

ALLOCATING RISK IN TRANSPORTATION MEGAPROJECTS: THE CASE OF THE CANADA LINE

by

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ABSTRACT

This project investigates risk allocation in urban transportation megaprojects within Canada and how public-private-partnerships (P3s) allocate risk in new ways. More specifically, I focus on how effectively the Canada Line P3 model dealt with construction-stage risk. The literature on megaprojects identifies ineffective risk allocation and cost overruns as typical features of megaprojects and recommends improved accountability and transparency throughout project planning and implementation. I also focus on how the Canada Line sets precedents for future transportation megaprojects.

I analyzed the legal case of a Cambie Street merchant affected by Canada Line construction and found the project particularly poor at managing compensation as a construction-stage risk, resulting in costly litigation. A case study comparison of three other transportation megaprojects revealed different ways of allocating construction-stage risk that were more effective than litigation. The role of transparency and comprehensive mitigation strategies emerged as being crucial to managing risk in transportation megaprojects.

Keywords: Canada Line; megaprojects; urban transportation; risk mitigation; risk allocation

DEDICATION

To my fellow Urban Studies students, and especially to Jessica Stutt, without whose enduring support, encouragement, and companionship this project would not have been possible.

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TABLE OF CONTENTS

Approval	ii
Abstract	iii
Dedication.....	iv
Acknowledgements	v
Table of Contents	vi
List of Figures	viii
List of Tables	ix
Glossary	x
1: Introduction	1
2: Methodology	4
2.1 Systematic Process Analysis	4
2.2 Using Legal Documents	6
2.3 Canada Line Data	7
2.3.1 Interviews	7
2.3.2 Legal Documents.....	8
2.3.3 Policy Documents.....	10
2.4 Case Studies	11
2.4.1 Sydney Airport Rail Link	12
2.4.2 Toronto Sheppard Subway Line	12
2.4.3 Seattle Central Link	13
2.5 Methodology Summary	13
3: Overview of Transportation Megaprojects	14
3.1 Defining Transportation Megaprojects	14
3.2 Characterizing Megaprojects.....	15
3.3 Total Cost Economics	19
3.4 Summary	21
4: Defining Public Private Partnerships	22
4.1 Definition of P3s	22
4.2 Rationale for Using P3s.....	25
4.3 Stages in a P3 Project.....	26
4.4 Evaluating P3 Project Outcomes.....	28
4.5 Summary	30
5: Defining Risk	31
5.1 Risk and Uncertainty	31
5.2 Creating a Risk Typology	33

5.3	Risk Allocation: Public versus P3 Approaches	37
5.4	Responses to Risk: Avoidance, Mitigation, and Compensatory Mitigation	41
5.5	Nuisance: a Litigious Risk	44
5.6	Canadian Precedent for Transportation Megaprojects.....	46
5.7	Summary	47
6:	The Case of the Canada Line	48
6.1	<i>Susan Heyes vs. City of Vancouver et al.</i> Summary	48
6.2	Project History and Legislative Environment.....	49
6.3	The Canada Line P3	52
6.3.1	Overview.....	52
6.3.2	Consultation Stages	54
6.3.3	RFP, BAFO and Selection Stages.....	56
6.3.4	Construction Stages	58
6.4	Risk Allocation in the Canada Line P3	60
6.4.1	Design Deficiency.....	62
6.4.2	Construction Delay	63
6.4.3	Nuisance.....	64
6.5	Transparency of the Canada Line Planning Process	68
6.6	Summary	70
7:	Case Studies	71
7.1.1	Sydney Airport Rail Link	72
7.1.2	Toronto Sheppard Subway Line	75
7.1.3	Seattle Central Link	76
7.2	Case Study Comparison	78
7.3	Summary	84
8:	Conclusion	87
	Reference List.....	91

LIST OF FIGURES

Figure 1: Typology of P3s	24
Figure 2: Risk allocation process in P3 contract procurement	40
Figure 3: Competition and selection procurement model for the Canada Line ...	54

LIST OF TABLES

Table 1: Basis for project success of megaprojects	29
Table 2: Risk typology for transportation megaprojects 44-45	34-35
Table 3: Costs, risk types and typical PSC vs DBFO P3 allocation strategies ...	44
Table 4: Allocation of risk in Canada Line P3	61
Table 5: Basic facts for megaproject case studies	72
Table 6: Case study comparison of costs and construction risk mitigation strategies.....	79
Table 7: Outcomes of megaproject case studies	81
Table 8: Risk allocation between public and private sectors in megaproject case studies	83

GLOSSARY

ALC	Airport Link Company
BAFO	Best and final offer
BOO	Build-own-operate
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
CLRT	Canada Line Rapid Transit Inc. (also known as CLCO)
DBB	Design-bid-build
DBFO	Design-build-finance-operate
DBFOM	Design-build-finance-operate-maintain
DBOM	Design-build-operate-maintain
PSC	Public Sector Comparator
RFEI	Request for Expression of Interest
RFP	Request for Proposals
SRA	State Rail Authority
TTC	Toronto Transit Commission
VFM	Value for money

1: INTRODUCTION

The planning and construction of major urban infrastructure projects has historically been a laborious, expensive, and often contentious process. The case of the Canada Line, the recently completed rapid transit link between Vancouver's airport and its downtown, is no exception. Developed ahead of schedule for the Vancouver 2010 Winter Olympic Games, the Canada Line is a groundbreaking project at the federal, provincial, and regional levels. On a national scale, the project is Canada's first airport rail link, although Canada is the last country in the G8 to build such a link. At a regional level, the Canada Line is Vancouver's first major underground transportation infrastructure project. The Expo and Millennium SkyTrain lines are almost exclusively elevated or at-grade and use different train technology. The Canada Line was the first rail transportation project in the province of British Columbia to employ a public-private-partnership (P3) to design, build, finance and operate the project. Other transportation infrastructure projects in the region were designed and financed using the P3 structure, but the use of P3s remains relatively new to the province of BC and particularly to rail projects. Thus, the Canada Line project constitutes a flagship project for several reasons and sets a major precedent for urban transportation projects.

Various groups including merchants, residents, and public officials were affected during the construction of the project, which raised concerns about the

project's impacts from the pre-planning to post-completion stages. The issue of compensation for affected parties became particularly contentious in the case of the Canada Line, as the legal action of former Cambie Street merchant Susan Heyes exemplifies. Heyes sued the project's public and private partners for economic losses due to construction on Cambie Street, the major corridor along which a large portion of the Canada Line was constructed. Heyes' claim for compensation hinged on the private partners' decision to use cut-and-cover tunnel construction, rather than the less obtrusive but more expensive bored tunnel method. I focus on Heyes' lawsuit because it brings to light the legal implications of how P3s allocate project risk. Furthermore, the outcome of her lawsuit has important implications for the planning of future transportation projects, whether they use P3s or not.

With these broad concerns in mind, my thesis addresses the following questions. How did the Canada Line project approach compensation for local merchants affected by construction? How did the P3 process allocate construction risk and the associated costs? Specifically, I examine how the Canada Line P3 process allocated construction risk and displaced costs to third parties. Accounting for total cost, accountability and transparency during project development, and effective risk allocation emerge from the literature as crucial elements in the successful development of transportation infrastructure projects. In addition to examining Susan Heyes' lawsuit against the public and private partners of the Canada Line, I examine three other transportation megaprojects to provide a meaningful context for analyzing how effectively various funding

structures allocate construction risk and its associated costs. While I analyze the role of P3s in relation to risk allocation, the involvement of the private sector in the planning and construction of transportation infrastructure is not the focus of this thesis. Rather, my research focuses on the outcomes of the Canada Line and particularly the precedents it sets for future urban transportation megaprojects in the region, as well as provincially and nationally.

2: METHODOLOGY

I outline the methodology of systematic process analysis used to compare the allocation of construction risks in the Canada Line project to three other transportation megaprojects. I also detail data collected, methods of collection, and relevance of each data type. I outline the development of my framework for evaluating costs and risk that underpins this case study analysis.

2.1 Systematic Process Analysis

I collected primary data related to the Canada Line from an extensive set of legal documents and two interviews. I also collected as many policy documents as possible related to the Canada Line planning process. I consulted newspaper articles during preliminary research and to contextualize some of the legal documents. For the three case studies, I collected secondary data from a combination of newspaper articles, transportation planning organizations, and academic journals.

I employed a methodology of systematic process analysis. Systematic process analysis entails comparing a relatively small number of case studies in detail, rather than employing statistical analysis of a large sample (Hall 2007). Case studies allow for focused attention typically on up to four instances of a social phenomenon (Babbie and Benaquisto 2002) and case study analysis helps explain the causal links in real-life interventions that are too complex for

survey or experimental strategies (Yin 1994). Systematic process analysis involves formulating a set of theories identifying the main variables that produce a specific outcome in case studies, as well as a brief account of how those and other variables interact to produce that outcome (Hall 2007). This methodology is useful for analyzing the case studies I chose because it allows comparison of several key elements in similar cases in order to draw general conclusions about the outcomes of each case. Case study analyses are particularly useful when examining “how” questions, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context (Yin 1994).

For this thesis, I chose a number of similar rail transportation megaprojects in Canada and elsewhere on the basis of varying levels of private-sector involvement. I constructed a framework for evaluating the costs, risks and risk allocation of each case study megaproject using literature on risk, P3s and megaprojects. While general principles for allocating risk are well defined in the literature (Irwin 2007; Bing et al. 2005; Loosemore et al. 2006), *ex post* studies of detailed risk allocation for specific projects are considerably scarcer. Hence, I developed a framework specific to my analysis that combined elements of various literatures.

I amalgamated a list of risks that characterize transportation megaprojects from various sources. From this broad risk typology, I chose several construction stage risks and one design stage risk to focus my analysis on (construction delay, nuisance and design deficiency). Using the literature, I

outlined typical allocation strategies for the selected risks, in both public sector and P3 approaches using the literature. I focused on the construction risks and associated costs that emerged during the lawsuit against the Canada Line, and examined the same risks in three other case studies. I focused on specific risk factors to provide a basis of comparability between projects that differed in their location, delivery method, and specific geohistorical context. The effectiveness of risk allocation strategies to deal with third party costs can thus be compared. I asked the following questions in all four cases: How was construction risk, particularly nuisance, allocated in each case? How was compensation for merchants dealt with during the construction stage of the project? To what extent did each project's promoters consider third party costs during the planning process?

I first examined case study data to determine how each risk was allocated between the public and private sectors. I subsequently considered whether specific strategies lowered the total cost of their respective projects. Finally, I briefly evaluated risk allocation as one of several elements in project outcomes. The literature outlines degree of competitiveness, transparency, and the nature of private sector involvement as determining project outcomes, in addition to risk allocation.

2.2 Using Legal Documents

Heyes' lawsuit provided a comprehensive overview of a specific risk factor (nuisance) throughout the planning and construction stages of a single project. Hence, legal documents were the most effective data for studying risk allocation

because they trace the legal precedent for nuisance in Canada and BC, discuss the ambiguities of public versus P3 funding arrangements, and establish the legal ramifications of involving the private sector in public projects. Effectively, Heyes' legal case and the documents detailing it are a discrete instance of risk allocation and its costs. Additionally, the trial included testimony of many crucial actors in the P3 decision making process. The testimonies of these witnesses, given under oath and taking as much time as the court required, are legally binding and provided information that I would not be able to attain in a personal interview. Furthermore, the case is currently on appeal, which precludes me from interviewing anyone involved in the lawsuit.

While numerous witnesses were called to testify on behalf of the provincial and federal governments as well as the private sector, other potentially knowledgeable actors may have not been included as part of the trial. Being reliant on the judges' choice of witnesses is thus a potential limitation of using legal documents. However, the witnesses' testimony available appeared more than sufficient for the purpose of evaluating the allocation of construction risks.

2.3 Canada Line Data

2.3.1 Interviews

I conducted two short unstructured interviews during the early stages of my research to supplement data I had collected to date. While my questions were brief and exploratory, respondents provided valuable information about the consultation and design process for the Canada Line that expedited my search

for policy documents and potential comparative case studies. Both interviewees were familiar with the project in varying capacities; one is a well informed planning and development consultant involved in the public consultation process at the City of Richmond, and the second respondent is a former transportation agency official.

2.3.2 Legal Documents

Before collecting any legal data I consulted the SFU criminology librarian to familiarize myself with legal data sources. I also spent time at several law libraries learning about Canadian tort law and property law. I collected all publicly available documents submitted as part of the *Susan Heyes vs. City of Vancouver et al.* lawsuit. Collecting these data required multiple trips to the court registry in downtown Vancouver, as legal documents cannot be removed from the desks of the court registry. These files were considered public as soon as the trial judgment was passed in May 2009, although as a researcher who is not party to the action I was required to pay a fee each time I accessed them.

The case file consisted of two main types of documents: documents related to the proceedings of the trial, such as notices of hearing and requisitions, and documents pertinent to the trial itself, such as transcripts and evidentiary documents. As the files were not organized in any discernable way, I immediately excluded documents related to trial proceedings and scanned all other documents page by page, uploading them to my laptop, and read them much more thoroughly after this stage. These documents included affidavits, amended statements of claim for the plaintiff (Susan Heyes), statements of

defence of each of the defendants, and lists of documents submitted as evidence (see references for full list).

Among the case files were transcripts of key witnesses' testimony, including the CEO of the public sector company CLRT, the VP of public affairs for the private company InTransitBC, and senior TransLink representatives. While many other witnesses testified, including other Cambie Street merchants and Heyes' accountant, I chose to focus on the testimony of high-level decision makers in the P3 planning and construction stages of the Canada Line. Upon the advice of Vancouver-based journalist Frances Bula (2009), who has followed the case closely for years, I examined the testimony of two other key witnesses, Gregor Robertson (then-opposition MLA for the Cambie area) and Carole Taylor-Phillips (then-minister of finance). Their testimony was particularly useful in describing the public sector's role in the project and their reaction to merchant concerns during construction. These two testimonies were not available as transcripts and I transcribed recorded files of the trial to obtain them.

Other legal documents exist that may have been helpful but were unavailable to me. I attempted to access the Book of Documents, containing all evidence submitted during the trial, by contacting Ms. Heyes' lawyer repeatedly. I did not receive a response and was subsequently informed by several law professors that much of the evidence remains sealed after the trial, particularly concession documents containing proprietary information. While accessing this mass of evidence would have provided much more detail on the trial itself, the

legal documents I was able to access provided more than sufficient information regarding the specific issue of risk allocation and nuisance.

One of the most critical legal documents was the judgment file summarizing the judge's decision to award compensation based on the claim of nuisance. Justice Ian Pitfield, who heard the case in the Supreme Court of BC, systematically outlines the series of events during the planning and construction of the Canada Line, the parties involved, and the legal precedent and rationale for his decision. This document was particularly useful in describing the claim of nuisance and the legal nuances of public versus private nuisance.

To analyze this extensive set of legal documents, I read each document closely and looked for discrepancies between planning-stage documents and witnesses' testimony regarding risk allocation and nuisance. When reading testimony, I considered the perspective of each witness and their vested interest in the lawsuit and highlighted quotes that elucidated the allocation of construction risk during the planning and construction stages.

2.3.3 Policy Documents

The second major source of data came from policy documents related to the planning and construction stages of the Canada Line. The Canada Line Rapid Transit Co (CLRT) maintained a website containing extensive and easily accessible policy documents for the project. However, the Canada Line website (www.canadaline.ca, formerly www.ravrapidtransit.com) was shut down in January 2010, several months after the project had opened, making access to

policy documents quite a bit more difficult. Many of the documents previously available on this website were subsequently posted on TransLink's website, although I had to contact several people at TransLink to find this out.

I collected select policy documents that provided in-depth information on each stage of the planning process, including the invitation to submit a best-and-final offer (BAFO), Value for Money (VFM) reports, and funding agreements, among others (see references for full list). To analyze these policy documents, I read each document closely and considered what organization wrote each document, what it said, and its purpose. I looked for discrepancies and vagueness of terms between these documents and evidence submitted in court and by witnesses at trial. I also looked for evidence of how construction risk was allocated between the public and private sectors and whether third party costs were considered during planning.

2.4 Case Studies

An overview of recently constructed large-scale urban transportation projects provides insight into how construction risk was allocated in each case. In chronological order of their construction, I discuss the Airport & East Hills railway line in Sydney, Australia, the Sheppard subway line in Toronto, and the Central Link in Seattle. I chose to focus on these three projects for several reasons. First, two are in North America, where automobile culture has dominated the physical and policy landscape to a greater extent than in European cities (Schrag 2006). The Sydney airport rail link Australia provides a close comparison to the Canada Line as an airport rail link developed for that

city's Olympics using a P3 delivery method. Secondly, all three projects are transportation megaprojects, which share certain features (outlined in section 3.2), including skewed cost-benefit analyses, major cost overruns, lopsided emphasis on cost reduction, and delivery through various partnerships between public and private sectors. Finally, all three projects were developed using a variety of funding approaches, from the conventional public funding structure of Toronto's Sheppard subway and Seattle's Central Link to the BOOT P3 structure of the Sydney railway line. Using systematic process analysis, I compared these projects along a variety of axes including funding structure, risk allocation strategies and transparency.

To collect information on case studies, I conducted library database searches of the key elements I was seeking to compare across case studies.

2.4.1 Sydney Airport Rail Link

I searched online for Sydney Airport and East Hills Railway Line. I also searched academic sources for information about this project, specifically documents that examine risk allocation, and found more than sufficient newspaper articles and academic journals discussing the project. I also searched the parliament of the New South Wales government for documents discussing the construction of the Airport Link project.

2.4.2 Toronto Sheppard Subway Line

I searched the Toronto Transit Commission (TTC) archives online as well as general searches for Toronto Sheppard Subway Line. For further details, I

searched newspaper archives. While I found some scattered articles briefly describing the project, there was a distinct lack of information about the planning and construction of the subway from public sources.¹ Searches of Toronto's Auditor General's office provided some information on the planning and construction of the subway.

2.4.3 Seattle Central Link

I searched for documents containing "Rainier Valley Community Development Fund" and found several salient documents outlining the impact mitigation strategies implemented during construction of the Central Link. These include a graduate thesis, newspaper articles, and information from Seattle's regional transportation planning authority, Sound Transit.

2.5 Methodology Summary

Systematic process analysis provided the methodology for examining four different transportation megaprojects. I collected data from a variety of sources, focusing on legal documents for the Canada Line and policy documents for all four cases. The next three sections outline in greater detail the literature on megaprojects, P3s, and risk that I used to construct the framework for systematic process analysis of construction risk and its allocation.

¹ Searching for information on the Sheppard Subway line on the TTC website returned this message: "TTC is working towards achieving a fully accessible website, however, there are some legacy pages and documents that are not yet fully compliant with our standards. For more information on our accessibility standards, please refer to our Accessibility Statement" (<http://www3.ttc.ca/Search/results.jsp>; accessed 11 May 2010).

3: OVERVIEW OF TRANSPORTATION MEGAPROJECTS

This chapter draws on the literature to define the term “transportation megaproject” and outline the history and characteristics of megaprojects. Major infrastructure projects have played a definitive role in urban development for decades, and understanding their history will assist planning for future transportation projects. I also present total cost economics as a theoretical tool for understanding and classifying the costs of megaprojects.

3.1 Defining Transportation Megaprojects

Megaprojects, by definition, are massive infrastructure projects that require substantial capital investment in the order of millions or even billions of dollars. The Canada Line and the three case studies I examine fit the definition of megaprojects as large-scale, complex projects delivered through various partnerships between public and private organizations (Morris and Hough 1987; Gellert and Lynch 2003; van Marrewijk et al. 2007). Further characteristics include a lifetime of fifty years or more, considerable uncertainty with respect to demand forecasts and cost estimations, and public benefit (Bruzelius et al. 2002). Thus the phrase “transportation megaproject” refers to a specific category of mega infrastructure project, and I deliberately utilize the term to indicate the immense scale, cost, and outcomes associated with megaprojects.

A brief history of megaprojects reveals the controversial role such projects have played in urban development over the past century. Altshuler and Luberoff (2003) identify four stages in the history of urban public investment in the United States: the pre-1950 era, during which cities had limited resources to build megaprojects; the “great megaproject era” of the 1950s to late 1960s which saw massive and disruptive investment programs; the 1970s era of transition; and most recently, the era of “do no harm”. The “do no harm” era grew out of intense citizen backlash to highly disruptive megaprojects and is characterized by substantial investment in megaprojects, although with differing project types and implementation strategies to mitigate significant disruption. Recently, the scale and number of urban megaprojects being undertaken has grown steadily upward, with “do no harm” constraints gradually weakening in the face of increased involvement of the private sector in public infrastructure projects (Altshuler and Luberoff 2003). While their research focuses on the United States, Canada faces similar increased involvement of the private sector in formerly public projects. The types of projects being undertaken, the delivery methods used, and the need to mitigate the effects of urban megaprojects have thus evolved over several eras to reach the current state of increased privatization of infrastructure.

3.2 Characterizing Megaprojects

The characteristics of megaprojects include skewed cost-benefit analyses, major cost overruns, lopsided emphasis on cost reduction, and delivery through various partnerships between public and private sectors (Morris and Hough

1987; Gellert and Lynch 2003; van Marrewijk et al. 2007; Flyvbjerg et al. 2002; Priemus 2010; Grimsey and Lewis 2004), while pitfalls in the early stages of decision making processes on megaprojects include absence of a proper problem analysis, lack of project alternatives, and ambiguities about project scope (Priemus 2010).

A commonly noted distinguishing feature of megaprojects is their massive cost overruns. Cost overruns are just one risk of megaprojects (Berechman 2009) but are some of the most common and costly. Thus, a comparison of megaproject outcomes warrants examination of cost overruns as a major risk. Flyvbjerg et al. (2003) argue that cost underestimation and overrun typify megaprojects. In a rigorous comparison of 258 transport infrastructure projects in 20 countries over 70 years, Flyvbjerg et al. (2003) compare forecast costs and actual costs. Older projects were included in the sample in order to test whether learning regarding cost estimation takes place. The authors found that in nine out of ten transport infrastructure projects, project promoters underestimated costs, resulting in cost overruns. Urban rail projects have the highest cost underestimation of all project types in the study; actual costs are on the average 44.7 percent higher than estimated costs (Flyvbjerg et al. 2002). Most significantly, cost underestimation and overrun have not decreased over the past seventy years and no learning seems to take place (Flyvbjerg et al. 2003).

The reasons for the budget overruns and inflated benefits that typify megaprojects are contentious. While Flyvbjerg et al. (2002) contend that cost

underestimation systematically result from “strategic misrepresentation” (lying), others argue that these cost underestimation and overruns are simply a result of normal practice of professionals operating with limited knowledge under the influence of ambiguous external and internal forces (van Marrewijk et al. 2007; Osland and Strand 2010). In other words, managing large-scale transportation infrastructure projects is difficult due to frequent misinformation about the costs which results in large cost overruns that often threaten the overall project viability (Cantarelli et al. 2010). The notion that rationality in megaprojects is always incomplete and bounded by imperfect knowledge and finite time (March and Simon 1958) does not excuse the project’s promoters from taking responsibility for the outcomes.

While the complex technology and lack of established methods for determining costs for rail investments (Flyvbjerg et al. 2002) helps explain why urban rail projects have the highest cost overruns, the reason for persistent cost overruns cannot be entirely technical. Megaproject costs and cost overruns have risen dramatically in the years 1970-2000, despite major improvements in technical capacity for cost estimation, which suggests that cost overruns are due primarily to politics rather than engineering or accounting (Altshuler and Luberoff 2003). Megaproject promoters and contractors have very strong incentives to produce optimistic estimates of a project’s viability, particularly politicians who underestimate costs in order to have projects approved but are rarely in office when viability can be calculated, if at all (Flyvbjerg et al. 2003). In addition, disincentives such as contractual penalties for overoptimistic bids are

relatively small (Davidson and Huot 1989). Rather, megaproject promoters often deliberately avoid and violate established practices of good governance, transparency, and participation in political decision making, either because of ignorance or because such practices are seen as counterproductive to getting projects started (Flyvbjerg et al. 2003). Hence, an analysis of transportation megaprojects necessitates examining the political motivations of each project's promoters.

Another characteristic of transportation megaprojects is that their creators typically rely too heavily on optimistic ridership forecasts and skewed cost-benefit analyses rather than deliberative and transparent planning processes (Flyvbjerg et al. 2002). The common result of such optimism bias, or the systematic tendency to be overly optimistic about the outcome of future planned actions (Siemiatycki 2010), is that high-risk projects are often pushed ahead without fully addressing the total cost to public, private and third parties. For large-scale projects, political parties, government administrations and various lobby groups tend to promote specific solutions without considering viable alternatives. During an interview, a former local transportation director explained the logical flow of questions when planning a new transportation megaproject: "What area does this project need to serve? Who will it serve? And which technology is appropriate based on the answers to these questions?" Rather than choosing the level of private sector involvement or specific technology for a project at its outset, however, promoters at early stages of the planning process should focus on economic performance, environmental sustainability and safety

performance, with a discussion of potential technologies following agreement on these issues (Flyvbjerg et al. 2003).

Regardless of whether megaprojects are delivered using public or P3 methods, a number of pitfalls typically arise in the early stages of megaproject decision making processes. These include absence of a proper problem analysis, lack of project alternatives, and ambiguities about project scope (Priemus 2010). Many of these pitfalls are common to P3 projects (as discussed in Section 4) as well as megaprojects. From these pitfalls, the need for transparency, flexibility and openness throughout the megaproject process emerges as being essential. Most of the time, the actual process becomes dominated by concerns about costs. A lopsided emphasis on cost reduction stands in the way of quality and innovation (Priemus 2010); that is, public sector cost is overemphasized and total cost is underemphasized. A consideration of third party costs, usually overlooked in traditional accounting methods, is one way to reduce the emphasis on up front cost reduction.

3.3 Total Cost Economics

A useful way to frame costs is total cost economics, which considers the total cost as the sum of costs borne by public, private and third parties (Ormsby 2009; Vining and Boardman 2008a). Costs of a project are more or less constant and depend on the level of project risk rather than the degree of private sector involvement. Vining et al. (2005) explain:

Regardless of the accounting conventions used, the underlying economic reality is not altered. A government that constructs a new

project using a P3 will have to pay for it at some point in time either via a rent charge or a user charge. This charge will normally have to recompense the private entity for all the construction risk it bore. This reflects the fact that no matter who finances the project, whether in the public or private sector, the overall cost... is determined wholly by the underlying risks associated with the activity (202).

Using total cost economic theory, each cost is calculated individually and tallied in the derivation of total social cost of a given project (Ormsby 2009).

Lost business income is an example of third party costs, as it leads to a decrease in local jobs and taxes earned and decreases general local benefit. Furthermore, if a third party brings legal action against any level of government because of project construction, the total cost of the project increases once more due to legal fees and possibly remuneration.

Governments should pick the mechanism that minimizes total costs, which includes a comprehensive evaluation of social impacts to residents and businesses (third parties). However, the analyses used to rationalize megaprojects (particularly “value-for-money” analyses for P3s) almost always exclude third party costs in their calculation (Globerman and Vining 1996). In keeping with the optimism bias that characterizes megaprojects, improper project evaluation is the rule rather than the exception. Ambiguous catch phrases such as “the project’s potential for urban development” and “the critical importance of rapid transit services to businesses and economic development” are often used to justify the construction of megaprojects (Berechman 2009: 76). And while politically appealing, such phrases amount to little during evaluation processes.

In a case study of six P3s in the US and Canada, Vining et al. (2005) found that “contracting difficulties make it difficult for the public sector to actually realize lower total costs, that is, including all transaction costs” (Vining et al. 2005: 212). Transaction costs include the costs of negotiating, monitoring and, if necessary, re-negotiating contracts with private sector firms. An example of a transaction cost is the cost of undertaking the competitive and highly complex bidding and tender processes (Reynolds 2006). Many of these transaction costs, however, are not included as a cost of the project in the project budget and are one of the “hidden” costs of a P3 (Vining et al. 2005). Some of these contracting costs may be captured in other government budgets, but they are infrequently allocated to the P3. From a social justice perspective, all project costs including transactions costs should be included when evaluating the “success” of P3s (Globerman and Vining 1996). While a total cost calculation is quite lengthy and outside the scope of my thesis, total cost economics is a vital conceptual tool for framing the multiple costs of any megaproject. Total cost economics attempts to incorporate all costs of a project, including often-overlooked third party costs to residents and businesses.

3.4 Summary

This chapter defined and characterized transportation megaprojects to help explain certain features of case studies projects including cost overruns and lack of transparent planning. In the next section, I discuss how the nature of private sector involvement in megaproject delivery has changed and the major differences between traditional public delivery and P3 contract delivery.

4: DEFINING PUBLIC PRIVATE PARTNERSHIPS

This chapter defines public private partnerships (P3s) and common rationales for employing them. It identifies factors that influence outcomes of P3 projects, which I use to construct my framework for evaluating case studies. I outline the various stages of a typical DBFO P3, which clarifies the stages of the Canada Line contract. The need for transparency and openness during the planning, procurement and contract management stages emerges from the literature on both megaprojects and P3s.

4.1 Definition of P3s

Private sector involvement in public infrastructure projects has a long history in Canada, where, for example, privately owned streetcar operators were the norm in the early 1900s. However, both the scale of infrastructure projects and the level of private involvement in these projects over the past several decades have grown considerably. P3s are being used more often for infrastructure megaprojects because these projects tend to be capital-intensive and involve large up-front expenditures. Governments faced with ever-decreasing funds are increasingly turning to the private sector for financing.

A wide range of relationships between the public sector and for-profit private firms could potentially be labelled as P3s. The critical feature of P3s is that they involve an ongoing relationship between a public sector entity and a

private sector entity with some degree of joint decision making and financial risk sharing (Vining and Boardman 2008a; Grimsey and Lewis 2004). In contrast, contracting out involves a “purchase” from the private sector by the public sector (Vining et al. 2005; Aziz 2007a).

Most P3 types are concession-based. The concept of a fixed-term concession uses various combinations of private sector resources to design, construct, finance, operate and maintain infrastructure; ownership may remain with the government or be transferred to the government once construction is complete or after the concession period ends (Grimsey and Lewis 2004). The stages of any infrastructure project include design, bidding, building, financing, ownership, operation and maintenance. The name of a contract indicates which stages are controlled by the private sector. Common P3 arrangements include the following: build-operate-transfer (BOT), build-transfer-operate (BTO), build-own-operate (BOO), design-build-finance-operate (DBFO), and design-build-operate-maintain (DBOM). While this list is not exhaustive, it identifies the main forms of P3s. Each type of P3 arrangement allows varying degrees of private sector involvement, as Figure 1 illustrates.

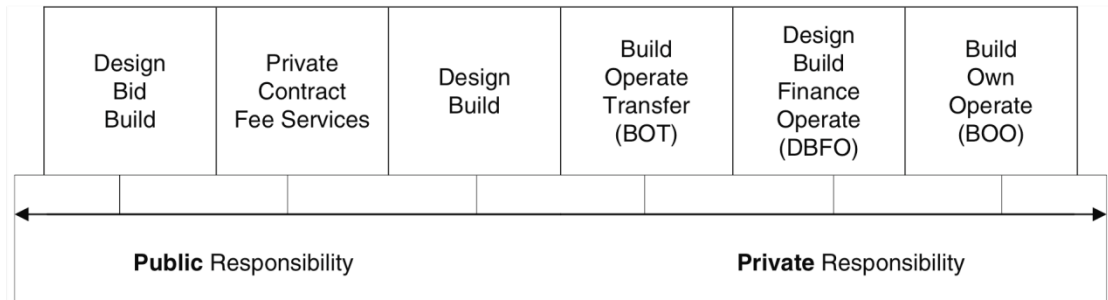


Figure 1: Typology of P3s

(source: US Dept of Transportation 2005)

The design-build-finance-operate (DBFO) model is the predominant P3 procurement approach for transportation megaprojects in North America (Bing et al. 2005). In a DBFO P3 arrangement, a public sector entity selects a private sector entity to design, build, finance and operate the required infrastructure (Grimsey and Lewis 2004). The government effectively leases the infrastructure from the private sector for the length of the concession, which is typically 30-35 years. DBFO P3s give the private sector a much higher degree of responsibility than other P3 contracts and gives a single company control of design, building, financing and operation. The only P3 contract with more private sector control is build-own-operate (BOO), in which the developer is responsible all stages with no provision for transfer of ownership the government (Grimsey and Lewis 2004).

In contrast to P3 contracts, a conventional public procurement contract is one in which a public agency secures the finance directly and pays the contractor as works progress (Grimsey and Lewis 2004). Each stage is typically

contracted to separate companies. A public sector comparator (PSC), discussed in Section 4.3, is a hypothetical benchmark based upon traditional public delivery.

4.2 Rationale for Using P3s

While the literature is divided on how effectively P3s deliver public transportation infrastructure, the rationale for employing them is generally agreed upon. Boardman and Vining (2008a) outline three major rationales for engaging in P3s. The first rationale is the minimization of on-budget government expenditures and the desire not to increase current debt levels; the second derives from the private sector's ability to provide goods or services at a lower up-front cost; and the third rationale relates to the transfer of a variety of risks to the private sector (and implicitly to reduce the government's own risk). This section is intended to provide information about the debate surrounding P3s, rather than assert whether or not they are appropriate for funding urban transportation megaprojects.

The primary rationale for a P3 is its potential ability to deliver projects at lower cost due to superior private-sector expertise. The major cost-superiority argument is that private sector firms have superior scale, scope or learning economies because they are larger and more specialized and experienced in construction and operation of a given business (Boardman and Vining 2008a). This rationale is strongest for the construction phase, as almost all delivery methods (including conventional public delivery) contract out the construction to private firms. However, while private firms are fully capable of also designing,

operating and maintaining public infrastructure, it does not necessarily follow that they should (Boardman and Vining 2008a). While cost reduction is one of the main arguments for using P3s, Boardman and Vining (2008a) note that private-sector cost savings may result in higher private sector profits, rather than lower public sector costs. Thus, the public sector benefit to keeping the debt off-budget in P3s is mainly political and merely shifts costs to the private sector and third parties, rather than lowering total costs.

A second argument is that the private sector is more flexible and willing to alter project specifications and/or utilize new technologies to reduce costs (Boardman and Vining 2007). The private sector may also have lower wage costs through hiring non-union labour (Gregory and Borland 1999). The flexibility of the private sector can have deleterious effects on third parties such as residents and local merchants; for instance, reducing the number of stations on a rail line may reduce upfront costs, but ultimately lowers its potential social benefit by reducing access. Again, the argument reduces to pressure on public sectors to download high investment costs to the private sector.

The third rationale for employing P3s, the transfer of a variety of risks to the private sector, is discussed in Section 5.3.

4.3 Stages in a P3 Project

A P3 project goes through three major stages: planning, procurement and contract management. Planning includes the stages of initial project definition, appraisal and creating a business case. When a business case is developed

after planning, the contract procurement stage starts with a Request for Proposals (RFP). The principal components of an RFP include instructions to bidders, output specifications, proposed contract terms, evaluation criteria for bids, and a risk matrix (Bing et al. 2005). Discussions are required with each bidder to clarify each proposal and ensure they meet output requirements. At the end stage of the RFP, each bidder is asked to submit a “best and final offer” (BAFO) on the basis of the clarified bids. After assessment of the BAFOs received, the preferred bidder is selected and the public client provides a risk allocation scheme to the contractor along with tender documents. After negotiation, the public sponsor and the private sector preferred bidder reach an agreed risk allocation scheme (Bing et al. 2005). The contract management stage begins once public and private sectors sign tender documents and involves the public sector finalizing project delivery and monitoring service outputs.

The need for competitiveness and transparency throughout the planning, procurement and contract process is essential to project success (Stambrook 2005; Vining and Boardman 2008a; Flyvbjerg et al. 2003) and is part of my framework for evaluating case studies. In an effort to improve transparency, VFM analyses are typically conducted at the early stages of a P3 project. A VFM analysis compares how value is achieved under a P3 compared to traditional procurement. The hypothetical benchmark cost of providing a specified service with traditional procurement is known as a public sector comparator (PSC) (Grimsey and Lewis 2004; Aziz 2007b).

The literature identifies several issues with VFM analysis. Firstly, they ensure transparency only if done before choosing whether to use a P3 or public sector arrangement; if a P3 form is pre-ordained, a VFM analysis becomes extraneous (Stambrook 2005). Secondly, these analyses are often fundamentally flawed in their calculation of project costs. In a recently conducted study of BC P3s, the authors concluded that P3s are more expensive because the VFM calculation does not factor in the risks that come with financing a project (Gilbert 2009). There comes a point when risk transfer to the private sector becomes sub-optimal since the premium demanded by the private sector will outweigh the benefit to the public procurer (Grimsey and Lewis 2004). Hence, in order to ensure accountability, independence and legitimacy, VFM analysis should be performed before deciding whether to use P3 or public procurement and should be done by a third party.

4.4 Evaluating P3 Project Outcomes

The following table summarizes factors that influence the outcomes of P3 projects. The common element in success factors is flexibility and transparency at all stages, from project conception to contract process to concession agreement (Stambrook 2005). Later in the project, risk management emerges as a major influence on project success. Although the table identifies success factors for P3 projects specifically, the megaproject literature identifies the same trends of flexibility and transparency as being essential to project success regardless of delivery method. Hence, I use this framework to analyze the

outcomes of the four transportation megaprojects that constitute my case study analysis.

Table 1: Basis for project success of megaprojects

Bases	Failure Factor	Success Factor
0. Project Conception		
0.1 Procurement choice	P3 form was ordained	Alternatives considered
0.2 Political imperative	Dictated decision/ partisan	None/ Non-partisan
1. Contract Process		
1.1 Degree of competitiveness	Sole-source	Competitive
1.2 Degree of transparency	None	Full
2. Concession Agreement		
2.1 Degree of openness	Fully confidential	Fully public domain
2.2 Conflict resolution process	Inflexible/ unfair	Flexible/ fair
3. Financing		
3.1 Payment related to risks	No/ minor	Yes/ major
3.2 Scope for innovation	None	Some
4. Risk management		
4.1 Construction on budget	No/ major overrun	Yes/ no overrun
4.2 Project completion on time	Delays	On time
4.3 Demand/traffic as forecast	Too low/ too high	As forecast
4.4 Operating costs on budget	Major cost overrun	No overrun

(Source: adapted from Stambrook 2005)

Further to improving P3s, Vining and Boardman (2008b) set out eight rules for government concerning the administration of P3s in Canada. Several of these rules include: establishing a jurisdictional P3 constitution (to ensure transparency for all P3s); separating the analysis, evaluation, contracting/administrating, and oversight agencies; ensuring that the bidding process is reasonable competitive; and including standardized, low-cost

arbitration procedures in all P3 contracts. These rules illustrate concrete ways to address the lack of transparency of many P3 contracts.

4.5 Summary

This chapter outlined how public private partnerships involve the private sector controlling design, finance, operation, maintenance and/or renovation of infrastructure. I described the three major rationales for using P3s, stages in a typical P3 contract, and factors that influence the outcomes of megaprojects. The next chapter examines the risks associated with transportation megaprojects and how risk changes when P3 contracts are used in place of public sector delivery.

5: DEFINING RISK

This chapter draws on the literature to define the related terms “risk” and “uncertainty”. It outlines a risk typology for transportation megaprojects and describes risk allocation strategies in public and P3 procurement contracts. I focus particularly on nuisance, a construction stage risk that was central to the outcome of Heyes’ lawsuit against Canada Line partners. I also present strategies from the literature for mitigating construction risks and costs. These mitigation strategies are an important example of the differences between public and P3 approaches to risk allocation.

5.1 Risk and Uncertainty

The term “risk” is used in a very specific way throughout this thesis. Decisions are said to be subject to risk when a range of possible outcomes could result and when objectively known probabilities can be attached to these outcomes (Bannock et al. 1982; Irwin 2007). Conversely, uncertainty exists when the probability of a specific outcome occurring is unknown (Bannock et al. 1982). While simple theoretically, the distinction between risk and uncertainty is much more complex when applied to infrastructure projects. A lack of quantifiable data is the norm rather than the exception (Loosemore et al. 2006), which means that on most occasions project managers are dealing with uncertainties rather than known risks. Theoretically, risk can be expressed as follows:

Risk = (probability of event) x (magnitude of loss/gain)

Each risk is thus associated with a specific cost, and any risk strategy needs to factor in the potential cost of various risks into a project analysis.

In practice, the key distinction between risk and uncertainty rests on the degree to which information on future events is available (Frame 2003; Loosemore et al. 2006). Furthermore, the gathering of information to reduce uncertainty does not in itself reduce risk (Loosemore et al. 2006). Thus, while gathering information on the probability of given outcomes is a crucial part of risk management, the distinction between uncertainty and risk is ultimately a matter of degree (of knowledge about the future event) rather than of substance. In relation to the Canada Line, the legal ambiguities of BC law in relation to P3 projects have thus far made the allocation of construction risk unknowable, with the probability of future outcomes depending on the ruling of the courts. Hence, I do not distinguish between risk and uncertainty except to recognize that the probability of potential outcomes can vary considerably and can have profound legal implications. I use the term “risk” as defined by Loosemore et al. (2006) to mean a potential future event which is uncertain in likelihood and consequence and if occurs could affect a company’s ability to achieve its project objectives.

Furthermore, risk can travel in two directions; outcomes may be better or worse than anticipated. Most discussions of risk in transportation planning literature focus on the downside of risk, particularly because construction contracts usually emphasize punishment for underperformance rather than

rewards for over performance (Loosemore et al. 2006). Incorporating incentives for over performance into project contracts is one strategy to encourage the upside of risk (Davidson and Huot 1989). Many DBFO contracts, including the Canada Line contract, include such incentives. The following sections discuss risks inherent in transportation megaprojects and possible response strategies.

5.2 Creating a Risk Typology

A variety of risks are inherent to infrastructure projects as part of their design, building, financing, operation and maintenance. In a comprehensive review of concession design for infrastructure projects, the World Bank (1998) identifies eight types of risk: design/development risk, construction risk, operating cost risk, revenue risk, financial risk, force majeure risk, performance risk, and environmental risk. I amalgamated a comprehensive list of risks associated with transportation megaprojects using various sources (Table 2). The fourth column indicates which party typically takes on each risk. Depending on whether the project is delivered using public or P3 delivery, the government can take on the roles of operator and design contractor. In a P3 delivery, these roles are taken on by private sector entities.

Table 2: Risk typology for transportation megaprojects

Project stage	Type of risk	Source of risk	Risk taken by
Design	Design deficiency	Contractor design fault	Design contractor
	Tender specifications	Fault in tender specifications	Government
Pre-construction	Site conditions	Ground conditions, supporting structures	Construction contractor
	Site preparation	Site redemption, tenure, pollution/discharge, obtaining permits, community liaison	Operating company/ project company
	Land use	Native title, cultural heritage	Government
Construction	Cost overrun	Inefficient work practices and wastage of materials	Construction contractor
		Changes in law, delays in approval, etc.	Project company/ investors
	Delay in completion	Lack of coordination of contractors, failure to obtain standard planning approvals	Construction contractor
		Insured <i>force majeure</i> events	Insurer
	Failure to meet performance criteria	Quality shortfall/ defects in construction/ commissioning tests failure	Construction contractor/ project company
Nuisance	Disruption during construction due to noise, dust, traffic restrictions, etc.	Project company	
Operation	Operating cost overrun	Industrial relations, repairs, occupational health and safety, maintenance, other costs	Operator
		Government change to output specifications	Government
	Delays or interruption in operation	Operator fault	Operator
		Government delays in granting approvals	Government

	Shortfall in service quality	Operator fault	Operator
		Project company fault	Project company/ investors
Maintenance	Revenue risk: changes in taxes, tariffs	Fall in revenue	Project company/ investors
	Revenue risk: demand for output	Decreased demand	Project company/ investors
Continuous	Force majeure risk	Floods, earthquake, riots, strikes	Shared
	Political interference	Breach/cancellation of license	Government
		Expropriation	Insurer, project company/ investors
	Project default	Combination of risks	Equity investors followed by banks, bondholders and institutional lenders
	Asset risks	Technical obsolescence	Project company
		Termination	Project company/operator
		Residual transfer value	Government, with compensation for maintenance obligations
	Financial risk: inflation	Payments eroded by inflation	Project company/ government
P3	Organization and coordination risk	Inadequate experience with P3s	Project company/ government/ public
		Inadequate risk allocation between public and private partners	Project company/ government/ public
		Third party tort liability	Project company/ government/ public

(source: authors' compilation based on Grimsey and Lewis 2004; Loosemore et al. 2006; World Bank 1998; Bing et al. 2005; Telliford 2009; Hodge 2004; Aziz 2007b; Berechman 2009)

While this risk typology covers most possible risks of a project, I focus specifically on three risks: the design stage risk of design deficiency and the construction stage risks of nuisance and delay in completion. The importance of the design stage cannot be overestimated, since poor design increases cost overruns in the construction and operation stages (Flyvbjerg et al. 2003). I chose to focus on nuisance because this risk was implicated in the Heyes lawsuit, and the legal documents from the trial trace this single risk throughout the construction stage. Finally, I focus on completion delay because it was also implicit in the Heyes lawsuit; the private sector chose a cheaper construction method, which caused construction delays and increased nuisance. Other construction risks are peripheral to my analysis, and the impact of long-term operation risks are currently uncertain since the Canada Line is less than a year old at the time of writing.

Some risks are characteristic of all transportation projects. If the private sector is involved in providing transportation infrastructure, however, additional risks are introduced including loss of control by the public sector, increased costs and user fees, unacceptable levels of accountability, unreliable service provision caused by unanticipated events, inability to benefit from competition due to the limited availability of potential private partners, and bias in the selection process (Berechman 2009). In Table 2 above, the last row includes risks that arise when the project is delivered using a P3 instead of public sector delivery. As “a project’s overall cost is determined wholly by the underlying risks

associated with the activity” (Jenkinson 2003: 325), increasing risk actually increases costs (Berechman 2009). And while P3 proponents cite risk transfer as a major rationale, they often overlook the increased risks and costs introduced by P3 delivery.

5.3 Risk Allocation: Public versus P3 Approaches

The ethos of allocating risks in a contract is that they go to the party best able to control them (World Bank 1998). While straightforward in principle, the actual practice of allocating risks is extremely complex. Whereas governments traditionally bear all risks in conventional public project delivery (other than construction risks taken on by the contractor), the P3 structure formally shifts some of these risks from the public to the private sector. The literature identifies the following allocations as being typical of P3 contracts. The private sector usually accepts design risks, construction risks including cost overruns and completion time, and future operation and maintenance cost overruns (Hodge 2004; Aziz 2007b; Berechman 2009). The public sector is typically more efficient in dealing with political and legal risks, land assembly and expropriation risks, and demand related risks. Both parties usually share the risk of litigation (Bing et al. 2005; Telford 2009).

How effectively public funding structures handle risk in transportation megaprojects is debated in the literature. Some argue that the conventional approach brings the government’s dual roles as both project promoter and guardian of public interest into direct conflict (Flyvbjerg et al. 2003; Bruzelius et al. 2002). Another criticism of the conventional approach is that risk analysis is

usually lacking, with a particular neglect of accountability issues relating to the implementation, operations, and economic regulation of projects in the planning stages (Flyvbjerg et al. 2003). Furthermore, the conventional approach, employed in two of my case studies, typically does not address concerns related to the external effects of projects until later in the project cycle (Collingridge 1992). This usually leads to project changes at a stage when such changes are particularly costly.

Conversely, P3 risk allocation can also be problematic. The ability to transfer risk from the public to the private sector is one of the major rationales for using P3s (see Section 4.2). However, risk transfer does not provide a strong normative justification for P3s, as it does not reduce risk *per se*; it only transfers risk (Boardman and Vining 2008a) and may increase risk, as Section 5.2 discusses. Furthermore, in a P3 arrangement the government can transfer some political risk to the private sector, which does not directly face voters or other public stakeholders. By acting as a “partner” in infrastructure provision, rather than the entity solely responsible, political leaders can deflect responsibility for megaprojects in their jurisdiction. The higher the share of risk the private partner assumes, especially demand risks, the higher the rate of return it requires to participate in the project (Bing et al. 2005; Berechman 2009; Telford 2009). At a certain point, the premium demanded by the private sector for taking on risks outweighs the benefit to the public sector of risk transfer (Loosemore et al 2006). Thus while the private sector may handle certain risks more effectively than the

private sector, project managers should employ careful analysis regardless of contract type.

Part of planning any megaproject is creating a risk management framework. Loosemore et al. (2006) identify the stages of creating an optimal risk management framework, which includes a process of risk identification, assessment of the cost each risk presents, and mitigation strategies for each outcome. For P3 projects, a risk allocation scheme is enclosed in the final contract and is legally binding (Bing et al. 2005). Such a scheme can be a simple list of risk factors, a risk matrix, or a risk allocation framework. Figure 2 below identifies an idealized risk allocation process in a P3 contract, although such formal structures rarely guide the risk allocation process in practice (Berechman 2009).

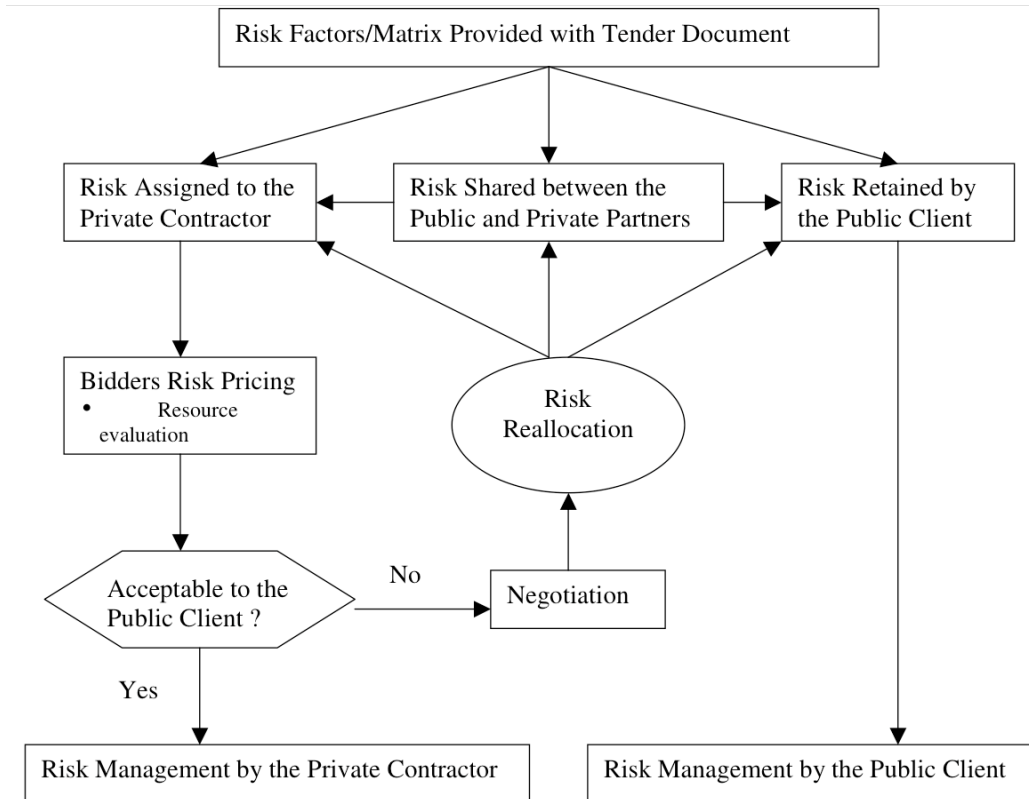


Figure 2: Risk allocation process in P3 contract procurement
 (source: Bing et al. 2005)

Despite several decades of experience with P3s, starting in the UK, the literature does not provide formulae for risk allocation between parties. Rather, risk-sharing schemes are often the result of ad hoc agreements and political negotiations (Berechman 2009) without a formal structure guiding risk allocation. Rather, “the common practice in transportation project evaluation is to forgo a comprehensive risk analysis, a decision that often leads to disastrous results” (Berechman 2009: 179). As the megaproject literature indicates, the reasons for this trend are likely political (Flyvbjerg et al. 2003), as

comprehensive risk analysis is time-consuming, costly, and could potentially find that politically popular projects have prohibitively high risks. Thus while P3 project delivery allocates risks differently than public sector delivery and can even potentially increase risk, standard practice is to omit comprehensive risk analyses at a stage when risks can be managed most effectively.

5.4 Responses to Risk: Avoidance, Mitigation, and Compensatory Mitigation

There are many possible responses to a given risk. While advance avoidance is generally agreed upon as the preferred tactic (Soon 2009), in many cases outright avoidance is not possible. Thus the preferred sequence is avoidance, mitigation, and compensatory mitigation. Avoidance might be achieved through project alteration, such as realignment. Mitigation might be achieved through design changes and construction techniques, while compensatory mitigation might be achieved through financial compensation or “banking” for future projects (providing a new replacement habitat, for instance) (Soon 2009).

The risk of cost overruns due to disruption during construction is common to all infrastructure projects. Certain costs can be reduced by a combination of avoidance, mitigation, and compensatory mitigation. Traditional public delivery tends to emphasize avoidance and compensatory mitigation, given the political accountability that project promoters have to their constituents and particularly in reaction to the disruption of the “great megaproject era” (Altshuler and

Luberoff 2003). P3 delivery tends to emphasize mitigation strategies by allowing for flexibility in design and construction techniques.

Typical mitigation strategies for addressing construction stage impacts include staggering construction along a corridor so impacts are localized, clearly defining expected length of impact, communicating the specifics of process and construction events with property and business owners, and providing regular project progress reports to business and property owners (Centre for Urban Transportation Research 2002). Typical compensatory mitigation strategies include direct financial compensation in the form of grants or tax breaks and local business engagement in such strategies (Harris Consulting 2005). And while the public sector can deny compensation on the grounds that the project is a public good, private sectors do not enjoy the same legal protection, as their legal mandate is to generate profit. Public bureaucracy, which has local expertise and a mandate to protect the public interest is essentially replaced with firms who are by their nature profit driven (Siemiatycki 2005).

The lawsuit Heyes brought against the Canada Line partners exemplifies what happens when risk allocation is vague or poorly defined in the contract stage. In Canada, and BC in particular, the increasing popularity of P3s has spawned a burgeoning field of law devoted entirely to translating the commercial language of risk allocation into legally binding language (Korstrom 2005). This field of law is clearly not worked out yet and represents a major challenge associated with involving the private sector in previously public projects. Susan

Heyes' lawsuit represents one such attempt to legally establish risk allocation in a transportation megaproject using a P3.

Hildebrand (2010) notes that litigation rates have increased steeply in European countries which have privatized formerly public infrastructure services including transportation. Two of the most notable shifts of the past decades are those “from state to market governance and from state to court governance” (Hildebrand 2010: 9), while steady increases in the number of lawyers, judges, and the number and amount of damage claims indicate a notable trend toward juridification (Hildebrand 2010). The legal system influences the trend toward juridification by creating precedents which “could prevent future conflicts, but they may also be interpreted differently by parties with conflicting interests and thereby lead to new, more complex cases” (Hildebrand 2010: 12). Thus, Heyes' lawsuit is arguably part of the trend of legal institutions playing an increasingly important role in sectors formerly governed by the state.

Table 3 indicates the risk factors I will examine across case studies and how DBFO P3 and public sector delivery models typically respond to each risk.

Table 3: Costs, risk types and typical PSC vs DBFO P3 allocation strategies

Cost type	Risk type	Source of risk	PSC Risk Allocation Strategies	DBFO P3 Risk Allocation Strategies
Design	Design deficiency	Contractor design fault	Take extra time to design/ incorporate public in design process	Bring private sector onboard to make use of their technical expertise
Construction	Delay in completion	Lack of coordination of contractors, failure to obtain standard planning approvals	Public sector takes on political consequences of delay	Penalties to private contractor for going over time (incentivize performance)
Third Party	Nuisance	Disruption to third parties during construction due to noise, dust, restrictions to traffic, etc.	Public consultation, avoidance and compensatory mitigation strategies	Mitigation strategies, allow litigation against the private partner

(source: partially adapted from Grimsey and Lewis 2006; Hildebrand 2010)

5.5 Nuisance: a Litigious Risk

Nuisance is an instance of a risk that is best understood as a matter of degree. The creation of dust, noise, and traffic interruption that accompanies the usual course of construction does not constitute nuisance; rather, the severity of these impacts on third parties constitutes nuisance (Berry 2009). Mitigation strategies cannot prevent these temporary annoyances, but they can prevent the occurrence of nuisance by minimizing construction impact. As the main focus of my analysis of the Canada Line, the risk of nuisance warrants further explanation.

In the legal context, nuisance does not describe any particular type of conduct. Rather, its unifying element lies in the general kind of harm caused. A public nuisance involves substantial and unreasonable interference with a public

right, or a right common to all members of the community or to all members of a class. Particular damage is readily established where the plaintiff has suffered property damage, personal injury or economic loss arising from interference with property rights (Berry 2009). In contrast, private nuisance involves harm inflicted on a particular party, potentially as a result of a public nuisance. Susan Heyes succeeded in establishing particular damage in the form of economic loss to her business. The case rests on whether the plaintiff has sustained some substantial injury beyond that suffered by the rest of the public (Berry 2009). Heyes won on the claim of nuisance, and although the judge did not distinguish between public and private, he claimed it was most likely private as she suffered “unreasonable” economic loss for a public project (Pitfield 2009: 148).

Legal differences between the US and Canada providing compensation to parties affected by public projects traces back to their respective constitutions. The popular notion of property as something owned encourages the conception of property rights as absolute and indefeasible (Bale and Brierely 2010), but property in the legal sense is more a “bundle of rights” (Ziff 1996) enforceable against others. In the US, the Fifth Amendment states that “private property [shall not] be taken for public use, without just compensation” (US Constitution Fifth Amendment 1787). The whole notion of eminent domain, the property taking on an involuntary basis for public use, runs against the broad tendency to stress the stability of property rights in the American legal order (Scheiber 1975). Legal action from businesses and residents seeking compensation for losses due to

construction is hence quite typical of infrastructure projects in the US and is a major contributor to cost overruns in megaprojects (Bushouse 2002).

In Canada, however, legal precedent for compensation for nuisance caused by public projects is much slimmer. The Canadian doctrine of expropriation involves the taking of land without consent of the owner by an expropriating authority in the exercise of its statutory powers (Bechard 1989). Unlike the US Constitution, the Canadian Charter of Rights and Freedoms does not expressly provide for the protection of property rights. Any constitutional guarantee should recognize that property is a “social institution that must be constantly remoulded” (Bale and Brierley 2010: 2) and that there is no preordained harmony between private property and public welfare. Justice Pitfield states in the Heyes judgment file that “the challenge is to identify the point at which give and take falls out of balance sufficiently to warrant a remedy” (2009: 137). Such a sentiment exemplifies the Canadian approach to property rights, and contrasts with the US approach.

5.6 Canadian Precedent for Transportation Megaprojects

Previous megaprojects and previous P3s employed in Canada offer lessons of actual practice for the mitigation of project risks. Vining and Boardman (2008a) found that P3s in Canada have worked reasonably well in circumstances where governments have not attempted to transfer use-risk or revenue risk to the private sector; projects have required specialized knowledge or proprietary technology held only by private-sector firms; and governments were able to transfer construction risk at something close to a fixed price.

These circumstances are close to traditional “design-build-transfer” or “build-transfer” contracts; governments must either recognize that P3s should be limited to projects that meet these conditions or they must do much better at reducing the potential for high transaction costs in contract design (Vining and Boardman 2008a: 11-12).

While publicly funded projects allocate risk differently than P3 structures, the precedent in Vancouver reveals similar problems. Siemiatycki (2006) notes that while opposing provincial political parties from the right and (then) left of the political spectrum delivered the first two urban rail transportation megaprojects in Vancouver using traditional public-sector procurement models, the planning processes faced similar criticisms: they were politically driven, had placed considerable burden on provincial taxpayers, and were characterized by a lack of transparency. Thus, evidence remains mixed for how effectively public and P3 models allocate risk in Canadian urban transportation megaprojects.

5.7 Summary

This chapter examined the concepts of risk and uncertainty and outlined the risks inherent in transportation megaprojects as well as risks that arise because of private sector involvement. It outlined the three responses to risk: avoidance, mitigation, and compensatory mitigation. It also examined how P3s versus public contracts typically allocate the risks of design deficiency, nuisance and construction delay. How these risks were allocated in the Canada Line will be addressed in the next section.

6: THE CASE OF THE CANADA LINE

With a review of the relevant literature on megaprojects, P3s, and risk in hand, this section examines in detail the lawsuit brought against the Canada Line P3 partners by Susan Heyes. It provides an overview of the legislative environment in BC during project planning, the various steps of the procurement process, and risk allocation and mitigation strategies. Together, this chapter examines the events that led to Heyes' lawsuit, and what this particular lawsuit reveals about risk allocation in megaprojects.

6.1 *Susan Heyes vs. City of Vancouver et al.* Summary

Susan Heyes operated Hazel & Co. near the corner of 16th Avenue and Cambie Street for 10 years. Gross profits fell by 48 percent while the Canada Line construction was taking place from 2005 to 2008 (Pitfield 2009: 143). Heyes has since moved her store to another location. When deciding whether to renew her lease in December 2003, she enquired about the proposed Canada Line and was told by someone at the City of Vancouver that the line would run down Cambie Street and there would be no station close to her store. She searched the City's website, found the final draft stating that the Canada Line would be an underground system constructed by bored tunnel along Cambie Street (Pitfield 2009: 94). Furthermore, the final draft did not specify that the final decision regarding tunnel construction method would be left to the private partner in the P3 arrangement.

Heyes claimed private nuisance due to cut-and-cover construction, alleging that bored tunnel construction was promised to merchants in the planning stages. Justice Pitfield found TransLink, its subsidiary Canada Line Rapid Transit Inc., and builder-operator InTransitBC jointly liable for causing a nuisance (unspecified whether public or private) during construction from 2005 to 2008. He dismissed the claims of nuisance against the City of Vancouver and the province of BC, effectively excusing direct levels of government from legal and fiscal culpability (Pitfield 2009: 223). He also dismissed the claim of misrepresentation based on the common understanding that the Cambie Street tunnel would use bored tunnel construction. Heyes' case is currently under appeal, with a verdict expected by fall 2010. No matter how the judgment is appealed, her case exemplifies how poorly certain project risks were handled in the planning and implementation of the Canada Line.

6.2 Project History and Legislative Environment

The history of the Canada Line project and the legislative environment at its inception reveals the tense and disproportionately powerful relationship between provincial and municipal governments. The origins of the Canada Line project can be traced back to the 1996 Liveable Region Strategic Plan, adopted by all municipalities in the Lower Mainland, which refers to a rapid transit line connecting Vancouver and Richmond. In 2000, TransLink retained Jane Bird (now the CEO of CLRT) as a consultant to consider the need for such a link and to prepare a rough estimate of cost and whether the private sector might be involved (Pitfield 2009). The project team and its consultants proceeded to

define the project late in 2001 on the basis that the Cambie street portion of the line would be constructed in a bored or mined tunnel and that it would involve private sector funding, likely as a P3 (Wales 2008). The report was cautiously optimistic that a successful P3 could be produced, but noted several challenges and provided no real estimates as to how a P3 might affect project scope or lower costs (Cohn 2008). Despite the report's caution, the provincial government mandated that such a project could only move forward as a P3 due to lack of public capital (Murray 2006) with no consideration given to the possibility of public delivery. A lack of project alternatives and ambiguities about project scope are hallmarks of typical megaproject planning and reflect the project's troubled start.

Key authorities in deciding Vancouver's regional transportation policy include TransLink, the regional transportation authority for the Metro Vancouver area, and the provincial government of BC. Until 2008, the TransLink board of directors consisted of 21 municipally elected officials. The TransLink board of directors voted down the Canada Line project twice in 2004, essentially preventing the two bids to proceed to the best-and-final-offer stage (Wales 2008). Shortly after the project was approved after a third vote, then-minister of transportation Kevin Falcon called for a review of the TransLink board, claiming it had become "parochial" (Wales 2008). The board of municipally elected officials was abandoned and replaced by a board of nine independent directors, none of whom were local politicians.

Furthermore, in December 2003, only months before the Canada Line vote was first brought before the TransLink board, the provincial government enacted the Significant Projects Streamlining Act (Bill 75). Bill 75 enables the Lieutenant-Governor-in-Council to assign special status to projects deemed to be significant and have broad benefits for the economic, social or environmental well-being of BC and was intended to address BC's reputation as having one of the most difficult and lengthy approval processes for major projects in North America (Boei 2003). Kevin Falcon conceded that the Act could be used on projects like the Canada Line should the project fall short of the capital funding required (Boei 2003). While Bill 75 was not used for the Canada Line, the provincial government's creation of the Act and subsequent restructuring of the TransLink board both signal the overarching power of the provincial government in municipal affairs. When examined in court for Heyes' lawsuit, however, provincial government representatives were quick to point out the province's limited role as merely a funding partner (discussed further in Section 6.3.4).

Another significant piece of legislation, introduced in spring 2002, was the Capital Asset Management Framework (CAMF). The overview states that CAMF has the following objectives: "to establish best practices in capital asset management", (CAMF 2002: 2) to be guided by principles of "sound fiscal and risk management; accountability in a flexible streamlined process; and an emphasis on service delivery" (CAMF 2002: 3). Cohn (2008) maintains that the main impact of the CAMF was to change the terms of the debate regarding P3s; instead of explaining why a P3 was justified, it would now be necessary to

explain why a P3 was not being employed. While TransLink's inquiry into private funding for the project took place in 2000, before the CAMF was established, TransLink first voted on the Canada Line project two years after the legislation was passed. Thus, both Bill 75 and the CAMF signal the BC Liberal government's concerted shift toward private sector delivery. As this legislation was designed to stimulate P3 projects, the outcomes of the Canada Line are particularly relevant given the potential increase of such projects in BC.

6.3 The Canada Line P3

6.3.1 Overview

Under the DBFO P3 for the Canada Line, several public agencies and a private partner provided funding. Public funding partners included TransLink, (Metro Vancouver's regional transportation authority), the Vancouver Airport Authority, the City of Vancouver, the province of BC, and the federal government of Canada. Private funding came from InTransitBC, a consortium of private companies that won the bid to design, build, finance and operate the rail link for a 35-year concession term (Pitfield 2009). TransLink created a subsidiary company called Canada Line Rapid Transit Ltd (CLRT) to oversee and manage the project and acquired ownership of the assets and infrastructure making up the Canada Line. The project was initially named the RAV Line (Richmond-Airport-Vancouver) and renamed the Canada Line once federal funding was confirmed.

A provincially owned company called Partnerships BC acted as the business advisor to the provincial government for the Canada Line P3 throughout the planning and construction stages (Partnerships BC 2006). As an entity created by the provincial government expressly for the Canada Line project, Partnerships BC conflates the provincial government's role in both analyzing and evaluating the project. Thus, firms with a vested interest in the proliferation of P3s were charged with producing the technical reports that shaped the official planning, public and political discourse (Siemiatycki 2005; Cohn 2008). Carole Taylor-Phillips expressed concern over this trend: "this particular model of P3 really concerned me, where the province plays the role of being the funder but has no control, has no say, but of course inevitably gets the blame" (Taylor-Phillips 2009: 5).

6.3.2 Consultation Stages

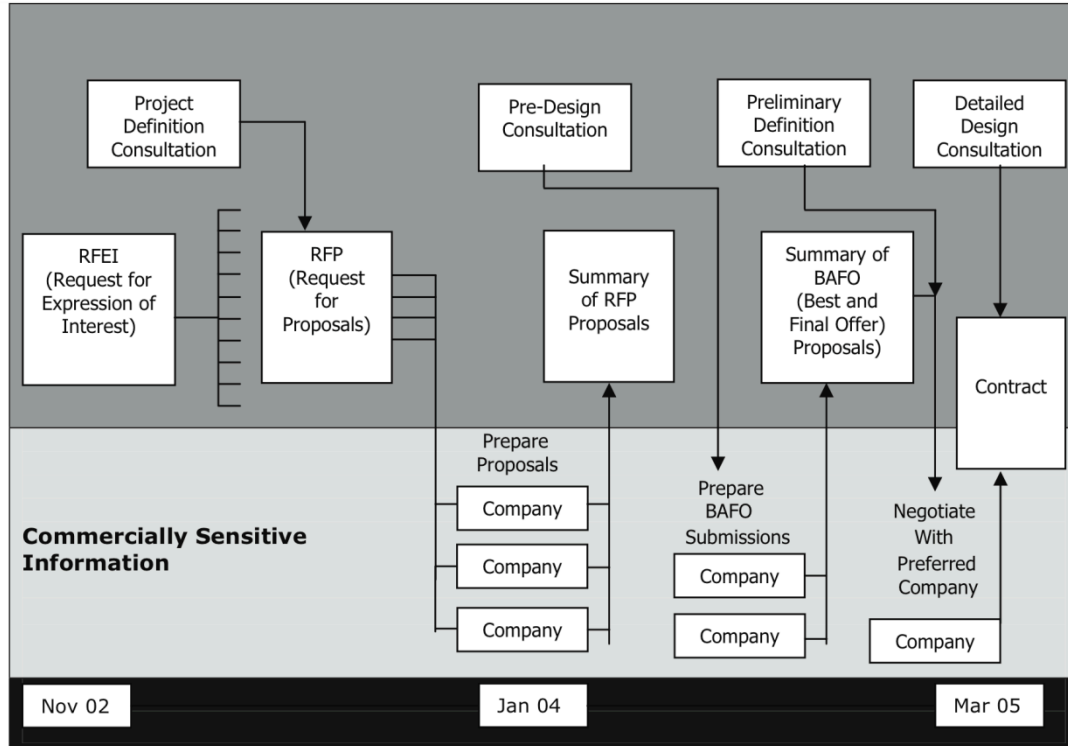


Figure 3: Competition and selection procurement model for the Canada Line
 (Source: adapted from Project Definition Report 2003)

An overview of the competition and selection process appears in Figure 3 above, the consultation process for the Canada Line entailed four phases: project definition (Feb to May 2003); consultation on pre-design (Oct 2003 to April 2004); consultation on preliminary design (June to July 2005); and community consultation on detailed design (September to November 2005) which involved “discussion of fewer but very specific treatments related to access, lighting, landscaping and other features of the rapid transit line” (Canada Line Consultation Report 2005: i). Although extensive, such public

input remains cursory at best. During the pre-design consultation process CLRT representatives were not permitted to discuss whether the rail line would be above or below ground, as a respondent who was contracted by CLRT to guide the consultation process indicated during interview.

Perhaps the widest gap between the public consultation and construction stages was common understanding of which tunnelling method would be used along the majority of Cambie Street. This misunderstanding arose for several reasons and was central to Heyes' lawsuit. First, the environmental assessment documents, released to the public in January 2005, only included bored tunnel for the line under Cambie. The project was planned to be 19.5 km in length; as a railway of less than 20 km, it was not a reviewable project within the provincial Environmental Assessment Act (Pitfield 2009: 27). However, the federal Environmental Assessment Act requires an environmental assessment in projects where a federal authority authorizes financial assistance, which required CLRT to provide a review of the project (Pitfield 2009: 28). The resulting document, "Scope, Procedures and Methods for the Environmental Assessment of the RAV Rapid Transit Project", contemplated that the Canada Line would proceed by twin-bored tunnel construction from Vancouver waterfront station to 37th Ave (Pitfield 2009: 30).

Secondly, by February 2003, the CLRT project team had completed a final draft of the project definition report. While this document was used for consultation with government bodies and the general public, it was not legally binding and was used to "not prescribe a solution, but rather define the problem

and encourage innovation from the private sector to achieve the solution that delivers the best value” (Project Definition Report 2003: 28). The report suggested ten possible options for the placement of the Canada Line, each of which contemplated a bored tunnel under Cambie Street between 6th Ave and King Edward (Pitfield 2009: 34). Bored tunnel construction, while more costly than cut-and-cover, is much less disruptive on the surface (Vuchic 1981).

6.3.3 RFP, BAFO and Selection Stages

The City of Vancouver approved the Final Draft subject to a number of conditions, one of which was that the line would be located in a tunnel from Waterfront Station to 46th Ave on Cambie Street, after which point TransLink prepared the request for proposals (RFP) and sent it to 20 entities that had responded to the request for expressions of interest (RFEI) (Pitfield 2009: 43). Significantly, the RFP stated that proponents were at liberty to develop alternatives to the method of tunnel construction, provided that the limits for maximum depth and the course the line would follow from one end to another were respected (Pitfield 2009: 44). Furthermore, the document states multiple times that “while the system will be rail based, the precise technology has not been selected and will be determined as part of a competitive bidding process” (Project Definition Report 2003: 2).

One of the alternate proposals, submitted by SCN-Lavalin, proposed cut-and-cover construction along the majority of Cambie Street rather than the bored-tunnel construction presented in consultation documents. This alternate proposal was the only one to suggest that cut-and-cover construction be used,

(Pitfield 2009: 48). Wayne Pledger, former manager of the City's Rapid Transit Office, noted under examination that "some of the impact would have been reduced if SNC-Lavalin had bored the tunnel for more of the route, as was initially envisioned. You would still have the impacts of the stations, but all the other impacts of the cut-and-cover would have gone away" (Pledger 2009: 78). Given that a tunnel-boring machine was already in use for other sections of the Canada Line, the only reason the bored tunnel method was excluded was cost.

CLRT invited SCN-Lavalin and one other entity to submit a best and final offer (BAFO) by September 2004, and the CLRT board recommended the SCN-Lavalin proposal because of its reduction in the required amount of public funding. As one of the few parties with access the confidential BAFO documents, Justice Pitfield notes that the difference in the cost of these two final proposals was due to the proposed use of cut-and-cover rather than bored tunnel construction (2009: 148).

TransLink approved SCN-Lavalin's bid in December 2004 (Pitfield 2009: 57). The fact that the construction proposal approved by TransLink would involve cut-and-cover was not made public until this time, by way of a disclosure on the Environmental Assessment Office website (Pitfield 2009: 60). Neither TransLink nor CLRT made a public announcement that the construction method would be cut-and-cover, despite the fact that public information to this point indicated that the tunnel would be bored (Pitfield 2009: 61). Reports of cut-and-cover construction first came from the media in January 2005. At a public meeting in January 2005, CLRT CEO Jane Bird confirmed that cut-and-cover construction

would be used, but that the tunnel trench would not be open at any particular location for a period of more than three months (Pitfield 2009: 61).

6.3.4 Construction Stages

Though Bird's estimate that trenches would not be open in a given location for more than three months reflected the information SCN-Lavalin had given up to that time (Bird 2009: 152), tunnel trenches remained open in front of Cambie Street stores for over three years. Pitfield (2009) notes that "the substantial increase in time arose because, as excavation began at the south end of Cambie Street, unstable ground was encountered and made it necessary to replace the planned "pre-cast" with the lengthier "pour-in-place" method of tunnel construction" (63).

Merchants' efforts to obtain compensation during construction were wholly ineffective. Representatives of the province, InTransitBC, CLRT and TransLink frequently redirected concerned merchants to each other's offices. When questioned in court about why InTransitBC was not offering compensation to affected businesses, vice-president of public affairs Stephen Crombie explained that "as the concessionaire there was no provision in our contract to provide any sort of compensation, and I directed further inquiries to the Canada Line office" (Crombie 2009: 54-55). Scores of letters written to Kevin Falcon, then-minister of transportation, received the rote response that "our government is proud to be a funding partner in the Canada Line" (Falcon 2005).

Provincial actors attempting to assist affected merchant also faced considerable difficulty. Former finance minister Taylor-Phillips attempted to “try and get the parties to sit down together... to really understand how difficult the situation was and to look at the possibility of mitigation” (Taylor-Phillips 2009: 6), although to little avail. In his former capacity as Opposition MLA, current Vancouver mayor Gregor Robertson brought many of these concerns before the provincial legislature. His encouraging the provincial government to address the difficulties that merchants in his riding faced due to construction garnered no response, however. Under examination, Robertson noted that “there was never any movement toward compensation” and that he “had slight hopes when the minister of finance spoke with concern about the impact on small business along the Canada Line but it never amounted to making any difference to the business owners” (Robertson 2009: 9).

The testimony of provincial representatives emphasized the lack of coordination between government offices and private sector representatives, particularly the following excerpt:

[Taylor-Phillips]: I’m handicapped in discussing how this was set up because I was not there at the beginning. I don’t know how that number was arrived at, I don’t know if the business community was consulted on that number. I do know that some of the business community was involved in the committee that decided how it would be spent. So I don’t know how that number was arrived at. All I could see is that whatever the number, there were difficulties out there with the community, with these business owners that had to be addressed.

[Cameron Ward]: While you were minister of finance, the provincial portion of the RAV funding fell within your budget considerations, correct?

[Taylor-Phillips]: The contracts were all signed before I became minister. (Taylor-Phillips 2009: 9).

The reaction of public and private sector representatives to merchants affected by prolonged disruption embodies a reactive approach to risk mitigation.

6.4 Risk Allocation in the Canada Line P3

The specific risk allocation process used for the Canada Line contract remains confidential. One of the documents referred to during witness testimony was a Risk Registry completed as part of the PSC, which included a “quantification of risk ranges (probability and dollar impact) on an individual risk basis” (KPMG 2004: 4). However, neither the Risk Registry, the PSC, or the independent review documents were ever released to the public and I had no access to them as part of the legal case file. While the quantification of risk ranges would have been informative from a theoretical perspective, my analysis rests on how construction risk was allocated in practice, rather than the methods used to calculate specific risks.

The risk allocation defined in the 2006 Final Project Report (Table 4) shows that, under the concession agreement, significantly more risk was transferred to the private sector (InTransitBC) than would have been transferred in the hypothetical public sector comparator (PSC) (Canada Line Final Project Report 2006: 18). Risk transfer from the public to the private sector is one of the primary rationales for employing a P3 delivery in place of a public delivery.

Table 4: Allocation of risk in Canada Line P3

Risk	Project	PSC	Phase
Land acquisition cost and schedule	CLCO	CLCO	Construction
Municipal and regulatory permitting, cost	CLCO/ InTransitBC	CLCO	Construction
Municipal and regulatory permitting, delay	InTransitBC	CLCO	Construction
Undisclosed environmental or archaeological liabilities	CLCO	CLCO	Construction
Cost of design build packages	InTransitBC	CLCO	Construction
Cost of construction	InTransitBC	Contractors	Construction
Construction inflation (labour, steel, etc.)	InTransitBC	Contractors	Construction
Construction delay	InTransitBC	CLCO	Construction
Utility relocation cost / delay	CLCO/InTransitBC	CLCO	Construction
Changed ground condition (tunnels and foundations)	InTransitBC	CLCO	Construction
Design integration	InTransitBC	CLCO	Construction
Integration between civil works and systems	InTransitBC	CLCO	Construction
Public protest, legal action, embargo or blockade	CLCO	CLCO	Construction / Operating
Reasonableness of behaviour of Agencies and Cities	CLCO	CLCO	Construction / Operating
Force Majeure	CLCO/InTransitBC	CLCO	Construction / Operating
Insurance costs	InTransitBC/GVTA	CLCO	Construction / Operating
Condition of civil assets (over the 35-year term)	InTransitBC	CLCO	Construction / Operating
Operating performance (over the 35-year term)	InTransitBC	CLCO	Operating
Operating costs (over the 35-year term)	InTransitBC	GVTA	Operating
Maintenance costs (over the 35-year term)	InTransitBC	GVTA	Operating
Useful life of trains and other systems	InTransitBC	GVTA	Operating
Ridership revenues	~90% GVTA ~10% InTransitBC	100% GVTA	Operating

(source: Canada Line Final Project Report 2006: 18)

In this configuration, CLCO (aka CLRT) retained the risk of legal action, which differs slightly from the risk of nuisance itself. The private partner, InTransitBC, took on the risks of construction delay and design deficiency (“design integration” in Table 4). The following sections describe how the risks of design deficiency, construction delay and nuisance were allocated in practice.

6.4.1 Design Deficiency

In the risk allocation matrix above (Table 4), design deficiency does not appear precisely. However, “design integration” refers to the same risk, namely the risk of poor contract and infrastructure design, and was allocated to the private partner. The judgment file states that the nuisance Heyes suffered arose from the choice to use cut-and-cover construction, for which InTransitBC, TransLink and CLRT were found liable given that a less disruptive alternative was readily available (Pitfield 2009: 149). Design deficiency, construction delay and nuisance are jointly implicated in this judgement; however, in the interest of clarity, I consider each risk separately.

The deficiency in Canada Line’s design stems from the tender specifications required of the private company. The bid for the Canada Line came down to cost, as P3 contracts seek to minimize upfront costs and download costs to third parties. The winning bid was the only one that included a cut-and-cover proposal for the tunnel under Cambie Street and was selected on the basis of cost savings. The VFM report for the project, made public in April 2006, showed significant technical and structural differences between the theoretical public-sector project and the one submitted by the winning bidders in the BAFO stage; the winning bid had one station less, sections of single tracking, and cut-and-cover construction in areas instead of deep tunnelling (Cohn 2008).

It can be claimed that these design changes were a result of the proponent’s innovation. However, if the design specifications had included an

analysis of third party costs, cut-and-cover construction would have most certainly been eliminated as an option due to its unnecessarily heavy impact on merchants. Allocating design deficiency risk to the private sector emphasized up-front cost reduction, and by choosing cut-and-cover construction, the private sector transferred some of their costs to third parties. Carole Taylor-Phillips noted under examination that the P3 used for the Canada Line proposal is just one type, and that “if you in fact say, well, yes price is an issue but also disruption is an issue... you can write tenders any way that you wish” (Taylor-Phillips 2009: 5). Her testimony reflects the concern that third party costs were not considered in the P3 contract.

6.4.2 Construction Delay

While the Canada Line project finished 110 days ahead of schedule (Chan 2010), the construction of tunnel trenches took much longer than anticipated in the planning stages. When construction began, unstable ground was encountered which necessitated a change in construction method mid-construction (Aitken 2010). The contract included financial incentives for finishing the project ahead of schedule, but no disincentives or penalties were included for going over schedule for individual sections of tunnel construction. While construction delay was allocated to the private sector, they did not suffer any financial loss for taking three years rather than three months for each section of tunnel construction. Thus the costs were transferred to third parties.

6.4.3 Nuisance

Notably, the risk of nuisance does not appear in Table 4. While this may have been an oversight by the parties constructing the matrix, the more likely explanation is that these parties did not consider nuisance to be a risk, since it only arises when impacts become unreasonable. As a result of this oversight, the planned mitigation strategies were designed primarily to reduce costs to the construction company, rather than merchants and residents. During Heyes' lawsuit, however, InTransitBC, TransLink, and CLRT were found jointly liable for losses. TransLink and CLRT are both arms-length government entities, so legally the risk of nuisance was allocated 2/3 to the public and 1/3 to the private sector. Pitfield's ruling emphasized the shared risk taken on by the project's public and private sectors, rather than placing responsibility solely on one party.

Heyes' "loss of more than \$500,000 over four years resulting from the decline in sales... caused solely by cut and cover construction cannot be regarded as a tolerable or acceptable burden which should be absorbed by Hazel & Co. as its contribution to the realization of a project of general public utility" (Pitfield 2009: 148). Litigation thus recognized the burden placed on third parties. And although only one merchant has been compensated to date, two class action lawsuits against the Canada Line public and private parties have been filed in the wake of Heyes' legal victory. Promoters of future projects in the region, whether public or private entities, will likely have to consider the risk of nuisance much more carefully.

6.4.3.1 Mitigation Strategies for Nuisance

Strategies to mitigate construction impacts include the following. In a case study review prepared for the Canada Line private partners, Harris Consulting (2005) summarizes the business impact mitigation strategies used during the construction of six major North American transit projects. Strategies include business participation in the planning and implementation of mitigation strategies, contractor buy-in, and promotion and marketing (Harris Consulting 2005). One example is to coordinate construction strategies with the retail calendar, such as back-to-school and Christmas periods. The case study review did not include projects like Seattle's Central Link, a publicly funded project which provided direct financial compensation to affected merchants. While the review was not legally binding in any capacity, it indicates the relatively minor scope of the mitigation strategies that were recommended to CLRT.

Key representatives of both public and private sectors never considered compensatory mitigation an option. Jane Bird describes the role of CLRT in mitigation:

We concluded that there was a role for the concessionaire in managing the communications around the construction, whether it was notices or any kind of widely recognized method for communicating construction, and that they would also be responsible for some public consultation around station design and what mattered to people. At the same time we realized we would need to have an ongoing role. (Bird 2009: 110)

Similarly, Stephen Crombie outlined the strategies designed to mitigate the impact of construction. He called it a "fairly comprehensive program of dissemination of information to the public residents and businesses" (Crombie

2009: 85) and included a project website that provided current information on traffic changes, an interactive voice response system that provided 24-hour information by segment, and multiple public notices of construction including radio and newspaper advertisements (Crombie 2009: 84). Additionally, a business support system was created whose main achievement was a campaign advertising that Cambie businesses were open during construction. The Business Support System was allocated a budget of \$3 million, a figure that included the salary of the community liaison office on Cambie Street, at a percentage of 0.15% of the total project budget (Crombie 2009: 47).

Heyes and other merchants expressed repeated discontent with these mitigation strategies. Heyes notes that “there was a number of things that were presented but none of them were effective, really, in correcting the issue, which was that people were absolutely avoiding the entire area” (Heyes 2009: 55). Bird admits that “it was clear to me that what the businesses wanted, amongst other things, was cash compensation” (Bird 2009: 194). So while the leader of CLRT was well aware of the concerns of business owners, she noted that “there is no policy to provide compensation for the temporary construction impact of a public infrastructure project that I’m aware of, and that was communicated to me by any government sponsor at any level [of the] government of Canada” (Bird 2009: 201). Because nuisance was not recognized as a risk in the planning stages, private and public sector representatives were only able to deal with the risk reactively. Pitfield found that, despite the defendants’ defence that the impact of construction was temporary and should not be overstated,

their claim that all possible steps outside of direct payments to mitigate the impact were “not persuasive” (Pitfield 2009: 146).

Furthermore, no record was taken by either the public or private partners of the businesses that closed down during construction of the Canada Line. Jane Bird confirmed this under examination: neither CLRT nor their community liaison office kept “an empirical record of what businesses opened and closed on Cambie Street during construction” (Bird 2009: 174). The lawyer representing Susan Heyes questioned witnesses on this matter and none of them were aware of such a record being taken. Stephen Crombie testified that InTransitBC did not commission any studies into the business impacts of construction, or even consider it (Crombie 2009: 54). The failure to collect such information indicates that mitigating the impacts of construction was not a priority to either the public or private partners.

6.4.3.2 Legal Implications of Private Sector Involvement

Bird’s response emphasizes the legal gray area that P3 projects presently occupy in BC. While there is no precedent for compensation for merchants for traditional public delivery projects, the involvement of the private sector creates new legal questions of risk allocation and its associated costs. The judgment file for Heyes’ lawsuit further emphasizes how poorly defined the P3 structure is in BC. Canada and the Attorney General participated as funders but neither was a partner in the legal sense of the word (Pitfield 2009: 168). For future P3s used in the region and elsewhere, further litigation may be necessary to allocate risks between the public and private partners. The need for litigation confirms

Hildebrand's theory (2010) that liberalization leads to more legal conflicts, and that the courts are playing an increasingly prominent role in governance. Thus the impacts of the Canada Line extend not only to the built environment but also to the legal environment.

6.5 Transparency of the Canada Line Planning Process

Several issues arise regarding transparency of Canada Line's planning process. Difficulty accessing the Canada Line website is one red flag. Withholding the documents detailing the calculation of a PSC against which a P3 method was chosen indicates a serious lack of transparency on the part of CLRT and InTransitBC. And because data on business closure rates were not collected, there is no clear record of the impact of construction on merchants.

The Canada Line planning process is marked by a lopsided emphasis on cost reduction, one of the trademarks of megaproject planning. A recent report ranking BC's openness and accountability found that in the last five years, the ability of both the Auditor General and Freedom of Information and Privacy Commissioner to do their work has been undermined by budget cuts and inadequate resources for new and expanded mandates, particularly at a time when the BC government was introducing significant change and risk (Reynolds 2006). These changes have undermined the openness and accountability of the government of BC at the financial and the policy level (Reynolds 2006). In his final report to the legislature in 2006, former BC Auditor General Wayne Strelloff states candidly that recent provincial transactions such as the Canada Line have "led to surprises for investors through the discovery of off-balance sheet

liabilities. In the public sector, similar surprises can emerge for taxpayers if they are not monitored and addressed rigorously” (Reynolds 2006: 6). The downloading of disruption costs to third parties is one such “off-balance sheet” liability.

Furthermore, TransLink and the provincial government’s approach to the project was to choose a specific procurement strategy (P3) and technology before considering all options. One of the transportation experts I interviewed noted that having a project office devoted to a given project invariably leads to a conflict of interest, since the people involved have a vested interest in the project going forward and not necessarily in creating a project that would create the most good for the most people. The tight deadline for completion before the 2010 Winter Olympic Games provided considerable political impetus for pushing the project forward, even though an airport link was not at the forefront of the planning agenda at the time (Siemiatycki 2005).

In terms of cost overruns, the Canada Line is no exception to the rampant cost underestimation that typifies megaprojects. Initial agreements between the public and private funders outlined federal government contributions of \$450 million, provincial contributions of \$435 million, and \$750 million from the private company InTransitBC for a total cost of \$1.76 billion (Provincial Funding Agreement 2004). In a press release issued five months before the line opened, BC premier Gordon Campbell announced that the project was on budget and ahead of schedule (Palmer 2009). He cites a budget of \$2.054 billion dollars, a difference that exceeds the initial budget by 33 per cent along with a 15 per cent

reduction in the number of stations. While the final budget has yet to be released, the difference between original and final costs remains significant.

6.6 Summary

In this chapter, I examined the details of the Canada Line P3 stages and the risk allocation of design deficiency, construction delay and nuisance. Susan Heyes' lawsuit against Canada Line public and private sectors reveals a disproportionate emphasis on cost reduction during the planning process. The extended nuisance she and other merchants suffered is a third party cost that went unrecognized in the choice to use cheaper cut-and-cover, rather than bored tunnel, construction. The planning documents reveal that most construction risks were allocated to the private sector, as well as the risk of design deficiency. While nuisance was not recognized in this risk allocation matrix, legally it was allocated between public and private sectors. The P3 contract failed to recognize and mitigate nuisance proactively at the planning stage of the Canada Line, and the outcomes will conceivably extend to future projects regardless of the degree to which they involve the private sector.

Now that I have explored the Canada Line megaproject in further detail, I will compare it to three other transportation megaprojects and contrast the risk allocation strategies and outcomes of each project.

7: CASE STUDIES

In this chapter, I compare the Canada Line to three transportation megaprojects. I briefly outline the details of each project before comparing all four. Using systematic process analysis, I compare case studies to highlight how differing risk allocation and mitigation strategies dramatically affect project outcomes. And by comparing P3 to public sector projects, I question the nature of private sector involvement and its effect on project outcomes. While primary and secondary literatures for case studies provide less information on nuisance specifically than Canada Line legal documents, they build a comprehensive view of overall project outcomes and how allocation of construction and design risks affects outcomes.

The following table summarizes basic facts for all four case studies, while the next three sections describe each project in greater detail including the planning stage and risk allocation between public and private sectors.

Table 5: Basic facts for megaproject case studies

	Sydney Airport Link	Toronto Sheppard Subway	Seattle Central Link	Vancouver Canada Line
Description	10 km heavy rail airport link to downtown Sydney built in time for 2000 Summer Olympic Games; 5 stations	6.4 km rapid transit line; 4 new stations plus reconstruction of Sheppard/Yonge station	22.4 km light rail segment; 11 stations (part of larger Link project); Central Link runs between Tukwila and downtown Seattle	19.5 km heavy rail system (not SkyTrain) built in time for 2010 Winter Olympic Games; 16 stations
Operation and ownership	Owned by ALC for 30-year term; operated by government-owned CityRail	Owned and operated by TTC	Owned and operated by Sound Transit	Owned by TransLink; operated by ProTrans BC (subsidiary of InTransitBC)
Opening date	May 2000	Nov 2002	July 2009	Aug 2009
Tunnel construction method (if applicable)	Bored tunnel	Cut and cover and bored tunnel	At grade and grade separated (light rail system)	Cut and cover and bored tunnel

(source: author's compilation based on Westland et al. 1998; Loosemore et al. 2006; Cowan 2002; Krieg 2009a)

7.1.1 Sydney Airport Rail Link

As a megaproject that used a P3 to construct an Olympic project on a tight deadline, the Sydney airport rail link is most similar to the Canada Line. The Sydney Airport and East Hills railway line is a 10 km underground railway between Sydney's central business district and the Kingsford Smith airport that connects a number of suburbs to central Sydney via the airport (Zou et al. 2008). The proposal for the link was put forward by property developers to the New South Wales state government in 1990, which announced it as a BOOT P3

contract between the public State Rail Authority (SRA) and Airport Link Company (ALC) (Loosemore et al. 2006). However, in 1994 political pressure caused the state government to terminate the project and re-seek competitive tenders. This caused a dispute between the private sector and the public sector partners which was resolved by an independent consultant, who concluded that the bid was deemed to be good value for money and contained an equitable sharing of risks (Loosemore et al. 2006).

No feasibility studies were conducted for the project, which gave the private sector only a few months to respond with expression of interest (NSW Gov. 1993) and reduced the competitive bidding process. Only four bids were received during the RFEI stage, and the two companies with shortlisted bids eventually created Airport Link Company and went forward with the project in non-competitive negotiations with SRA (Loosemore et al. 2006). This relaxation of planning processes in preparation for the Olympics resulted in reduced accountability to the community (Owen 2001). The project opened May 2000 and ran into financial trouble six months after opening; Airport Link went into receivership in November 2000 (Williams et al. 2005).

The project's problems have led to significant public criticism and questions about how risks were allocated between public and private sectors. An academic paper on the rail link identifies the distribution of risk between public and private sectors as follows: Airport Link Company took on design deficiency risk, construction delay, and nuisance, in addition to most operation and revenue risks (Loosemore et al. 2006). However, the literature does not

identify the specific process employed for allocating risks in the planning stage, or whether the BOOT contract included a risk identification and analysis process at all. Considering the paucity of evidence, the lack of feasibility studies and the non-competitive bidding process, it seems unlikely that the project's P3 partners undertook a comprehensive risk analysis in the planning and contract stages.

With regard to construction delay risk, tunnelling took place underneath densely populated residential communities, Australia's busiest airport, and inner-city industrial areas. Few retail or commercial businesses were affected during construction, mostly because the siting of the line was through residential and industrial areas. Also, bored-tunnel construction was employed for the entire length of the line (ATS 2010), which contributed to the project's high cost. In terms of design, trains are not dedicated airport trains and may be full of suburban commuters by the time they reach the airport en route to downtown (Chung 2003). Excessive ticket price largely contributed to the project's low patronage (Zou et al 2008), while overly optimistic ridership projections plagued the project; anticipated patronage was 48,000 riders per day while actual ridership averaged 12,500 riders per day in the first six months (Zou et al. 2008). If ALC's loan defaults continue, the government may be forced to purchase the privately built stations (Loosemore et al. 2006), further increasing costs to the public. Thus, while design risk fell to the private sector during planning by virtue of the P3 contract, the public sector ended up taking the risk after construction was complete.

7.1.2 Toronto Sheppard Subway Line

The Sheppard Subway line is a 6.4 km spur line in northeast Toronto originating at Yonge Street and extending east to Don Mills Road. Opened in 2002 by the Toronto Transit Commission (TTC), the city's transit authority, the project took eight years to complete and was the largest development project in Toronto in 20 years (Belford 2003). The city's first subway line in 36 years, the line has been "widely condemned as a waste of precious public transit funds" (Dault 2002). In 2007, in the face of massive funding cuts to the city, shutting down the underused Sheppard subway was presented by the TTC as a potential solution. While the subway remained open, a local journalist notes that "by general agreement, the subway... was a mistake, though eventually it will obviously have an effect" (Hume 2009).

The subway was constructed using a design-bid-build (DBB) procurement and contracting approach, which is the most common form of public project delivery. The rationale for choosing this model was that "TTC has found success with Design Bid Build and considers it a proven and viable method of delivering major transit infrastructure" (TTC Report 2008, Appendix 2: 2). As the DBB label indicates, the public agency contracts with separate entities for each the design and construction of a project (Grimsey and Lewis 2004). The design and construction stages are awarded to separate private subcontractors, under the guidance of the public sector. Thus in the case of the Sheppard subway, the private sector took on construction cost overrun and delay risks. Design deficiency risk and nuisance fell to the public sector, as they were the entity

selecting from among various bids. Formal risk allocation schemes are not necessary for traditional project delivery, as the public sector bears all risks but the construction stage risks taken on by private contractors.

In terms of nuisance, business effects within the construction zone were significant (Harris Consulting 2005) and anecdotal evidence suggests that some businesses along the tunnel route closed down during cut-and-cover construction, although no records of business closures were kept (Cowan 2002). A report on mitigation strategies notes that, despite property owners being ineligible for business loss compensation, the city handled “many owner complaints, claims, and requests for property and business tax abatements” (VTA 2003: 13). Rather than provide compensatory mitigation, the Sheppard subway promoters employed mitigation strategies similar to the Canada Line promoters in response to nuisance. For example, prior to construction, dialogue between local business owners and the contractor led to a plan that reduced construction from nine weekends to two weeks (VTA 2003). Under the Sheppard subway’s traditional delivery method, however, merchants were not entitled to claim legal compensation for the temporary impacts of construction.

7.1.3 Seattle Central Link

This transportation project was cited in the Canada Line court documents as an example of successful business mitigation. The Seattle Central Link is a 22 km segment of a larger light rail project known as Link, which includes Airport Link and University Link segments. During construction of Central Link, the existing downtown transit tunnel was utilized, which minimized construction

impacts in the central business district. However, a 7 km portion of Central Link was built at-grade along Martin Luther King Jr. Way South, a diverse working class neighbourhood with numerous small and ethnically owned businesses operating along the route (much like Cambie Street). Construction severely disrupted traffic, minimized access, and created congestion on this corridor. Construction began in July 2004 and most major activity was completed by March 2008 (Krieg 2009a).

Similar to Sheppard subway, Seattle Central Link used a DBB contract, allocating design deficiency risk and nuisance to the public sector and construction cost overrun and delay risks to the private contractor. While public financing precluded a more costly construction method such as tunnelling (Krieg 2009a), the public managers considered third party costs in their analysis. To ameliorate the expected construction impacts of the five-year construction period in the Martin Luther King Jr. Way area, public entities Sound Transit, the City of Seattle, and King County founded a \$50-million Rainier Valley Community Development Fund (CDF) in 2002. This fund included the Supplemental Mitigation Assistance program, which provided financial assistance in the form of grants to businesses that could document a loss in net revenues or to businesses that were relocated as a result of light rail construction. From 2003 to 2008, the CDF disbursed \$15 million in direct payments to local businesses (Krieg 2009b). The five mitigation products included re-establishment payments and business interruption payments to compensate businesses for loss of income due to construction (Krieg 2009b).

Significantly, time limits were premised on Sound Transit's original construction timeline which estimated direct impacts in front of businesses lasting between three and nine months.

Of the 310 businesses eligible for the assistance program prior to construction, 85% remained open (Krieg 2009a). Krieg (2009a) found that the creation of the community development fund was both a mitigation measure and an acknowledgment by various government entities that a given neighbourhood would experience disproportionate impacts. Furthermore, the CDF was flexible and amended various mitigation products ten times in response to changing construction conditions (Krieg 2009a). Seattle Central Link used compensatory mitigation strategies to deal with construction stage risks to a greater extent than most transportation megaprojects.

7.2 Case Study Comparison

Table 6 summarizes case studies on the basis of project costs, mitigation strategies, degree of private sector involvement, provision for compensation during construction, and transparency during planning.

Table 6: Case study comparison of costs and construction risk mitigation strategies

Project	Period of construction (years)	Projected costs (\$)	Actual costs (\$)	Cost increase, % ²	Business impact mitigation strategies	Provision for compensation	Nature of private sector involvement	Level of transparency in planning
Sydney Airport Rail Link	5	600 million ³ (AUS)	920 million ⁴ (AUS)	53.3	Avoidance (route through industrial and residential)	None during planning stage	Build, operate, own, transfer (BOOT P3 contract)	Low
Toronto Sheppard Subway	8	511 million ⁵ (CAD)	933 million ⁶ (2002 CAD)	82.5	Community liaison program, business assistance	None during planning stage	Design, build (DBB contract)	Low
Seattle Central Link	5	1.82 billion ⁷ (1996 US)	2.07 billion ⁸ (US)	13.7	CDF providing direct grants to affected businesses	\$50 million CDF, \$15 million directly to businesses	Design, build (DBB contract)	High
Vancouver Canada Line	4	1.76 billion ⁹ (2004 CAD)	2.054 billion ¹⁰ (CAD)	16.7	Community liaison program, business assistance	None during planning stage; litigation to obtain compensation	Design, build, finance, operate (DBFO P3 contract)	Low

² Data for projected costs, final costs, and years of each cost vary in the literature; I have reported best available data. Cost increase percentages are unadjusted for inflation and are general estimates only.

³ Zou et al. 2008; year not specified

⁴ Loosemore et al. 2006; year not specified

⁵ Westland et al. 1998; year not specified

⁶ Cowan 2002

⁷ Krieg 2009a

⁸ Krieg 2009a; year not specified

⁹ Provincial Funding Agreement 2004

¹⁰ Palmer 2009; year not specified

Several trends emerge from these data. Every project had cost overruns, which is typical of megaprojects, although overruns varied widely. Based on estimates given best available data, Seattle's Central Link had the lowest cost overruns, which may be partially attributed to its more deliberative planning process compared to Toronto's subway. Additionally, Seattle made use of an already existing bus tunnel. Toronto's cost overruns were highest; the Toronto Audit (1998) attributes the rising costs of the Sheppard subway during construction to utilities, tender prices, increased labour costs and unreasonably low contingency provision. Sydney's Rail Link had the next highest cost overruns. Notably, it was difficult to obtain accurate cost estimates and final costs, particularly from government sources, which highlights the strong political motivations that keep project promoters from revealing a project's actual costs (Flyvbjerg et al. 2003). Business impact mitigation strategies (specifically, whether financial compensation was provided) varied widely across projects. While Sydney's rail link promoters avoided nuisance to merchants by siting the line through industrial and residential areas, Toronto's and Vancouver's project leaders employed mitigation in the form of business liaison. Seattle's public authorities employed compensatory mitigation for nuisance to merchants during construction. While the Sheppard subway had no construction delays at each station (VTA 2003), Canada Line faced major construction delays. In both cases, local merchants demanded compensatory mitigation. The Sheppard subway's public procurement contract allowed the TTC to avoid litigation.

Table 7: Outcomes of megaproject case studies

Bases	Sydney Airport Rail Link	Toronto Sheppard Subway	Seattle Central Link	Vancouver Canada Line
0. Project Conception				
0.1 Procurement choice	P3 form ordained	DBB form ordained	DB, then DBB ¹¹	P3 form ordained
0.2 Political imperative	Dictated decision	Dictated decision	Non-partisan	Dictated decision
1. Contract Process				
1.1 Degree of competitiveness	Low (non competitive bidding process)	Low (few bids on construction)	High (3 bids)	High (4 bids for contract)
1.2 Degree of transparency	Low	Low	High	Low
2. Concession Agreement				
2.1 Degree of openness	Low (confidential)	Low	High (entirely public)	Low (confidential)
2.2 Conflict resolution process	Inflexible	Inflexible	Flexible	Inflexible
3. Financing				
3.1 Payment related to risks	No	No	Yes	No
3.2 Scope for innovation	Some	Some	Some	Some (contingent on lower cost)
4. Risk management				
4.1 Construction on budget	No	No	No	No
4.2 Project completion on time	Yes	No	No	Yes (overall project done ahead of schedule)
4.3 Demand/traffic as forecast	Low (passenger volumes 25% of forecast)	Much lower	As forecast	Yes (set to reach 100,000/day by end of 2010)
4.4 Operating costs on budget	No (Airport Link went into receivership Nov 2000)	No (TTC almost shut down subway in 2007 due to low ridership)	NK (line still very new)	NK (line still very new)

(Source: adapted from Stambrook 2005; TTC Report 2008; Loosemore et al. 2006; Cowan 2002; Krieg 2009a; NK= not known)

¹¹ Seattle previously attempted in the late 1990's to construct an LRT line employing DB contracting. This was halted due to problems with DB (specifically, for work including extensive tunneling for which the tendered contract bids far exceeded the estimated cost and budget). The DB approach was abandoned largely because of this issue. Following a six year postponement, work was restarted using DBB (TTC Report 2008:7-8)

Table 7 above lists the outcomes of each project at various stages.

To populate the column on transparency, I made a qualitative judgment about how open the planning stage of each project was based on the literature. As such, the column is meant to be taken as a supplement to other, more extensive data. Sydney's rail link and the Canada Line earned a "low" rating because the P3 bidding process is, by nature, confidential. Siemiatycki (2006) notes that "the explicit need for secrecy and the prevalence of commercially confidential information associated with the competitive tendering process appears to be incongruent with the need for openness and transparency associated with an accountable planning process" (145). And for the Canada Line, transparency rated low due to the factors outlined in Section 6.5. For Toronto's Sheppard subway, I had difficulty accessing public documents from the TTC online. The fact that Seattle's CDF amended various mitigation products ten times indicates a transparent and responsive planning process, although such transparency is not attributable to its public funding structure alone.

The low level of transparency for one public and both P3 projects supports findings from the literature that a lack of transparency during planning of megaprojects is typical regardless of contract type (Flyvbjerg et al. 2003; Vining and Boardman 2008a). A high degree of transparency in the planning process ensures that the most appropriate technology is used and that poorly planned projects do not move past the planning stage. For instance, if Sydney's Rail Link promoters had conducted feasibility studies, a costly underground tunnel

may not have been chosen for the route. Thus, these project outcomes confirm the need for transparency at all stages.

Another trend that emerges from Table 7, Section 4 (risk management) is the difficulty of forecasting ridership and costs. Every project went over budget, and ridership forecasts for Rail Link and Sheppard subway were overly optimistic. The Canada Line, however, has reached its ridership forecasts quicker than expected and may need to increase capacity to keep up with demand (Sinoski 2010; Chan 2010). The difficulty of forecasting costs and ridership further emphasizes the need for comprehensive risk allocation measures at the planning stage to effectively manage varying outcomes.

Table 8 summarizes how design deficiency, construction delay, and nuisance risks were allocated between public and private sectors in case studies at the planning stage of each project. As the Canada Line case illustrates, actual risk allocation can change between the planning and construction stages, particularly given legal action.

Table 8: Risk allocation between public and private sectors in megaproject case studies

Risk	Sydney Airport Rail Link	Toronto Sheppard Subway	Seattle Central Link	Vancouver Canada Line
Design deficiency	Private	Public	Public	Private
Construction delay	Private	Private	Private	Private
Nuisance	Private	Public	Public	Private

In all four projects, construction delay was allocated to the private contractor. Toronto and Seattle, the two publicly funded projects, allocated design deficiency and nuisance to the public sector, while the two P3 contracts allocated these risks to the private sector. The differing risk allocation strategies do not account for the dramatically varied project outcomes; while Seattle and Toronto's projects were both publicly funded projects and allocated the same risks to the public sector, Central Link had lower cost overruns and a much more effective mitigation strategy. Thus other factors have a greater influence on project outcomes than the simple allocation of risk between public and private sectors.

7.3 Summary

This chapter examined the details of three transportation megaprojects, particularly risk allocation and risk mitigation strategies. I also compared project outcomes to analyze the effectiveness of risk allocation in the Canada Line.

The transfer of a megaproject's risk to the private sector is one of the often-touted benefits of developing projects through P3s. There is considerable debate (Flyvbjerg et al 2003; Bruzelius et al. 2002; Collingridge 1992; Boardman and Vining 2008a) regarding optimal risk allocation and whether public or P3 structures can distribute risks effectively. What emerges from this debate is that the more accountable a project's administrators are to the public, the more accurate and effective risk allocation strategies will be. My case study analysis shows that whether risks are allocated to the public or private sector does not seem to be the most crucial factor. Rather, the mitigation strategies for

construction risks have the most impact in managing risk. Whether the private sector is involved or not appears secondary to the need for transparency and comprehensive risk analysis, allocation, and mitigation strategies at the planning stage. This points to the need for more effective risk management strategies regardless of contract method.

That having been said, contract method played a role in determining project outcomes. Canada Line's DBFO P3 contract allocated and managed construction risks of delay and nuisance relatively poorly by leaving compensation up to the courts. And while Sydney's Rail Link largely avoided nuisance and delay by project siting, both P3 projects suffer from low transparency. While one publicly funded project employed compensatory mitigation to deal with nuisance, a second publicly funded project overlooked third party costs in much the same way that Canada Line promoters did. Thus the public funding structure of Sheppard subway did not deal with construction risks very effectively, while out of the four case studies, Seattle's Central Link dealt with construction risk most effectively. The experience in Seattle highlights that mitigation strategies and proactive risk management affect project outcomes most prominently.

Among all four case studies, Central Link was the most effective in mitigating nuisance and construction delay, largely attributable to Sound Transit's comprehensive consideration of third party costs at the planning stage. While P3 contracts could theoretically include a comprehensive total cost and risk analysis during planning, such processes are expensive and likely to be

skipped in the private sector's mandate to reduce upfront costs. The Canada Line is a perfect example. Under DBFO P3 contracts, the private sector retains autonomy over design in addition to building, financing and operating. Without a public sector entity ensuring proactive risk allocation at the planning stage, the task of reactive risk mitigation falls to the legal system. Such reactive strategies may end up costing more than a proactive risk allocation strategy would have. Thus based on case study analysis, Canada Line's DBFO P3 contract was not as effective at risk allocation and mitigation as some other public sector projects.

8: CONCLUSION

The literature on megaprojects, P3s, and risk reveal the characteristics, potential benefits and problems typical of urban transportation megaprojects like the Canada Line. Using systematic process analysis of three transportation megaprojects in addition to the Canada Line, I examined how each project allocated the construction risks of delay and nuisance and the risk of design deficiency between public and private sectors. Additionally, I compared project outcomes and found that risk mitigation strategies and transparency of the planning process affected project outcomes more than whether risks were allocated between public and private sectors. While the mitigation of construction risks varied between public sector delivery projects, both P3 projects fared poorly in this regard, suggesting that public sector delivery is more likely to include total cost and risk analysis during planning.

Limitations of research included the inability to access some of the risk and PSC calculation documents, the Book of Documents, and limited access to planning documents for Toronto's subway, and not knowing the outcome of the Heyes appeal. The lack of detailed risk allocation schemes for case study projects was somewhat problematic and indicative of the need for improvements in risk management in the planning stage. Also, obtaining official planning documents for older projects, especially Sydney, was more difficult than obtaining more recent records.

Focusing on several case studies allowed for breadth of comparison but less depth in the scope of analysis. Given greater time and resources, an examination of a greater number of risks, rather than only three, would have yielded further information on the relationship between risk allocation and costs. Questions and ideas for future study include the development of a comprehensive risk management framework for future transportation megaprojects and an investigation of how private sector involvement alters risk allocation measures. Determining the total costs of public versus P3 delivery is another potential research question.

Implications for urban policy include a need for comprehensive risk allocation strategies in the planning stage of megaprojects. While the use of P3s are to be approached with caution given the legal ambiguities and fundamental issues of private sector involvement in public infrastructure projects, they have presented improvements in terms of competition and incentives to innovate. DBFO P3s in particular have a well-integrated contract structure. However, tender specifications need to be considered carefully and ideally should include a total cost economics analysis, with a concerted emphasis on third party costs, in addition to a comprehensive risk analysis and allocation scheme. Other types of P3 contracts may be more effective at ensuring these comprehensive analyses are undertaken during the planning stage. For example, the public sector may contract out the design while having the final say in tender specifications; once the design contract is returned and reviewed, it may be sent out for re-bidding on construction, operation, financing and/or maintenance. While risks cannot be

eliminated from major projects, they can be acknowledged and their impacts reduced through careful identification and by allocation of risks to those best suited to manage them.

The Canada Line follows the patterns that typify megaproject planning and execution: it came in over budget, its planning process suffered serious flaws in transparency. Furthermore, the P3 structure particular to this project removed responsibility from the provincial and municipal governments, relegating their role to funding partners. Merchants devastated by years of construction were left without recourse to compensation. The lawsuit brought against the Canada Line illustrates how cutting costs up front can ultimately backfire. While the use of cut and cover construction was endorsed because it was cheaper and reduced cost by more than \$400 million, the reduction in cost was achieved by imposing an unacceptable burden on Cambie merchants. The cost that fell to third parties including Heyes was disproportionate. While the P3 used for the Canada Line had its share of flaws, the success of the project raises the question of whether the end justifies the means. Given that more extensive mitigation efforts (particularly direct financial compensation) could have remedied construction impacts quite readily, the upfront cost reduction does not appear justified in this case.

Heyes' lawsuit is part of the trend towards increased use of the courts to reduce risk created by liberalization. The number and scale of megaprojects has been increasing over past decades, as well as the nature of private sector involvement. My analysis was partially based on such research efforts, which

aim to determine how increased private sector control affects, allocates and mitigates risk in megaprojects. Examining such trends is critical for determining best practice in the development of future urban transportation megaprojects.

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