited.

Another set of actors who are prone to change between the design and delivery phase of a megaproject are the contractors. As stated, each of our cases involved the early engagement of contractors. However, there is a contrast between the megaproject cases and the IPD cases in terms of how this early engagement played out across the project lifecycles. In the case of the megaprojects the early stage contractors who are heavily involved in creating the designs, budget, and schedule are not guaranteed to be involved in the delivery stages of the schemes. Interestingly, when megaprojects are under fire by observers the blame typically falls on those in charge of delivery, yet their success is at least partially dependent on those that were involved in a planning and design phase overseen by different contractors' years before. However, these early phase participants, with no longitudinal ties to the project or risk for the long-term budget, are not guided by incentives for constraining costs or seeking innovative solutions to deliver to a lower budget.

This phenomenon of changing contractors throughout the phases of a project lifecycle leads us to question whether early stage contractors should be held accountable for the success or failure of a project. Early stage contractors may be incentivized to create a more efficient plan through bonuses – but if they are no longer present to carry out the plan then what downsides are there to failure? The IPD projects notably engaged in the validation process at the outset to ensure the budget and design were in alignment, with the validation document serving as the 'bible' for the project moving forward. There is potential for mega

projects to learn from this model and have a transition or handover process with the delivery team engaging with and validating the designs created in this gestation phase of projects.

Across all of the IPD case studies, the project team members agreed that the shared risk and reward pool served as an incentive for collaboration. As one team member noted, the contract cannot dictate trust. However, if the team members know that working together improves their firms financially, then they are more open to engaging and communicating to find ways to be more efficient or find savings.

Conclusion:

This study serves as a first step exploratory study linking together the disparate research into IPD schemes and megaprojects, under the theme of front-end stakeholder engagement. By drawing on the extant megaproject and IPD literature, supported by research from project management and organization design, our discussion centers around the lessons that can be learnt by comparing between these two forms of capital development.

Both IPD schemes and megaprojects share the same fundamental problem of stakeholder engagement early in the scheme and maintain those relationships throughout the project's delivery. Both the leaders of IPD schemes and megaprojects have recognized that an important element of this stakeholder engagement is through bringing the project supply chain in at an early stage and incentivizing them to optimize the design.

However, a key difference between the IPD schemes and the megaproject schemes in our sample is seen in the extent to which these early engaged stakeholders are involved throughout the entire project lifecycle. Megaprojects by design have been seen to replace both leadership teams and suppliers for the delivery phase, often accompanied by significant shifts in the performance metrics of the scheme.

In an IPD context the early stage contractors are accountable for the end result of the scheme, and they are incentivized to ensure its success. In contrast megaproject project early contractors have no guarantee of being involved in the project's delivery and are not held accountable for failure – the ire is instead poured on the delivery teams who inherited the design and performance metrics from the now absentee early stage contractors. Thus, we end with a question for future research – can megaprojects find a means to make early stage contractors accountable for the long-term delivery of the scheme?

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