Designing Under Pluralism: Debunking the Performance Myth

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THE COMPLEXITY OF PLURALISM: Designing collective action in megaprojects

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The forces that matter are rooted in the very nature of things, and in the processes used to create them Carliss Baldwin and Kim Clark

Introduction: Pluralism, Complex Systems, and Megaproject

Organizations

As the twenty first century gives the first steps, mankind faces unprecedented challenges. The world's population is projected to increase substantially, climate change is a cause for major concern, and the growing disparity of wealth between rich and poor exacerbates societal pressures. When the twenty century drew to a close, modular technologies had set in motion an unprecedented revolution in the way people work, communicate, and socialise. These technologies "break apart" a complex system into units that are highly interconnected in themselves but largely independent of other units. By empowering people to make individual choices without taking away (important) choices from the others, modularity became a powerful force to manage complex systems and solve complex problems[1]. But for all the good technology brings us, the world is not a less troubled place today. It is more crowded, remains politically unstable, and the outlook for younger people is a lot gloomier than it was a few decades ago. And crucially, technology has not changed the basic needs of people. We still need to afford a shelter, to move and trade, to have access to safe water, sanitation, energy, and to protect ourselves from belligerent groups and natural catastrophes.

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[1] The idea of modularity is rooted in Herbert Simon (1962)'s theory of nearly decomposable systems, in which 'the interactions among the subsystems [in hierarchic systems] are weak but not negligible. Carliss Baldwin and Kim Clark leverage this idea in *Design rules* into a theory of design and industry evolution—the ideal of "perfect" modularity is "plug and play" (Baldwin and Clark 2000)

In an increasingly interconnected and crowded world, devising sustainable ways to fulfil our basic needs is a task that faces governments all over the world together with private firms and the civic society. Basic needs create shared problems that call for the development of new complex socio-technical systems: transport infrastructures to move people and goods; utility networks to supply energy, safe water, data, and discharge sewerage; fleets of new schools, hospitals, and prisons; and defence systems to protect against the rise of sea water levels, extreme weather events, and other global threats. Their role is so crucial in modern society that the World Economic forum lists them as one of the pillars of the basic requirements in their global competitiveness index, side by side with institutions, macroeconomic environment, and heath and primary education. In a human-dominated world, as biologist Edward Wilson puts it, complex systems are the 'ultimate prosthesis': take them away from highly populated areas of the world, and millions of people will die.[2]

 Complex socio-technical are the outcomes of project-based enterprises—the so-called "megaprojects". Megaprojects are fascinating enterprises that capture the imagination of elected leaders, governments, businesses, and the civic society. They are also capital-intensive[3] and highly controversial—a point that we will return to several times in this book. But before we discuss megaprojects, the phenomenon at the heart of this book, it is important that we reflect on the many common sense meanings of the word *project* in English.

Project (noun) [L. projectum 'something prominent', neuter past participle of proicere 'throw forth', from pro- 'forth' + jacere 'to throw'. **1.** An individual or collaborative enterprise that is carefully

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[2] Wilson, E.O. 1998. The Unity of Knowledge. Vintage Books. Random House Inc NY

[3] The McKinsey Global Institute estimates that the world would need to spend $57 trillion over the next 18 years just to accommodate anticipated global growth. Dobbs, R., Pohl, H., Lin, D., Mischke, J., Garemo, N., Hexter, J., Matzinger, S., Palter, R., and Nanavatty, R. 2013. Infrastructure productivity: How to save $1trillion a year. McKinsey Global Institute.

planned to achieve a particular aim; **2.** A piece of research work undertaken by a school or college student; **3.** A proposed or planned undertaking[4]

This spectrum of meanings suggests that *project* can refer to the organizations formed to achieve a goal and the processes and structures designed for that purpose. But it can also refer to the subject of a concerted effort, for example, a proposal, a scheme, or a design. The same is true for *mega*-projects[5], a term which can be used to either refer to any organization formed to develop a complex socio-technical system, to the underlying development processes and organizational structures, or to the system-level goal and thus the complex system itself. To avoid complications to theory development, we will use the term *megaproject (organization)* to refer to the organizations that need to be formed to produce complex socio-technical systems. When referring to the development processes and organizational structures involved in the production of a complex system, we will use these specific terms. And we will use the terms *designed artefact* or *complex system* to refer to the outcomes of the megaprojects.

In this book we will develop the argument that megaproject organizations are but an empirical instantiation of a much broader organizational class: that of pluralistic settings. Pluralism is a "flat" form of organizing collective action in which the decision-making power over strategic choices is distributed across multiple autonomous actors with conflicting goals and knowledge-based processes. Pluralistic arenas are found in the public sector, in regulated industries, and in collectives of individuals. Higher education and health care are typical examples. Under pluralism, collective action is consensus-oriented. The power of pluralism is to create organizational settings that encourage voluntary contributions of individually-owned resources to achieve a higher-order goal which a single actor acting alone could not achieve.

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[4] Oxford Dictionary

[5] "Mega-" [from Greek *megas*, great] is just an adjective that used in combining form means "extremely large, huge" , or more generally, things that are extraordinary examples of their kind

However, pluralism is a major source of management complexity to the extent that early scholars such as Mancur Olson and Garrett Hardy had limited hope in the capacity of getting things done effectively in the collective action arenas that pluralism creates.[6] In their view, within a shared-resource system, self-interested individuals would invariably try to selfishly maximize their short-term utility contrary to the long-term common good. Pluralism thus would lead to the collapse of the shared resource, the so-called tragedy of the commons: the over-extraction of ground water, the overfishing of the oceans, the overgrazing of common parcels of land. These seminal pessimistic claims were later on counteracted by the optimism brought in by Elinor Ostrom's research on consensus-oriented collective action. Pluralistic settings are complex, she argued, but complexity is not the same as chaos.[7] To make her point she presented plenty of evidence showing effective and sustainable pluralistic arenas formed to govern shared resources such as fisheries, pastures, water reserves, and police forces.

Following Ostrom's lead, we will argue that a megaproject is a viable form of organizing work to develop a complex socio-technical system. But the pluralism at the core of a megaproject is a major source of management complexity. Hence, the source of complexity motivating this study includes but is not limited to the complexity that Herbert Simon associated to systems made up of a large number of parts that have many interactions.[8] For sure, this is one source of the complexity of managing megaproject organizations given the large-scale of the focal designed artefacts. But pluralism, and thus the sharing of decision-making power over single strategic choices, is another major source of complexity.[9] The

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[6] The term "commons" is used in political science and institutional economics literature to refer to consensus-oriented collective action; the term "pluralism", which is in essence about the same phenomenon, is germane to management literature. In this book we adopt the term pluralism for the sake of consistency with management literature. But we draw from commons research when discussing the governance of pluralistic settings.

7 Ostrom, E. 2010. A Long Polycentric Journey. Annual Review of Political Science. 13,1-23.

[8] Simon, H. 1962. Proceedings of the American Philosophical Society, 106, 467-482

9 In *The Sciences of the Artificial* Herbert Simon (1971, p. 130) suggests awareness of the complexity endemic to pluralistic settings but also of their advantages, "We have usually thought of city planning as a means whereby the planner's creative activity could build a system that would satisfy the needs of a populace. Perhaps

conflation of technical and social dimensions of complexity in megaprojects can make these organizations appear "chaotic"; it also makes it hard to predict how they evolve in any detail. But this does not mean that megaproject organizations are "unmanageable". Studying collective action in megaprojects thus creates opportunity to further our understanding of how to get complex systems done under conditions of pluralism. We will carry the premise that pluralism is central to understand megaprojects and their performance throughout our study.

We seek to advance our understanding of the complexity of pluralism by building upon the idea that to advance our comprehension and understanding of why things are the way they are, we need to dig deep in the forces that matter[10]. These forces are rooted into the very nature of things and in the processes used to create them. At the very nature of a megaproject organization is the system-level goal of developing an artefact designed by humans. Designs contain the instructions necessary to build artefacts that perform specific functions.[11] However, the outcomes of megaproject organizations belong to a particular class of designed artefacts. Most complex socio-technical systems are capital-intensive, long-lived designed prototypes that will be shared in use by multiple independent actors. A central government may be the sole promoter and financier of a new railway system; but the railway will be shared in use with train operators, local governments, passengers, and retailers. Likewise, a government may promote and finance a new Olympic park; but the park will be shared in use by sports associations, local communities, multiple public agencies, and other actors.

Future users and others that directly or indirectly will be impacted by the development have a stake in the project outcome—they are "stakeholders". Many of these stakeholders

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we should think of city planning as a valuable creative activity in which many members of a community can have the opportunity of participating-*if we have wits to organize the process that way* (emphasis ours)
10 Baldwin and Clark 2000
[11] Alexander 1964; Simon 1969

will also individually own or directly control resources that are critical to achieve the system-level goal. The shared nature in use of complex socio-technical systems juxtaposed with the scale of the endeavours thus creates a class of development problems in which ownership and/or direct control over critical resources is distributed across multiple legally independent actors. This encourages resource-rich stakeholders to claim legitimacy to directly influence the one-off strategic *design* choices; these are the strategic choices that define the design structure of the future single complex system. Put simply, stakeholders want to be development partners. This very nature of the development problem central to a megaproject organization is the root cause of pluralism and of the management complexity that ensues.

Complex Systems and Performance

The management complexity of capital-intensive developments of complex socio-technical systems translates into an empirical regularity. Numerous accounts and statistical studies suggest that megaproject organizations struggle to achieve their system-level goal—the production of a functional designed artefact—within the performance targets announced at the onset of the development process. Figure 1 is telling. It illustrates the evolution in the cost forecast for the London 2012 Olympic park; it spans the period from when the idea gained traction in the public domain to the handover of the park to Londoners. We compiled the figure in a painstakingly manner using information publicly available from multiple sources[12]. In the process we encountered many negative evaluations: "Olympics 2012 chiefs willing to spend money like water", "optimism bias has left the taxpayer out of pocket", "the costs were grossly and persistently underestimated"; and an equal amount of superlatives: "Britain delivered", a lasting difference", "great leadership", "a showcase for the best of British construction and engineering". The controversy is not uncommon. Figure 1 too is

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[12] We converted all original cost forecasts in undiscounted prices without VAT into final prices (cash prices with VAT) using the rates published by the UK Treasury Green Book 2003 and a standard cost profile.

unsurprising. The recurrence of cost and/or schedule overruns makes people cynic of megaprojects, and wary of entrusting leaders with the power to sanction them. But what is going on here? What are the powerful forces at play that explain what we see and hear? Could it be different in any other way? In scholarly debates, these regularities have led to two clusters of conflicting explanations.
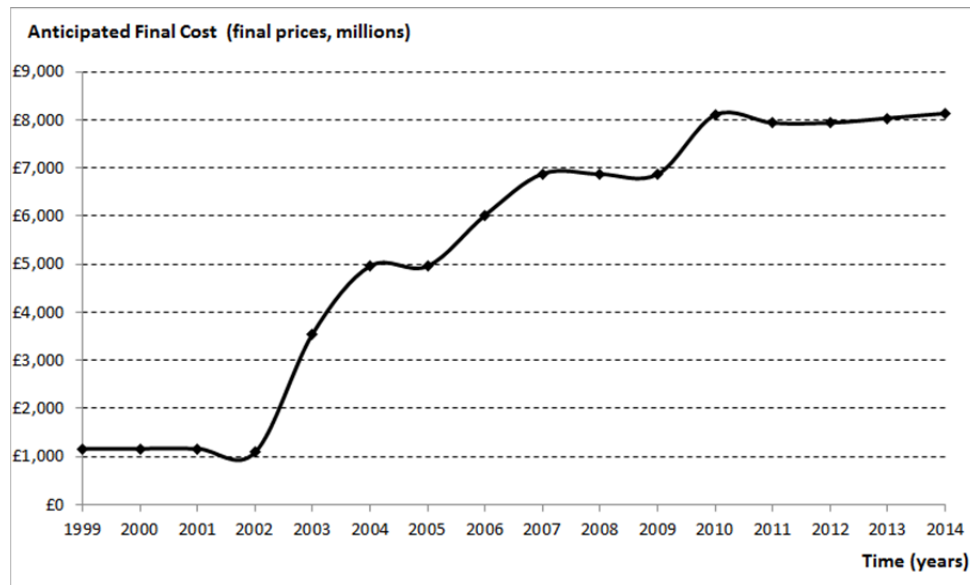

Figure 1- Evolution of the Anticipated Final Cost (AFC) for the London 2012 Olympic Park (all figures presented in cash/final prices). Compiled from public sources.

One research cluster is very critical of the megaproject promoters. Research in this tradition is heavily influenced by established social norms that link positive project performance to the ability to achieve a goal within the cost and schedule targets committed to upfront.[13] This research tradition is rooted in the seminal works of David Cleland, William King, Peter Morris, Arthur Stinchcombe, and Barry Staw in management literature and Peter Hall, Martin Wachs, and Bent Flyvbjerg in planning literature. In this research tradition, megaproject organizations that miss the initial cost and/or schedule targets and experience major scope creep 'fail'. 'Failure' is a pejorative term which reflects how, by failing to

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[13] Underpinning these norms is the pervasive idea of efficiency in modern management that draws from 18th century physics , classical economics, and the principle of least-means (Ritter and Webber 1971)

conform to deep-seated social norms, overruns destroy the legitimacy of a megaproject organization for allocating the resources which the initial pledges allowed it to acquire[14]. Within this cluster, theoretical explanations trace 'under' performance to agency problems including strategic misrepresentation by promoters (aka "lying") and opportunism by contractors (self-interest seeking with guile, as put by Oliver Williamson); another set of explanations pertain to capability problems including failure of management to avoid optimism bias, escalation of commitment, and underinvestment in strategic planning activity.

The aforementioned ideas have co-existed with another cluster of ideas that offers more benign explanations for the empirical regularities that characterise the performance of the megaproject organizations globally. This research cluster is rooted in the seminal works of Roger Miller, Donald Lessard, and Serghei Floricel in management literature and of Horst Rittel and Melvin Webber in planning literature. This line of thought was subsequently reinvigorated by Ray Levitt and Dick Scott, the first to study megaproject organizations from the perspective of institutional theory. Research in this tradition argues that the juxtaposition of multiple institutional logics in megaproject organizations creates inherently "wicked problems"—ill-defined (as opposed to tame) problems in which the "plurality of objectives held by pluralities of politics makes it impossible to pursue unitary aims…they rely upon elusive political judgment for resolution"[15]. Scope creep and overruns are thus traced to conflicts between logics, to institutional interests that lay outside the sphere of direct influence of the promoter, as well as to events in the environment which were hard to foresee

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[14] Scott, WR 1987 Organizations Rational, Natural, and Open Systems (2nd ed) Prentice-Hall, Englewood Cliffs, NJ.; Suchman, MC1995. Managing legitimacy: strategic and institutional approaches Academy of Management Review, 20, 571–610; Denis, J-L, Dompierre, G, Langley, A, Rouleau, L, 2011. Escalating indecision: Between reification and strategic ambiguity. Organization Science, 22, 225-244.

[15] Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a General Theory of Planning. Policy Sciences 4, 155-169.

ex-ante by the megaproject promoters. The main point of this research boils down to suggest that top management in megaproject organizations deserves our sympathy, not blame.

Reconciling the two clusters of theoretical explanations as to why megaproject organizations perform the way they perform has been a conundrum for scholars for more than twenty years. A major obstacle to resolving this controversy has been the lack of conceptualization over what class of development problems a megaproject belongs to: a megaproject is one of what? If we have incipient theoretical understanding of the structure of this complex form of organizing work, how can we agree on the management challenges endemic to a megaproject and on how to assess megaproject performance? The ideas of structure and performance are the cornerstone of a vast body of literature in organization design.[16] We seek to extend these ideas to further our understanding of megaprojects.

Specifically, our argument proposes to move forward the debate as to why megaprojects perform the way they do by tracing the (under) performance of megaprojects to the pluralistic structure at the core of this complex form of organizing work. The core structure of a megaproject organization controls strategic choice. We will argue that it is the diffusion of power over strategic design choice that makes it so hard to define upfront the structure of the designed artefact, aka project scope, and to commensurately produce reliable cost and schedule forecasts. We will elaborate this idea by studying the making of strategic design choices. Our research approach is the method of induction, which is the gathering of evidence over salient facts that are relevant to the research question, and the formulation of theoretical patterns, relationships, and explanations through iterative analysis of the evidence. Specifically, we will analyse the structures that govern strategic choice and thus the structures that enable and constrain collective action, shape development processes, resolve disputes,

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[16] Puranam, P. 2014. How organizations work: A micro-structural approach to organization design.

allocate resources, and impact performance. Under pluralism, the design of both governance structures and complex systems themselves are substantive acts of collective leadership. Hence this book is ultimately about the design of collective action under pluralism.

Clearly the development of capital-intensive, complex socio-technical systems is not a modern phenomenon. Societies have been setting up megaproject organizations to develop complex socio-technical systems for thousands of years going back to the pyramids in Egypt, the water irrigation systems in Sri Lanka, the Grand Canal of China to the railway networks built in the industrial revolution era, and the networks of highways and power plants built in the twenty century. Our motivation is not, however, to examine past ways of doing things. Rather our aim is to further our understanding of the capital-intensive developments of complex socio-technical systems in today's crowded, pluralistic, and interconnected world. Admittedly, countries vary in their social contracts, rules and systems of law, property rights, and social norms. We can thus expect differing contexts surrounding a megaproject organization to affect strategic design choice and governance. We will thus also study how changes in context impact megaproject performance and the presumption of pluralism itself.

Collective Action under Pluralism

The diffusion of decision-making power across multiple autonomous and heterogeneous individuals and organizational actors with different interests, knowledge-bases, value systems, and ideologies is the cornerstone of pluralism.[17] Pluralistic settings constitute a complex form of organizing work to develop things. The very notion of pluralism stymies efforts to break apart the development process into a hierarchical system of modular design choices with clear, agree-upon interfaces. In a modular system, as Carliss Baldwin and Kim

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[17] In management literature, this point is made several times by Jena-Louis Denis and his collaborators who studied decision-making in health-care arenas (e.g., Denis et al. 2001, Denis et al. 2007, Denis et al. 2011); and by Paula Jarzabkowski and her collaborators who have studied decision-making in universities and regulated enterprises (e.g., Jarzabkowski, P. 2005, Jarzabkowski, P. Balogun, J. 2009. Jarzabkowski P, Sillience, JAA Shaw D 2010. Rittel and Webber make the same point in the planning literature.

Clark explain, design rules preserve key interdependencies between design choices, whilst creating space within the modules for individually-owned design choices; hence, within the modules, designers make choices with limited need to interact with other designers. The near-decomposability in modular systems thus enables to reconcile concerns with efficiency with flexibility to accommodate heterogeneous and dynamic interests, needs, and preferences. This, in turn, encourages voluntary contributions of individually-owned resources.

In marked contrast, in a pluralistic development setting, multiple actors with rivalrous design preferences and differing institutional logics cannot be excluded from one-off decision-making processes to make interdependent strategic design choices. Strategic design choice thus becomes 'indivisible' and inherently political. If the participants in a dispute fail to cooperate, reciprocate, and compromise, collective action cannot ensue. Complicating matters, government and regulated sectors—the two classic contexts for enabling megaprojects—create extreme pluralism. Extreme pluralism is characterized by the low likelihood that a dominant coalition of actors can emerge and impose their strategic preferences on others.[18] Under these circumstances, the participants in a pluralistic setting have, perforce, to complement analytical deliberation processes with negotiation and bargaining. Both approaches are needed to coordinate the individuals' behaviour and knowledge, bridge differing preferences, and ultimately enable collective strategic choices.

The premise that (extreme) pluralism is at the core of the development of complex socio-technical systems has important implications to our understanding of megaprojects and how they perform. If strategizing is the outcome, in part, of interest-based negotiation within a mutual-gains bargaining structure, two major risks ensue. One risk is that of impasse and inaction. This occurs when actors who do not really trust each other keep disputing the

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[18] Pettigrew 1973; Jarzabkowski, P. 2005. Strategy as Practice: An Activity-Based View. London: Sage

evidence used by the other party to back up their arguments. If cooperation fails to flourish, some actors can defect and the pluralistic setting collapses. Or alternatively, some resource-rich actors may not even feel tempted to join the pluralistic arena as they are too pessimistic about its chances of success, and thus the pluralistic enterprise never gets off the ground. This is the case, for, example, of the story in our book of London Crossrail, a high-capacity train under London that only got off the drawing table after three failed attempts over two decades.

A second risk is that efforts to sustain a pluralistic setting lead the promoter to make concessions and side payments to other powerful stakeholders that are arguably rather disproportional to their stake. Compromise is effective to carry along multiple actors with incompatible goals and can produce good reasons for slippages in the performance targets for a pluralistic setting. But an excessive number of concessions and side payments can ultimately undermine the value of the collective enterprise. This, in turn, can lead to 'white elephants' such as the infamous Athens Olympic village and some South Africa's World Cup stadiums, cases of megaprojects that led to designed artefacts with limited value in legacy.

Pluralistic settings are not alien to management literature. Indeed a substantive body of literature illuminates symbolic and communication practices necessary to sustain pluralistic settings.[19] First, we know that in these arenas strategic choices are made, unmade, and remade multiple times; hence pluralistic settings are prone to the formation of "networks of indecision", in which "participants have become sufficiently attached to a common project to continue working together to move it forward, but their divergent conceptions of what this involves prevent them from materialising it in tangible form[20]. Second, we know that a major source of management complexity is the multiple couplings between strategic choice with the

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[19] Denis et al. 2001, Denis, JL, Langley, A. Rouleau. L. 2006, 7, Denis et al. 2011; Jarzabkowski, P. 2005, Jarzabkowski, P, Fenton E 2006, Jarzabkowski P, Sillience, JAA Shaw D 2010
[20] Denis et al. 2011.

interests of the constituents of the decision-makers and of other affected independent organizations, as well as the coupling between strategic choice and the environment. Third, we know that strategic ambiguity creates space for incompatible goals; this notion translates into the deliberate use of equivocal language, vague goals, procrastination of difficult decisions, safeguarding of rights to reverse decisions, and inflationary consensus (collective agreements disproportional to the resources actually available). Fourth, we know that early commitments to numeric targets are necessary to fill the strategic void created by ambiguity. Finally, we know that reification practices are useful to make it hard for the participants that have entered a pluralistic setting to withdraw without losing face. Reification practices include the use of enthusiastic language in public discourse implying prestige, process and technological leadership; signatures of non-binding protocols, and ratification of documents.

There is no doubt about the value of communication, rhetoric, and symbolic devices to sustain pluralistic settings. Strategic ambiguity and reification practices are necessary to carry multiple actors along and create opportunity to achieve goals that a single actor cannot achieve individually. Early commitments, in turn, give the promoter legitimacy to ask other actors to commit their resources to the enterprise. But these practices per se do not get things done. Furthermore, these practices are double edged as they sow seeds of discord and thus can stymie the collective action they intended to encourage in first place. This is the paradox of pluralism.[21] Hence our book builds upon these ideas but shifts the focus to strategic design choice under pluralism. Specifically, our emphasis is on furthering our understanding of organizational and governance structures that enable collective action under pluralism.

Importantly, the premise of pluralism creates opportunity to deploy literature on the governance of consensus-oriented collective action rooted in Elinor Ostrom's work on

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[21] Garud, R., Gray, B., Tuertscher, P., 2014 The Paradox of Pluralism: The Case of Atlas, CERN. Working Paper.

Governing the Commons: The Evolution of Institutions for Collective Action[22]. It is the task of the constellations of leaders that share strategic decision-making power to collectively design governance structures. Governance allocates decision-making authority and resources, and thus enables and constrains collective action. In a megaproject organization context, governance is necessary to coordinate the interfaces between the promoter with its constituencies, other organizational actors, and with the environment, as well as to coordinate the work of the project suppliers and skilled labour. Furthering our understanding of the governance of megaproject organizations under pluralism is a central objective of this book. We turn now to explain how we propose to advance our understanding of the complexity of pluralism in megaproject organizations by looking to new infrastructure developments.

Infrastructure and Megaproject Organizations

Our entry point in our attempt to further our understanding of how to develop complex socio-technical systems under pluralism are the megaproject organizations formed to develop large, capital-intensive infrastructure. Infrastructure is the backbone of modern society, and provides the foundation needed for the functioning of any community or society. Without transport systems, people cannot trade and travel; without power plants and distribution networks factories cannot produce goods; without safe water and sanitation people's lives are at risk; without water irrigation systems farming activities cannot prosper; without schools and hospitals education and health cannot be improved; without Olympic parks people and nations cannot release energy and compete in civilised and healthy ways.

The development of new, large infrastructure requires setting up a megaproject organization. Irrespectively if the promoter of the infrastructure is the government or a regulated firm, the system-level goal cannot be achieved unless the promoter assembles a vast

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[22] Ostrom, E. 1990.

array of resources. These include the finance, land, political support, regulatory consent, technical and management capabilities, and tacit knowledge of needs in use. It is unlikely that a single organizational actor directly controls all these diverse and substantive resources. Many resources are also not up for sale, and thus cannot be acquired on the markets through transactional mechanisms. Most likely, the ownership of this diversified array of resources is distributed across multiple, legally-independent organizational actors. Hence, any new infrastructure development, perforce, requires cooperation across organizational boundaries.

New infrastructure developments create, however, challenging settings for norms of cooperation to flourish including trust, reciprocation, and compromise. First, new capital-intensive infrastructure schemes are invariably controversial because they commit large sums of money. Because the actors are heterogeneous, it is hard to establish a meritocracy-based authority and entrust *de facto* decision-making to wise and knowledgeable professionals; complicating matters is the "aura of irreversibility" around the decision-making process[23]. Second, new large infrastructure developments often require compulsory land take and blight property. In a crowded world, these schemes impair on people's property rights and lead to disputes that create winners and losers, and have the character of zero-sum games. Third, the value proposition of a new infrastructure development is associated with long planning horizons which leads to high ambiguity in the cost-benefit analysis. Fourth, new infrastructure developments are one-off enterprises that bring together multiple actors who may have never worked together and may lack time and incentives to build a robust social contract. And fifth, many of the strategic design choices that define a new infrastructure system are not so technologically complex that they cannot be comprehended by many heterogeneous actors. This accessibility of strategic design choice exacerbates pluralism.

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[23] Simon (1996 p.163) makes this point in the context of nuclear energy deployment, for example.

Challenges notwithstanding, the development of new infrastructure is a phenomenon of universal relevance. In developing states, the gap between infrastructure supply and demand is a major obstacle for socio-economic development. India, for example, is at the cusp of becoming the world's largest country by population. However, its crumbling infrastructure and chronic traffic delays causes annually multi-billion economic losses; lack of infrastructure is also choking efforts to diversify the Indian economy away from agrarian activities into manufacturing, a move necessary to lift millions of people out of poverty. African states are also notorious for incipient infrastructure. And yet, the United Nations projects that Africa's population will reach a quarter of the world's population by 2025 and 40% when the century draws to a close. Likewise, South America's strong population growth has led to chaotic and rapid urban development, and to some of the most unequal and dangerous cities in the world.

In an interconnected world, a lack of local infrastructure becomes everyone's problem. The dire living conditions in developing states spur their peoples to leave behind their loved ones and belongings, and put their lives at risk in an attempt to reach out developed states. Mass migrations are occurring at a time when many governments in the developed states are cash-strapped and face massive bills to modernize aging infrastructure. For example, the infrastructure gap in the US has moved to the centre of the public debate after deadly bridge collapses and the destructive Katrina hurricane and Sandy storm. Likewise, new infrastructure development is back at the heart of the UK policy agenda, a country that was once a global leader in infrastructure but gradually lost its edge in the twenty century.

The stories of megaproject organizations formed to develop new infrastructure which we will share show, unexpectedly, that these enterprises are pluralistic at their core even in contexts where governments do not offer a democratic bargain. Irrespectively of context, any

new infrastructure development provokes the same fundamental questions: How can self-interested agents bridge their differences under diffused power? Why should one scheme go ahead in detriment of others and displace people who do not want to move? How to deal with normative expectations to deliver projects on time and within budget? Why do some enterprises derail or lead to 'while elephants' whereas some good schemes may fail to get off the ground? These are complex questions that we address to advance our understanding of contemporaneous megaproject organizations formed to develop new infrastructure.

Advancing our understanding as to how new infrastructure comes about—or fails to happen across different contexts—is part of what we are trying to do. In telling these stories, we are seeking to construct a theory of developing complex systems under pluralism. Hence our accounts and our theory are intertwined. The stories ground our theory and offer the evidence that informs our claims. Our theory illuminates the phenomena and helps us to comprehend megaprojects and how they perform. In this approach, we embrace Immanuel Kant's idea that "experience without theory is blind, but theory without experience is mere intellectual play." To prepare for this intellectual journey, we turn now to provide an overview of our theory. We then proceed to a detailed exposition of how the theory illuminates our comprehension of megaproject organizations and the complexity of pluralism.

An Overview of the Theory

There is a research tradition of beginning theories that attempt to explain complex phenomena by introducing the structures, or basic language, that constitute the subject matter of the theory. Theory development can then describe the context in which the structures exist and elaborate on the implications of changing the structures and/or the context that enables

those structures. Holland's theory of complex adaptive systems[24], for example, proposes a template in which complex structures are built up of simple structures, and complex changes occur as a result of combination and sequences of changes to those structures. Likewise, Baldwin and Clark develop a theory of design evolution. The authors first build on design theory to introduce the constructs of designs and design processes, and then use that template to theorize the process of design evolution via modular operators and clusters.

We follow their lead, and have thus organized this book by first developing the language of our theoretical framework. We start by introducing a process model that conceptualizes the life-cycle of a megaproject organization in two temporal brackets: strategic planning and implementation. The end of implementation is the start of the long service life for a new infrastructure. During the service life an actor will operate the infrastructure, maintain it, and manage the interfaces with the end-users and the environment at large. In ideal conditions, the infrastructure operator would be involved from the onset of strategic planning. But given the long timescales, often the operator only gains organizational form in implementation when the hand over to operations nears and detailed operational deliberations urge.

Specifically, strategic planning is about transforming a grand idea for a new socio-technical system into an actionable plan. It can take years when not decades (and a few failed attempts along the way) until the promoter succeeds in forging a plan that reconciles the available financial resources and technology with the interests, value-systems, knowledge, and design preferences of multiple resource-rich actors. The case of the development of the London 2012 Olympic park, one of the stories at the heart of this book, is telling. It took three consecutive unsuccessful bids until multiple actors in the UK succeeded to collectively formulate a bid that was endorsed by the International Olympic Committee, the powerful

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[24] Holland, JH 1998, Emergence: From Chaos to Order. Reading Mass. Persues Books

brand-owner. Strategic planning is thus a protracted process of acquiring commitments from multiple actors to supply critical resources to the enterprise. This process requires announcing performance targets to fill the strategic void created by ambiguity in the cost-benefit analysis.

We will argue that during strategic planning the promoter holds considerable sway over many strategic choices including designing the megaproject organization structure, securing the finance, and selecting the project suppliers. And yet, it is at the critical process of defining the structure of the designed artefact, and thus setting the project scope, that pluralism rules. This makes strategic planning inherently political. We trace pluralism back to the very nature of the system-level goal. Megaproject organizations develop long-lived systems which will be shared in use by many heterogeneous actors. This creates a problem where multiple independent, resource-rich actors will want to appropriate the potential value that the system could create *for them* in use, and thus they will want to directly influence—and indeed will claim legitimacy to do so—strategic *design* choices that define the future system. They will do so in exchange for committing to supply their resources to the collective enterprise.

We will thus argue that strategic design choices qualify as an Ostrom's 'common-pool resource;' this is, a resource that is shared by many non-excludable claimants with rivalrous goals. We will also argue that strategic design choices can be subjected to polycentric governance.[25] This form of governing consists of creating a nested structure of decision-making centres with capacity for mutual adaptation and local variation. Polycentric governance is a classic form of organizing large shared resources. Elinor Ostrom found them in Indiana police forces and in California water management services. Here, we will argue that polycentric governance is endemic to megaproject organizations. We will also argue that, under some circumstances, polycentric governance can encourage commons logic to flourish

[25] Ostrom, V. 1972. Polycentricity. Presented at 1972 Annual Meeting of the American Political Science Association, Washington, DC, September 1972.

among the participants in a megaproject. And yet, we will also show instances where commons logic does not flourish between the megaproject participants albeit polycentric governance. In the latter scenario, not all strategic design disputes can be self-resolvable by the participants in the megaproject. We will then discuss other governance devices that enable collective action under pluralism, notably: i) slack resources to reconcile incompatible goals under conflict; and ii) outside umpires to referee disputes that cannot be self-resolved.

We will then show how the very nature of the implementation stage is fundamentally different from strategic planning. Implementation is about transforming a strategic plan into a functional artefact. Rarely does the infrastructure promoter have all the necessary technical and management capabilities in-house to implement a strategic plan. But the formal agreements which the promoter forged with resource-rich actors in strategic planning enable the assemblage of a vast supply chain of design and management consultants, manufacturers, and building contractors. Suppliers are profit-seekers that bring capabilities that are substitutable to varying degrees, most of which can be acquired on the markets through transactional mechanisms. Central to the implementation stage is thus the decision-making process of dividing the project scope into multiple work packages, selecting the suppliers that will implement each package, and designing the contracts to govern each buyer-supplier relationship. These decisions delineate the structure of the megaproject organization in the implementation stage, and enable the promoter to 'simulate' an authority hierarchy.[26]

Furthermore, we will show that resolving the problems created by pluralism in strategic planning is a protracted process. Hence the strategic planning and implementation stages that our template arranges sequentially for the sake of exposition of our theoretical argument can in reality overlap from a moderate to extreme degree. This overlap is a quality of the

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[26] Stinchcombe, AL., CA. Heimer 1985. Organization theory and project management: Administering uncertainty in Norwegian offshore oil. Scandinavian University Press.

development process for a complex socio-technical system. This overlap is also a cause of major uncertainty in requirements throughout implementation. We will discuss variance in the extent both stages overlap, and how the overlap has implications for setting the boundaries of the megaproject organization and the reliability of the performance targets.

We conclude the exposition of our arguments with a discussion of how changes in context impact the structure and performance of megaproject organizations. Whilst we know that context always matters, we seek to illuminate as to why and how it matters. We first examine the case of megaproject organizations formed to develop new infrastructure in developing states by looking in-depth to major schemes in India, Nigeria, and Uganda. In these settings, we trace pluralism to the scarcity of financial resources to develop new infrastructure. We will argue that the source of finance had direct impact on the design of governance structures, on the decision-making processes to define strategic design choices, and ultimately on megaproject organizational performance. We also show that in developing states the collective action problems that are endemic to pluralism are exacerbated by the scarcity of management and technical capabilities, brutal politics, and fragile institutions. Still, we will trace differences in organizational performance to differing forms of financing and structuring megaproject organizations in these contexts. Specifically, we contrast the structure and performance implications of megaproject organisations financed through transparent but slow deals vis-à-vis megaprojects financed through opaque but fast deals.

Finally, we examine megaproject organizations formed to develop infrastructure in autocratic monarchies in the Middle East. These rentier states offer a social contract very different from western-style regimes. If there is no taxation, the government does not necessarily operate under the assumption that it needs to offer a democratic bargain. We could thus be led to believe that the presumption of pluralism at the core of a megaproject

organization would not hold. However, that is not the case. We will show that abundance of financial resources is not a sufficient condition to enable one actor to acquire absolute control of strategic design choice in megaproject organizations. Even in rentier states, pluralism can emerge although delineated to a restricted group of privileged actors with conflicting goals.

We turn now to a detailed description of the contribution of each chapter. Figure 1 illustrates our conceptual model of the life-cycle of a megaproject organization and shows how we have positioned the contributions of the three parts of the book.
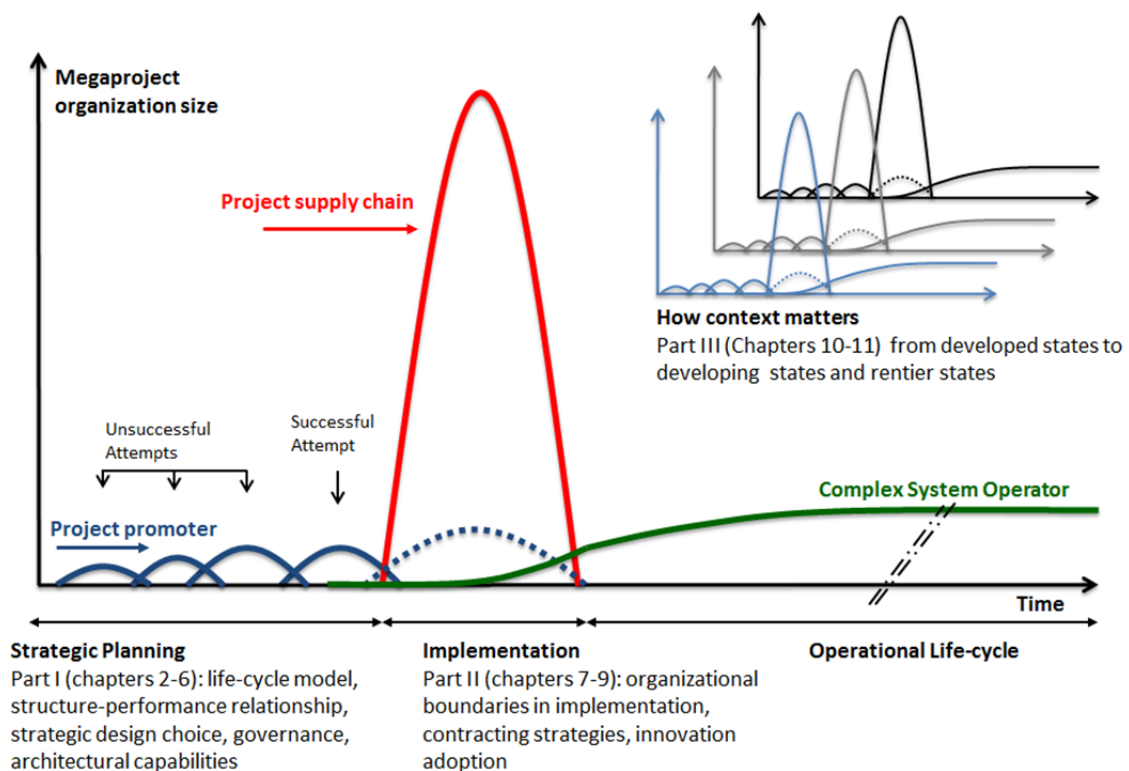
Figure 1 –Megaproject Organizations: A life-cycle model of the development process

Part I – Strategic Planning, Pluralism, and Governance

We start Part I by introducing a model of the life-cycle of a megaproject organization. Specifically chapter 2 decomposes the development process into two temporal brackets that highlight different problem structures: strategic planning and implementation. This chapter is grounded in data from three contemporaneous large infrastructure developments: London

2012 Olympic park, London Crossrail railway, and Heathrow airport Terminal 2. We explain how strategic planning is about the processes of acquiring commitments from multiple actors to supply critical resources to implement the grand idea; implementation, in turn, is about the ensuing processes of allocating those committed resources within the solution space delineated in strategic planning. Hence, we include within the boundaries of the megaproject organization the resource-rich stakeholders with power to directly influence strategic design choice. As part of the environment, we include resource-poor stakeholders, i.e., organizations and individuals who may need to be consulted by regulation, but lack the power to influence directly strategic choice; and regulation and laws in the environment, and other formal institutions, the so-called rules of the game[27]. By delineating the organizational boundaries of a megaproject in this way we reveal the pluralism at the megaproject organization core.

We focus the discussion of megaproject organizational performance on the evolution of the strategic design choices and thus scope, and of the corresponding cost and schedule targets. We trace the performance evolution to the longitudinal growth of the core membership of the megaproject. We also explain how "optimism bias" is both a blessing and curse: optimism is necessary to belief that the system-level goal is achievable under pluralism, but fuels underestimation of the necessary cost, time, and effort. We conclude by showing the potential value of using a Gumbel statistical distribution to predict the evolution of the cost forecast as a function of the growth of the membership of the megaproject. The Gumbel distribution is often used for modelling equipment breakdown data; in our datasets cost hikes correspond to 'consensus breakdowns' amongst megaproject participants.

The chapters 3 and 4 in Part I then go on to illuminate alternative structures that can be collectively designed to govern the pluralistic settings created to develop large infrastructure.

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[27] North 1990

Specifically, chapter 3 argues that, under certain conditions, a polycentric commons is a possible governance structure. This chapter is grounded in data from a program to develop a group of new secondary school buildings in the UK (the Manchester Building Schools for the Future program). In agreement with studies on collective action, we show that governance of large infrastructure projects is polycentric. In a polycentric structure, the authority to make strategic choice is distributed across nested centres of decision-making and power with capacity for mutual adaptation and local variation. We also argue that polycentric commons governance has two main functions. On the one hand, it delineates authority over strategic choice to pre-empt disputes. On the other hand, it creates devices to resolve strategic disputes that cannot be pre-empted. The self-resolution of disputes leads to adaptive performance. The basic idea is that under pluralism, performance outcomes are influenced both by targets set unilaterally by the promoter as well as by local disputes rooted in differing individualistic design preferences. Hence evolution in performance targets does not automatically indicate underperformance. Rather, slippages in performance targets that are commensurate with change in strategic design choices are the consequence of sustaining a pluralistic setting.

Chapter 4 moves us outside the boundary conditions articulated in chapter 3, and thus into megaprojects so large that context presupposes pluralism will make it virtually impossible to self-resolve all disputes. This chapter is grounded in data from four large infrastructure projects in the UK (High-speed 2 and Crossrail railways, London 2012 Olympic park, and Heathrow airport Terminal 2). We use Design Structure Matrices, a tool from design theory, to shed light on shared power over strategic design choices. We show that polycentric governance emerges irrespectively of the type of design structure (modular vs. integral), promoter structure (solo vs. coalition), and deadline rigidity (immovable vs. flexible). We trace the evolution of performance targets to polycentric governance. The central claim is a contingency model of megaproject performance that contains a relationship

between: i) the availability of slack resources (time, money) to reconcile incompatible goals despite conflict; and ii) the presence of an umpiring structure external to the megaproject and enabled by context to referee strategic disputes that cannot be self-resolved.

Chapter 5 provides a deeper look at strategic planning for a large infrastructure. This chapter is grounded on an in-depth empirical study of the strategic planning for High-speed 2, a national train network in the UK projected to be completed in 2032/3. The central question is: if we control for context and governance structure, why do we still observe substantive variance in the performance of strategic planning across nested centres of local decision-making? The main point of this chapter is to trace variance in local performance to the degree of goal congruence at local level and to pre-existing local governance structures. We show that if the local actors themselves have incompatible goals and local governance structures are fragile, consensus with the promoter is much harder to achieve. Vice-versa, if local goal congruence is high and governance structures are robust, the promoter has a less difficult job.

We also illuminate how variance in the local pluralistic structures and in the degree local actors are in agreement among themselves leaves the promoter with a delicate balance. On the one hand, the harder it is to search for a mutually consensual local solution, the harder it gets to strike a consensus without making multiple concessions and side payments to satisfy all local participants. On the other hand, the more concessions the promoter makes to solve one local problem, the more pressure mounts to make similar levels of concessions elsewhere—equity concerns are endemic to pluralism. If the promoter only pushes back claims from one group of local participants, it can be accused of playing favourites and being unfair. If the promoter attempts to treat everyone the same way and keep to the same level of concessions across the board, pressure on the performance targets can cause the development to unravel. This reveals how the rule of pluralism over strategic design choices creates

interdependency between local decisions to allocate capital in a megaproject organization, which impairs the promoter's ability to set reliable targets upfront.

Chapter 6 concludes Part I by attempting to refute our own premise that pluralism is at the heart of new infrastructure developments. The point we want to make here is that whilst pluralism cannot be eliminated, it can be attenuated. Using data from the projects introduced in chapter 4, we discuss the extent the promoter can influence the formation of the megaproject organization in order to align the growth of its core membership with the hierarchy of strategic design choices. Hypothetically, if the promoter could align the timing to make strategic design choices with the arrival to the megaproject organization's core of the actors that control the resources relevant to those decisions, unnecessary cycles of decision-making could be pre-empted. To enact this idea, we will argue that promoters need strategic architectural capabilities to, on the one hand, understand the landscape of resource-rich actors and corresponding strategic design choices which these actors want to directly influence. Their lack of commitment to supply individually-controlled resources is a bottleneck that the promoter needs to overcome. On the other hand, promoters need architectural capabilities to understand the technical structure of the designed artefact and thus the actual strategic design choices. We discuss how attempts to mirror the longitudinal evolution of the structure of participation in the megaproject with the evolution in the hierarchical structure of strategic design choices are facilitated or complicated by pre-existing structures and external events.

Implementing Complex Systems under Pluralism

If strategic planning of a new infrastructure is successful, implementation ensues to transform the plans into a functional, long-lived designed artefact for people to share in use. Organizing for implementation under pluralism is the focus of Part II. Implementation happens once the promoter has a sufficient number of formal agreements with multiple

resource-rich actors as to the tangible form of the designed artefact. A major task of the promoter is to assemble a vast network of specialised suppliers and let contracts. Unresolved strategic disputes create uncertainty and a risk of late change in requirements. This creates complications since many suppliers are non-capitalised firms with limited ability to carry large equity-type risks, and thus predisposed to aggressively price risk if forced to carry it.

Chapters 7 and 8 in Part II illuminate how the promoters set the boundaries of the project organization created to implement a complex system under pluralism. The sources of data are four large infrastructure development projects in the UK: Heathrow airport Terminal 2, London Crossrail railway, London 2012 Olympic park, and Thames Tideway Tunnel, a super-sewer currently in construction under London. We will use our qualitative and quantitative data to illuminate three major tasks that promoters face at the implementation stage. First, the promoter needs to divide the project scope in work packages to be carried out by different suppliers, and devise a plan to integrate the effort of each supplier and manage the interfaces. Second, the promoter needs to select the suppliers who will do each job. And third, the promoter needs to design contracts to govern the buyer-supplier relationships.

In Part II we will build on theory on organizational boundary setting[28] to argue that the boundaries of the megaproject organization at the implementation stage can be understood as the outcomes of the interplay of four intertwined logics: i) a logic of efficiency that is concerned with writing buyer-supplier contracts that reduce the costs of the one-off transactions whilst offering enough flexibility to cope with the uncertainty endemic to pluralism; ii) a logic of capabilities that seeks to assemble a supply chain that is technically and managerially capable to build a complex designed artefact under uncertainty in requirements; iii) a logic of power that recognises the interdependences between the

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[28] Santos and Eisenhardt

megaproject organization and the environment, and thereby the constraints that this interdependency sets on the space of possible organizational solutions for the megaproject; and iv) a logic of organizational identity that acknowledges that megaproject promoters operate under various institutional pressures from the environment to conform to particular social norms and practices.

Specifically, in chapter 7 we show how the interplay of these four logics impacts the process of setting the organizational boundaries of the megaproject. We illustrate alternative ways to set organizational boundaries with contracting strategy maps, a graphical tool that creates a two-dimensional orthogonal matrix that allows representing both the key functional components of the complex system and the activities that need to be undertaken in order to produce those components. We trace the observed variance in contracting maps to the extent one organizational boundary-setting logic may subdue other logics in the decision-making process. In chapter 8, we look more in-depth at the implications of the interplay between the four organizational boundary-setting logics on the processes of selecting the suppliers and writing the contracts that govern the buyer-supplier relationships. We also discuss discrepancies (endemic to pluralism) between what the promoters say they do and what they actually do when it gets to set the organizational boundaries in the implementation stage.

Chapter 9 adds an important strand to our story by focusing on innovation adoption. The data sources are decisions to adopt technological and process innovations at the Heathrow airport Terminal 5 project. The chapter will show how innovation occurs in complex socio-technical systems under pluralism, and thus that consensus and politics are not necessarily fatal to innovation. However, the process of innovation under pluralism is, as expected of a complex setting, non-linear and protracted. The chapter will trace innovation adoption to two factors: i) the capacity of the participants in the pluralistic settings to 'absorb' potential

innovations; and ii) the diffusion of decision-rights over the strategic design choices to innovate across multiple actors. The more the decision rights are diffused across multiple actors, and the more some of these actors lack absorptive capacity, or lack the time and other resources to develop the capacity necessary to absorb new ideas, the more difficult it becomes to exploit the innovation potential of a new infrastructure development.

PART III – How and Why Context Matters

Part III extends the theoretical claims developed so far (and empirically grounded in the UK context) into two fundamentally different contexts: developing states and autocratic monarchies, the so-called rentier states[29]. Specifically, this section is informed by in-depth case studies of large infrastructure developments unfolding in India, Africa, and the Middle East. We will argue that the construct of pluralism still applies to understand the structure and performance of the megaproject organizations formed to develop new infrastructure in these contexts. But the empirical instantiations of pluralism in these contexts exhibit important differences from those observed in a developed state such as the UK.

In a developing state legal frameworks and regulation are incipient, and enforcement of laws and property rights is weak. There is also abundance of organizational defiance practices, and thus of the pursuit of informal economic activity either to seek rents by breaking the law, or to circumvent ambiguity in formal rules. Many rulers and officials can also be expected to treat public resources as their private property and attempt to use public authority to appropriate property of others. However, we will argue that fragile institutions, corruption, and scarce managerial and technical capabilities are not sufficient conditions to enable a single actor to dictate strategic design choice in a new infrastructure development. If the government of a developing state is cash-strapped, two basic options lay ahead to finance

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[29] Hertog, S. (2010). Defying the Resource Curse: Explaining Successful State-Owned Enterprises in Rentier States. World Politics, 62(2), pp.261–301

major infrastructure ambitions. First, the government can secure finance through a bilateral agreement with a lender state. Bilateral agreements come with multiple strings attached over strategic design choices and pluralism outrightly ensues. Alternatively, a cash-strapped government can seek finance from a multistate agency which again will also have strong views as to the design structure of the future infrastructure. Hence scarcity of financial resources is a major source of pluralism of megaprojects in developing states.

Chapter 10 in Part III builds on this insight to further our understanding of the structure and performance of megaproject organizations in developing states. Specifically, we contrast the megaproject organizations financed by bilateral agreements with those financed by a multilateral agency. Our sample includes two schemes enabled by Chinese finance: the development of Entebbe-Kampala's expressway, Uganda's first toll highway; and the development of Lagos' blue line, the first metro line of Nigeria's capital, a city projected by the United Nations to become Africa's largest city by population around 2020. A third scheme is enabled by a Japanese lender: the development of the Western dedicated freight railway corridor that links Mumbai to New Delhi in India. In contrast, the World Bank is the financier in three other schemes: the development of the Eastern dedicated freight railway corridor in India that links New Delhi to Kolkata; the development of a rapid bus transit corridor in Lagos, Nigeria; and the modernization of the roads of Kampala, Uganda's capital.

We chose this sample to vary the nature of the borrowing state. India and Nigeria are 'competitive developing states'[30] where political and economic rules have become more impersonal, though some other necessary aspects of democratic sustainability have not yet been achieved or some rules remain personalised. Uganda, in contrast, is an instance of a

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[30] Levy, B. 2014. Working with the Grain. Integrating Governance and Growth in Development Strategies. Oxford University Press.

'dominant discretionary state'[31], states where strong political leadership (perhaps military or organised around a political party or a charismatic individual) has consolidated its grip on power but the institutions remain weak. Rule in the latter is more personalised and the organizational separation between the public and the private realms is weaker.

We build upon an in-depth analysis of these six cases to reveal how the premise that pluralism is central to megaproject performance still holds in a developing state context. But we also show that in these settings the complexity of pluralism is further amplified by lack of governance devices to reconcile incompatible goals notably umpiring structures and slack resources. This, in turn, can lead to two development patterns. On the one hand, the speed at which strategic planning unfolds can be very slow, and many urgent schemes with real socio-economic value will struggle for decades to get off the ground. As difficult talks drag in strategic planning to reconcile incompatible goals, new announcements of updated performance targets succeed one after the other. This state of flux can easily give rise to a prevailing but arguably unfair perception of extreme underperformance. We trace this pattern to schemes financed by the World Bank and Japan International Cooperation Agency (JICA), two organizations that want to see major strategic disputes resolved openly before committing finance, and releasing the capital necessary to start implementation.

Alternatively, weak institutions in a developing state can enable to move a megaproject organization into the implementation stage without first resolving major strategic disputes. We observed this scenario in schemes financed by Chinese lenders. The upside of allowing for extreme overlap between strategic planning and implementation is the opportunity it creates to accelerate new infrastructure development. However, under these circumstances, it is virtually impossible to produce reliable performance targets upfront for the megaproject

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[31] Levy, B. 2014.

and to prevent major strategic disputes to emerge later on between the megaproject participants. In many cases emerging disputes end up stalling progress in implementation; in other cases, dispute resolution requires radical change in scope. Either way, a perception of extreme underperformance arises. These insights reveal an important trade-off: the faster development progress, the less transparent it becomes. This is not a trivial trade-off when applied to schemes that can have a major positive socio-economic impact, but simultaneously require massive capital investment in a context where millions live below poverty line. This suggests we need to have more nuanced definitions as to what positive performance of a megaproject means in contexts where resources are scarce and institutions are weak.

Chapter 11 concludes Part III by discussing the case of developing large infrastructure in the autocratic monarchies or rentier states common in the Middle East. Leveraging data from studies of the Oman national railway project and the Qatar FIFA World Cup 2022, we show how pluralism still matters to understand strategic design choice and concomitant evolution in the cost and schedule targets in these contexts. In rentier states, the social contract that sets out the condition to rule between a government and its peoples is fundamentally different from western states. In these settings, the state has steady streams of substantive guaranteed revenues, for example, from oil exploration which relieves the state of having to impose taxation on society. This, in turn, creates an environment where the state appears to operate under much less institutional pressure to offer a democratic bargain to society.[32]

And yet, we will argue that many strategic design choices in a megaproject are still the outcome of negotiated processes within a bargaining structure. Pluralism occurs because large infrastructure developments impact nonetheless multiple resource-rich actors even in

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[32] Gray, M. 2011. A Theory of "Late Rentierism" in the Arab States of the Gulf. Center for International and Regional Studies. Georgetown University School of Foreign Service in Qatar. Occasional paper No. 7. ISSN 2072-5957;

autocratic monarchies. But the mechanisms that give access to strategic decision-making processes are different as they often hinge on kinship. This creates opportunity for the supply chain schooled in the Western environment to play a more influential role in the strategic decision-making processes. We discuss how abundance of financial resources makes it less complicated to reconcile incompatible goals and creates lucrative business opportunities for suppliers. We also discuss the implications to the performance of megaproject organizations.

We turn now to the task at hand. We aim to provide an explanation of how pluralism shapes the processes of strategically planning and implementing capital-intensive complex socio-technical systems. We do not argue that pluralism is central to the development of all complex systems. But we argue that pluralism is a powerful force affecting the development of complex systems such as infrastructure. Ignoring this force obfuscates our ability to comprehend what we can see. We begin in chapter 2 by looking at the growth of the megaproject organizations formed to develop infrastructure and how we can trace evolution in the performance targets to the evolution of the organizational structure under pluralism.