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THE PROCUREMENT OF PUBLIC INFRASTRUCTURE: COMPARING P3 AND TRADITIONAL APPROACHES


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The views expressed in this paper are our own and should not be attributed to any other individual or organization.
This research was supported, without editorial input, by the following companies active in both procurement environments: Aecon Group Inc., Bird Construction Inc., EllisDon, Fengate Capital Management, Kiewit Development Company, Macquarie Capital, PCL Constructors Inc., Plenary Group Canada, and SNC Lavalin.

EXECUTIVE SUMMARY

- In December 2014, the Auditor General of Ontario issued a report suggesting that traditional procurement of public sector infrastructure would be superior to P3 procurement if projects were simply 'managed better' by government. The conclusion was surprising because it ran contrary to the findings of a substantial body of academic and practitioner research.
- The Lawrence National Centre for Policy and Management at Western's Ivey Business School was asked by group of firms active in both procurement environments to compare the processes and incentive structures embedded in the two approaches to public sector procurement.
- We began by developing a framework or logic model encompassing the traditional and P3 approaches. We then used the framework to compare six cases of traditional and P3 procurement of health and transportation infrastructure.
- Based on our investigation of the two approaches and the experience from the case studies, we believe that the P3 approach is generally superior because it brings to bear specialized expertise, due diligence and accountability mechanisms that are not possible to replicate in the political environment in which public sector managers work.
- While the public sector projects we examined could have been managed better, the incentives to manage better were weak and incomplete.
- We recognize that not all projects are best delivered by the P3 approach and we lay out conditions to help choose between the two approaches when considering specific projects.
- Finally, we agree with the Auditor General that value-for-money analysis is key to determining which approach is best for specific projects and that continued work to refine methodologies is strongly recommended.

INTRODUCTION

In December 2014, the Auditor-General of Ontario (AG) issued a report suggesting that 'traditional' procurement would be superior to "Public Private Partnerships" (P3s)[1] if projects were simply 'managed better' by government:

"Based on our audit work and review of the AFP model, achieving value for money under public-sector project delivery would be possible if contracts for public-sector projects had strong provisions to manage risk and provide incentives for contractors to complete projects on time and on budget, and if there is a willingness and ability on the part of the public sector to manage the contractor relationship and enforce the provisions when needed. Total costs for these projects could be lower than under an AFP, and no risk premium would need to be paid." [2]

This conclusion by the AG runs counter to what has become broadly-accepted thinking among public sector practitioners, not only across Canada but also around the world, that the P3 approach delivers better outcomes, and does so precisely by creating incentives that spur better project performance. This is evidenced by the fact that a growing number of prominent multilateral institutions such as the World Bank, Inter-American Development Bank, and the United Nations have created subsidiaries dedicated to capacity building in P3 procurement methods for infrastructure. Across the industrial world, countries such as the US, UK, and Australia have applied the P3 approach extensively to meet their infrastructure needs.

The Lawrence National Center for Policy and Management was asked by a consortium of firms[3] that work in both P3 and traditional public sector procurement environments to examine the Auditor-General's conclusion and, in particular, to assess the underlying constraints and incentives embedded in both approaches to public infrastructure procurement.

Our objectives in this paper are two-fold: first, we want to clarify the long-term policy objectives that public infrastructure projects aim to support. These objectives will serve to guide our discussion of the two approaches to infrastructure projects throughout the rest of our paper. Second, we want to delve into the underlying factors that explain why and how the traditional approach to public sector procurement has generally been found wanting and the incentive mechanisms by which the P3 approach can potentially address many of those observed failures.

Governments are constantly faced with a variety of choices among methods of delivering services to their citizens, particularly services that require infrastructure assets. We need, therefore, to ensure that those choices are made on the basis of a clear understanding of the strategic issues involved and, ultimately, employ the procurement approach that is optimal for a particular case/project.

The paper is structured as follows. We begin with background information and context setting in Section 2. In Section 3, we develop a framework or 'logic model' to compare the traditional approach to infrastructure procurement with the P3 approach. Six case studies spanning both traditional and P3 approaches, many of which involved the same firms, are presented in Section 4. The studies were not chosen to be representative of either approach to infrastructure procurement. Further, our case-study analysis is not

[1] Infrastructure Ontario uses the term 'Alternative Financing and Procurement' (AFP) to denote P3 projects. "Value for Money Assessment: Sault Area Hospital Project," Infrastructure Ontario, 2007, accessed 2015, http://www.infrastructureontario.ca/Templates/Projects.aspx?id=2147484707&langtype=1033.

[2] Office of Auditor General, "Reports on Value-for-money Audits (Introduction)," in *Annual Report of the Office of Auditor-General*, (2004), 193-218.

[3] Aecon Group Inc., Bird Construction Inc., EllisDon, Fengate Capital Management, Kiewit Development Company, Macquarie Capital, PCL Constructors Inc., Plenary Group Canada, and SNC Lavalin.

a formal test of our framework. However the case studies allow us to gauge the usefulness of the framework to see whether it can help us understand the constraints and incentives embedded in the two approaches and whether any other important lessons emerge.

Finally, in Section 5 we draw out the lessons learned from applying our framework to the two alternative approaches used in the case studies. This allows us to form a judgment regarding the Auditor-General's conclusion that better management of traditional procurement projects would make them more cost-effective than P3-delivered projects.

2. BACKGROUND AND CONTEXT

To understand why so many governments seek "alternative procurement" models, it is instructive to start with an understanding of governments' ultimate objectives when investing in infrastructure; how it fits into their daily business; and the challenges that it creates for any jurisdiction, regardless of level or country.

The long-term case for any infrastructure project must lie in the services that it enables, whether they be transportation, health care, education or clean water and sanitation. The scale and nature of such projects change over time as the types of services needed by the public evolve. For instance, a rapidly urbanizing municipality will require an increasing number of mobility options to transport its residents efficiently and cost-effectively. The public sector has an obligation to procure the necessary physical assets to supply this service.

Traditionally, the procurement of most infrastructure projects has been managed directly and on an end-to-end basis by the public sector. Under this approach, the government oversees all stages of the construction and management of a particular project, with various parts of the project outsourced by the public sector authority to different contractors. More recently, many jurisdictions have moved towards an alternative approach for infrastructure projects, which is built on the following two principles:

- Defining **service needs, priorities and affordability** for taxpayers and users **are** core public sector responsibilities and competencies.
- Project management of the construction and operation of **capital assets** needed to deliver services **are not** core public sector competencies.

Put simply, the tasks of planning, constructing, and managing physical assets are not a core competence of governments. With no "Department of Construction", or construction trades on their permanent payroll, mainly because of the variety and episodic nature of major capital investments, it is hard to make a case that governments are best qualified to apply the professional project management and operational expertise for complex, multimillion-dollar projects and ongoing service delivery. Rather, many jurisdictions have decided that the management of such projects and ongoing physical operation should be the preserve of the private sector, which possesses far greater professional experience in running projects, procuring finance, negotiating contracts and managing assets.

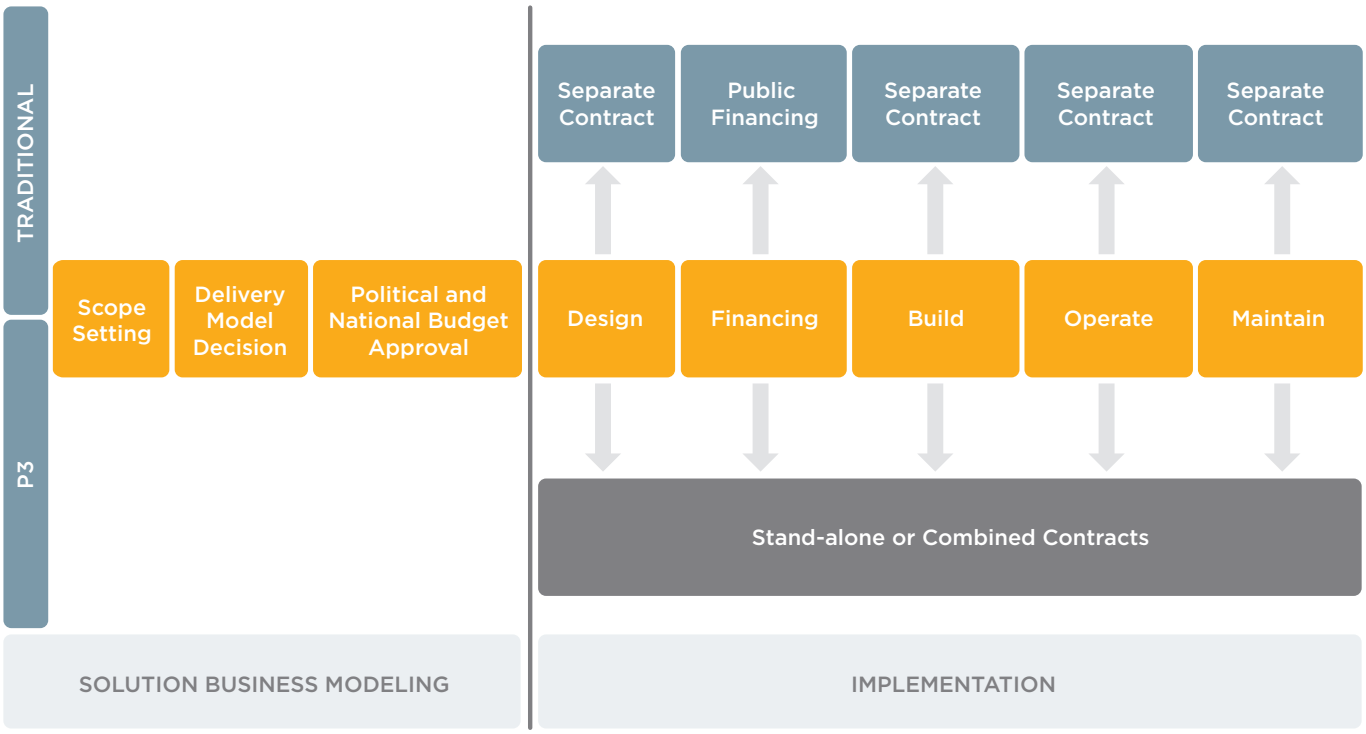
Finally, the success of an infrastructure project should be measured on the standard of service enabled by the asset, rather than on the inputs alone. In particular, the performance of publicly-owned infrastructure should be assessed on a wider range of criteria including total elapsed time to service start-up, and the cost, ongoing availability and quality of the services enabled by the asset.

The challenges and critiques related to infrastructure procurement are not simply of interest to auditors, academics and journalists. The demand for infrastructure-enabled services is soaring as our populations grow, age and concentrate in cities and suburbs, all while our stock of infrastructure put in place in the 1950s and 1960s reaches and exceeds the limits of service lives. Moreover, many provinces and municipalities face an escalating need to cover a growing set of competing needs for public services and programs, even as they continue to grapple with tighter fiscal conditions.

3. A FRAMEWORK FOR INFRASTRUCTURE PROCUREMENT

Infrastructure procurement systems are complex by nature. Even within traditional or P3 procurement approaches, no two projects are identical. Traditionally-managed projects can include provisions that are typically found in a P3 project (e.g. bonus/penalty incentives to reduce risks of delays and cost overruns) and P3 projects can take a number of forms (from Design-Build to Design-Build-Finance-Operate-Maintain). Figure 1 shows the different paths possible when considering infrastructure procurement options.

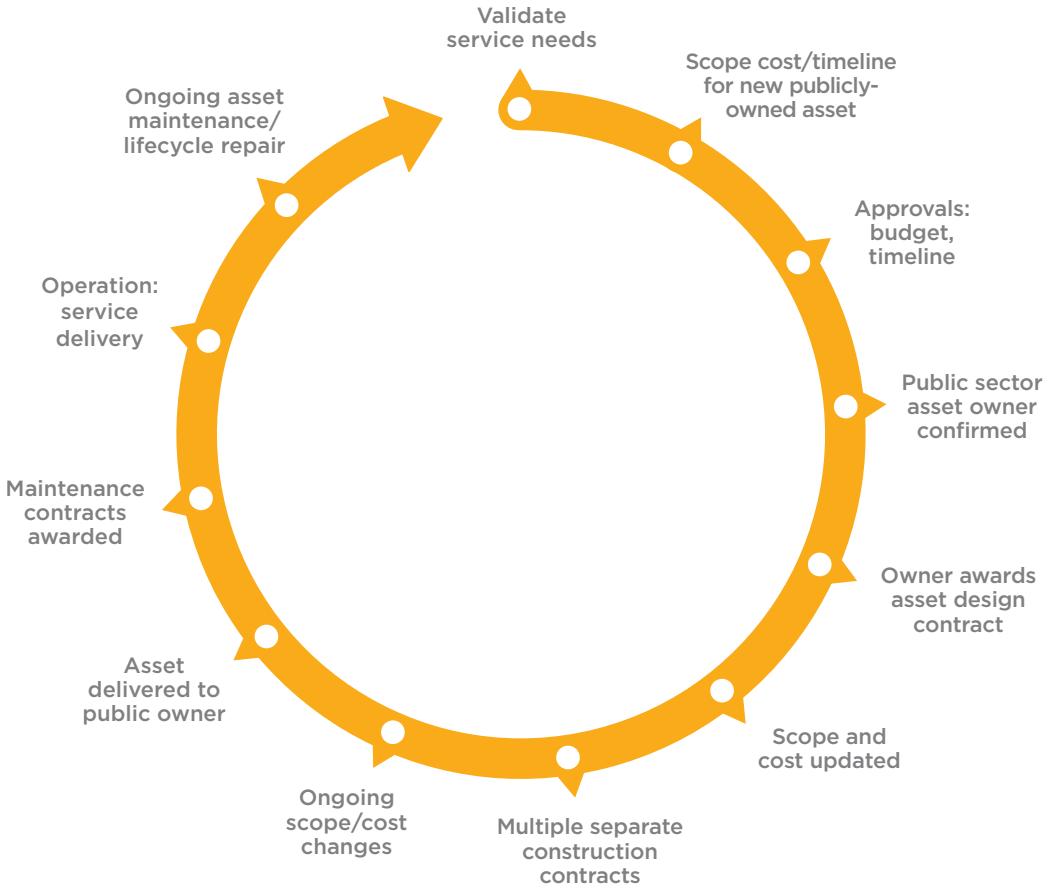
Figure 1 **Traditional and P3 Procurement Approaches**



Traditional Approach

To help understand in more detail how traditional and P3 procurement processes differ we need to dig deeper than Figure 1 and look at the constraints and incentives that are embedded in each approach. To do this, we develop the framework or logic model presented in Figure 2. We begin (at "12 o'clock" on the diagram) with the validation of service needs. This is a core public sector responsibility and competency and should be the starting point for any public infrastructure procurement. Next (1 o'clock), the relevant public sector authority scopes the approximate cost and timeline for the new infrastructure assets required to deliver the public services in question such as hospitals for health care or transit systems for mass transportation. This is followed (2 o'clock) by approvals of budget and timelines. For large projects, approvals are given by elected officials at the level of cabinets or municipal councils.

Figure 2 **Traditional Infrastructure Procurement**



Along with the approvals comes confirmation of the responsible public sector owner (3 o'clock). Owners are typically government departments or agencies that must then drive the procurement process forward. The next step (4 o'clock) is awarding of the detailed design contract by the owner. Often (5 o'clock) the scope and cost of the procurement process must be updated to reflect the newly completed detailed design.

With detailed design and updated cost and scope in hand (6 o'clock) the owner moves to a series of tenders and awards of construction contracts for different parts of the project. Throughout the construction phase (7 o'clock) ongoing scope and cost changes occur as new information comes to light, input prices change, the owner makes changes to requirements, or changes are directed from the political level. When construction is complete, the asset is delivered to the public sector owner (8 o'clock) and any final fitting up related to service delivery (not shown here) is done. Maintenance contracts are tendered and awarded (9 o'clock) and ongoing delivery of the public service begins (10 o'clock). Finally, over the life of the infrastructure asset (11 o'clock) ongoing maintenance and repairs are undertaken.

Assessment

What are some of the problems that occur in the creation and operational life of a public sector infrastructure asset procured using the traditional approach? A review of traditional infrastructure projects from around the world[4] reveals that certain problems systematically emerge. For example, the costs and timelines for projects are typically locked in too early in the process, before the detailed design is even completed.

Not surprisingly, post-design cost may differ from initial estimates. Indeed, this is why the private sector classifies the typical sequence of cost estimates (Class A versus Class D) to indicate progressive levels of precision and reliability. However, inflexible budget procedures or the political consequences of varying from announced parameters often cause problems for the public sector owner.

Separately, the detailed asset design may be too focused on the asset itself rather than the services it will be called upon to provide. Thus, the designer generally has little incentive to integrate operating costs or service quality considerations into the asset design. Indeed, in an effort to present a winning bid, the designer may trade off life-cycle efficiency to achieve lower construction costs.

A central problem that emerges with traditional procurement is that once budgets and design are set, the asset owner acts as project manager, letting multiple, separate, contracts for inter-related construction activities. This leaves a broad range of project risks with the asset owner and ultimately taxpayers and service recipients. Such risks include construction delays (with their knock-on effects) due to physical or site factors, unforeseen problems causing costs and/or delays associated with obtaining regulatory approvals, and shortages of skilled labour or materials. The list is long. In addition, public sector owners must be responsive to shifting public and political priorities, yet the accountability for the resulting scope and design changes is often unclear, adding risks to costs and timelines.

[4] The international experience shows similar results. A UK study found P3s typically finished one per cent earlier than scheduled while government-led projects finished 17 per cent behind schedule. Cost overruns averaged virtually zero in P3s compared to 47 per cent in government-led projects. Moreover, an Australian study found P3s were delivered 3.4 per cent ahead of schedule while government-led projects were delivered 23.5 per cent behind schedule. See Mott Macdonald, Mott, Review of Large Public Procurement in the UK (London: Mott MacDonald, 2006) and Infrastructure Partnerships Australia, "Performance of PPPs and Traditional Procurement in Australia," accessed 2015, http://www.infrastructure.org.au/Content/PPP.aspx.

Finally, the separation of construction and maintenance contracts increases the risk of the failure to design or budget with the life-cycle of repair and replacement activities in mind. The problem of under-investing in maintenance is especially acute in the public sector where the (politically) urgent construction of new assets frequently overwhelms the (operationally) important ongoing maintenance of existing assets. Even where such factors are taken into account initially, subsequent periods of government-wide fiscal stress that drive across-the-board cost-cutting exercises are disproportionately hard on maintenance, repair and replacement budgets.

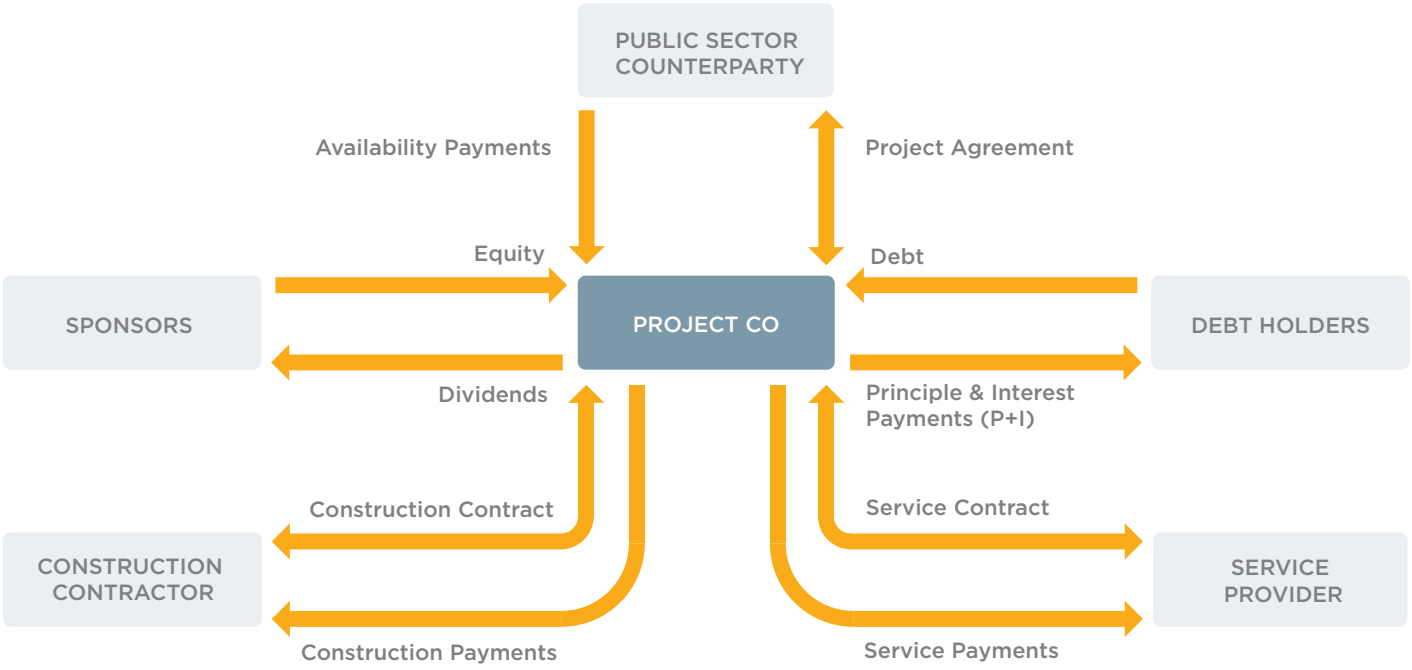
In sum, there is widespread agreement among academics and financial and industry experts that the traditional approach to procurement frequently results in cost over-runs, missed timelines, under-investment in maintenance and missed opportunities for innovative service delivery. The risks of these failures are borne by taxpayers and service recipients.

P3 Approach

P3 procurements can take many forms but their key characteristic is that they expand and integrate the roles that the private sector plays in public infrastructure asset creation and operation. Broadly speaking they can be defined as a joint, cooperative arrangement between a private sector consortium and a public sector agency for (two or more of) the services required to: a) design, b) build, c) finance, d) operate, and e) maintain the infrastructure assets needed to deliver a public service. Cooperation between the two parties is structured with long-term, integrated contracts that serve to transfer risks (at a cost) from the public to the private sector when the private sector is better placed to manage those risks.

Who are the members of the private sector consortium? In Figure 3[5] we show the relationships between the different types of private sector entities typically involved and the public sector owner (counterparty). The key feature is that a project company undertakes the overall (or at least primary) relationship with the public sector owner. The project company in turn interacts with its project sponsors, construction contractors, service providers and debt holders, with reciprocal flows of funding and services between each entity.

Figure 3 **P3 Participants**



Source: DBRS, 2015

[5] Dominion Bond Rating Service, *Methodology: Rating Public-Private Partnerships*, Toronto, 2015.

A key advantage of the P3 approach is that it brings a broad range of private sector expertise and capacity to bear, yet does so through a single point of accountability – the project company. This project-executing company is typically created by a consortium of experienced firms. It, in turn, arranges private financing (equity from its shareholding sponsors, debt via bond issuance), a lead construction contractor, and a service provider.

The project agreement with the public sector owner will provide some blend of payment at substantial completion of construction and of "availability payments" over time based on asset performance and quality. The agreement typically requires a minimum injection of equity and ongoing overall private finance, depending on the desired risk transfer from the public sector owner to the project company.

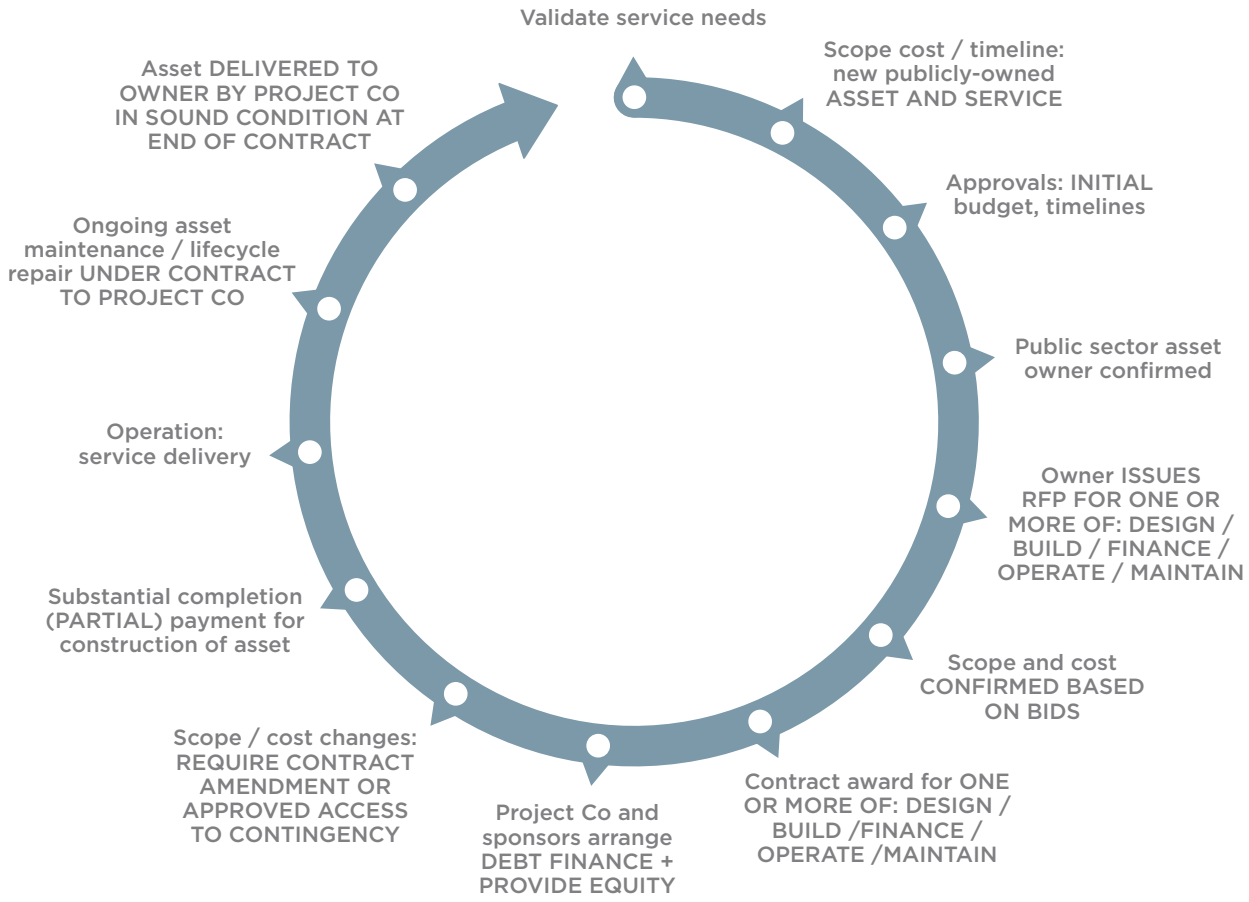
BOX 1
VALUE ≠ COST

Governments and taxpayers need to distinguish between cost and value when trying to compare traditional and P3 procurement options. A P3 project will rarely be the cheapest option when one looks at the short-term infrastructure costs (brick-and-mortar, building systems, etc). However, when the above-mentioned spectrum of risks is considered, lifecycle costs and other qualitative factors tip the balance in favour of P3s as the projects are now being compared on a value-for-money (VFM) basis rather than a partial baseline.

The appropriate methodology for deriving VFM assessments is subject to debate as it implies a certain dose of qualitative or counterfactual assessments that need to be converted into value to the taxpayer. In brief, the VFM analysis attempts to evaluate the lifetime costs and benefits of a P3 project compared with a public sector comparator. Some of the factors considered are delivery times, financial risks for taxpayers, and lower lifecycle costs due to innovative designs and/or materials. The authors of this report agree that the VFM methodology needs to be continuously refined and updated, taking into account new evidence as additional P3 projects are completed.

In Figure 4 we highlight the differences between the P3 and the traditional approach:

Figure 4 **P3 Infrastructure Procurement**



- The scoping of costs covers both construction and service delivery from the outset.
- An integrated RFP is developed at the outset for two or more of design/build/finance/operate/maintain.
- The final scope and cost of the project are confirmed only on the basis of the winning bid.
- An integrated contract is awarded including a pre-specified contingency reserve.
- Private finance in the form of equity plus debt is secured after substantial due diligence is completed by arms-length private sector organizations, notably bond-rating agencies.
- Scope changes require formal and costed contract amendments or approved access to the contingency reserve.
- Ongoing asset maintenance/lifecycle repair and replacement are included in the initial contract with the project company.
- The asset must be delivered to the public sector owner by the project company in sound condition at the end of the contract.

Assessment

The traditional approach uses separate, sequenced contracts with private sector firms for design, construction and maintenance of infrastructure assets. In contrast, P3s broaden the scope of a contract to take advantage of the private sector's specialized project management expertise for large, complex projects.

End-to-end responsibility incents integrated innovation from construction through to operation, maintenance and repairs, thereby lowering the overall cost of service delivery. End-to-end responsibility also enables the transfer of risk to the private sector, ensuring overall coordination among all contractors and a single locus for active risk management that is internalized into each project decision.

Requiring an appropriate private sector equity contribution, as well as bond financing, incents overall risk management via " skin in the game", while bond financing adds independent and transparent due diligence on project costs and other risks via bond-rating agencies. The public sector gains certainty regarding total costs and time-lines because pre-construction approvals and contract awards are based on bids rather than budgets.

BOX 2
WHAT ASPECTS OF P3s MAKE THE BIGGEST DIFFERENCE?

The key advantage of the P3 approach is that it facilitates bundling of end-to-end services to a single winning private bidder, which in turn encourages an integrated, whole-of-life perspective to the project. The definition of project requirements in the RFP draws a line beyond which officials and politicians cannot make scope changes without clear accountability and defined cost implications. In contrast, internal government processes cannot, by definition, preclude changes in priorities.

Due to the need to define end-to-end contract requirements beforehand, P3 project agreements are typically the result of longer and more detailed study than is the case with traditional procurement. P3 contracts often account for a comprehensive list of considerations including the types of risks to be distributed, service output requirements, as well as performance milestones to be fulfilled.

Public-sector practitioners should bear the following in mind when executing P3 contracts:

- A competitive and open marketplace for private sector bidders is critical in ensuring diligent and warranted pricing in P3 contracts of risk transfers and the appropriate firm expertise in the integrated management of large, complex projects and long-lived assets.
- Comparisons of time-to-delivery and alignment to initial cost estimates must be careful to compare apples-to-apples.
- A robust output specification framework should be at the heart of all P3 contracts. It not only facilitates the smooth implementation of complex contracts, but also ensures that performance incentives are effective at motivating the private sector to fulfill the project in the most efficient manner. This framework should specify key performance indicators as well as associated penalties and bonuses, potential risks, and how these risks are allocated between the public and private sector parties. Once the project delivery phase is complete, P3 projects should be evaluated on their performance to maintain transparency and improve future practices.

4. CASE STUDIES

In this section we present case studies of six infrastructure projects in the areas of health care and transportation. Our goal is to examine whether the projects exhibit outcomes that are consistent with the framework. We make no claim that the cases we examine are representative. Indeed with the small number of cases we examine in depth, we do not believe 'representativeness' is a practical objective. However, using a case study approach allows important insights that a large sample, statistical study would miss. Thus, our analysis should be seen as a complement to the larger-sample studies and summary statistics that are widely-cited.[6]

For the health sector, we compare one project that was procured using the traditional public sector approach (Thunder Bay Regional Health Sciences Centre) to two P3 projects (Bridgepoint Hospital Redevelopment Project and Sault Area Hospital). For the transportation sector, we compare two traditional projects (Montreal Subway Extension to Laval and Toronto-York Spadina Subway Extension) to one P3 project (Canada Line, Vancouver). A number of the same private sector firms were used to deliver both traditional and P3 projects.

THUNDER BAY REGIONAL HEALTH SCIENCES CENTRE – TRADITIONAL PROCUREMENT

Project summary

In 1998, the Ministry of Health and Long-Term Care (MOHLTC) announced the development of a new 375-bed hospital for the Thunder Bay Regional Health Sciences Centre (TBRHSC).[7] The project was managed by TBRHSC under a traditional Design-Bid-Build model, with separate contracts for a Prime Consultant/Architect and for a Construction Manager (CM) (EllisDon), and a multitude of other construction contracts.

In 2004, the hospital was completed after a seven-year planning and construction process. The initial project cost estimate was $126M. After various planning, design and construction phasing changes, the final cost was determined to be $284M. The new building had increased by 18 percent in size from the initial plan, opened a year behind schedule, and cost almost 38 percent more per square foot than a comparable project in eastern Ontario.

Ontario's Minister of Health appointed a special advisor, Tom Closson, to assess the TBRHSC's capital redevelopment project. Mr. Closson retained PRISM, a redevelopment consulting group with expertise in large-scale capital projects, to review the project and provide comments with respect to management mechanisms and processes and assessment of the governance and project procurement.

Decision making process

The role of the Board of the TBRHSC was to monitor completion of the project, and authorize all contracts in excess of $1M. The Board created a New Hospitals Building and Facilities Committee (with some Board of Governors members, internal senior administrators, the project coordinator, and community members) to more closely monitor issues of project cost, scope and schedule. PRISM noted that notwithstanding the fact that the Committee met over sixty times over a four year period, costs and schedules were not kept in check over the duration of the project.

Change orders were being authorized by a variety of participants, outside of any regimented process. Over 2,800 change orders were issued. For a similar project (the University Health Network Clinical Services Building in the Toronto) there were 420 change orders.

[6] *For a survey of P3 projects in Canada,* see Mario Iacobacci, *Dispelling the Myths: A Pan-Canadian Assessment of Public-Private Partnerships for Infrastructure Investments.* (Ottawa: The Conference Board of Canada, 2010).

[7] Thunder Bay Regional Health Sciences Center, *Thunder Bay Regional Health Sciences Center Capital Redevelopment Review*, Thunder Bay, 2004.

Design

PRISM reported that they found no evidence that options for the project master plan and building design/envelope were developed and presented to MOHLTC for their consideration. They also concluded that the state of the overall building design was insufficiently advanced as tendering commenced.

Procurement

The capital development project was based on a delivery model incorporating overall management by the TRBHSC; they contracted separately with a design consultant and a construction manager (CM) as advisors. The CM managed all further construction contracts in the best interests of the public sector owner, with the owner retaining all the construction financial risks. PRISM notes that the CM contract was never formerly executed, and that construction activities were in progress while the CM contract was still under discussion.

The hospital was built under various individual tendering packages (e.g. pilings, mechanical/ electrical, roofing, exterior masonry, exterior vapour barrier and insulation), with the CM providing management oversight on contracts they had not negotiated themselves.

Finance

The financing was provided by government, with the MOHLTC assuming the majority share of the final cost of $284M, while the Hospital was responsible for approximately $75M. There were at least four requests for additional funding over the life of the project. In 2001, there was a request for additional funding of $100M (representing an 80 percent budget increase), most of which had been committed or spent before the additional funding request was made, leaving few options to the decision makers but to accept the revised budget.

Risks/Incentives

There appear to have been no specific risk sharing measures built into contracts. All risks, including delays and cost overruns, fell back to the TRBHSC. The contractor did not have any incentive to complete the project on time/on budget (e.g. no bonuses or penalties provisions). In essence, all responsibility for fiscal management of the project remained with the public sector. Accountability was never clearly set out.

Assessment

Overall, costs of the project more than doubled. Scope and design changes resulted in a significant increase in final project size. The project was delivered one year late with the public owner bearing the bulk of the cost and timing risk, the latter of which was shared by the potential patients and their families. All of these outcomes are consistent with poor incentives embedded in the traditional approach. However, generally poor management within the traditional approach was also to blame. Particular examples include the fact that tendering started before the design process was complete and contracting with the CM took place after construction was underway. In addition, PRISM commented that poor communication and definition of responsibilities was as much to blame as the procurement model for the failure to come in on time and on budget.

BRIDGEPOINT HOSPITAL REDEVELOPMENT PROJECT – P3 PROCUREMENT[8]

Project summary

This project involved building a new hospital to replace an aging structure on the east side of Toronto's city centre. It is a 680,000 square foot facility, with a capital cost of $380M.[9]

After a planning design phase completed in February 2007 by Stantec and KPMB, a request for proposals (RFP) was issued in July of 2008 for a consortium to design, build, finance and maintain the facility. The contract was awarded to the Plenary Health consortium in August of 2009. The consortium was responsible for construction, building maintenance, lifecycle repair and renewal and project financing. Construction commenced October 2009. The project was completed on time and on budget in March of 2013.

Decision making process

With DBFM the accountability was clear. The client set the output standards and the private sector partner had latitude to meet them, sometimes using innovative means. In particular, the DBFM contract empowered the private sector partner to make design and construction decisions for the long-term to provide for optimal operation and maintenance of the structure.

Design

While the Stantec/KPMB team laid out the planning design, and was responsible for compliance, the Plenary team (Plenary Group, Innisfree, HDR Architects/Diamond Schmitt Architects, PCL Construction Canada, Johnson Controls, and RBC Capital Markets) was responsible for detailed designs and all subsequent phases including subcontracting. Plenary Health designed the building to be certified under the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

Procurement

The RFP process for an AFP consortium commenced in July 2008, and the winning consortium was selected in August 2009. From then on, contract management risk was transferred to the private sector partners, for all tasks from design to maintenance. The maintenance contract includes lifecycle repair and renewal that will ensure that heating and cooling systems, windows, floors and roofing structures are kept in good working condition over the thirty-year life of the contract.

Finance

The total amount to be paid (in annual installments) to the consortium was $1.27B ($622M in present value terms). Payments cover construction, building maintenance, lifecycle repair and renewal and project financing. The annual payments are comparable to a fixed-rate mortgage with maintenance and repair expenses included. Financing for the Bridgepoint Hospital project was provided by RBC Dominion Securities Inc. as bond underwriter, together with a banking group consisting of Calyon New York Branch, Dexia Credit Local and Royal Bank of Canada. Equity was provided by Plenary and Innisfree.

Risks/Incentives

The Plenary consortium was required to accept all construction, environmental, financial, and approval risks as well as ongoing costs over the thirty-year period. It also agreed to absorb all financial penalties and delay costs associated with any coordination errors and deficiencies. The agreement was structured to incent the private contractors to complete the project on budget and on time.

[8] Bridgepoint Active Healthcare. 2015. Retrieved from http://www.bridgepointhealth.ca/en/index.asp

[9] "Bridgepoint Active Healthcare," PCL Construction Inc., accessed 2015, http://www.pcl.com/Projects-that-Inspire/Pages/Bridgepoint-Hospital-Redevelopment.aspx.

Assessment

Consistent with our framework, this P3 hospital redevelopment project resulted in on time and on budget delivery of the project with risks transferred from the public sector owner to the project manager. A value for money (VFM) assessment conducted by Deloitte & Touche after the preferred bid was determined, concluded that there would be a 10.4 percent cost saving ($95M) compared with traditional delivery.

SAULT AREA HOSPITAL PROJECT – P3 PROCUREMENT

Project summary

The Sault Area Hospital Project was initiated to combine the services of the Plummer and General sites at the existing Sault Area Hospital. The $408M contract was awarded in August 2007, and the 289-bed hospital was completed in March 2011, on-time and on-budget. This was a P3-delivered, Build-Finance-Maintain (BFM) contract between Hospital Infrastructure Partners (HIP -- a private consortium of Carillion, EllisDon and Fengate Capital Management Inc.), and the Sault Area Hospital.[10]

Under the terms of the agreement, HIP carried out the construction of the hospital according to performance standards set out in the contract, followed by maintenance over a 30-year (2010 to 2040) period, during which time it is responsible for building maintenance, repair and lifecycle replacement. HIP was also tasked with additional duties that would facilitate its construction responsibilities such as working with the Sault Area Hospital on equipment procurement and the integration of existing facilities into the new facility.

Specific performance standards relating to its management of "hard facilities" (physical infrastructure) were built into the project agreement. In addition, the consortium was responsible for financing the construction (along with all associated capital costs).

Decision making process

This was one of several AFP redevelopment projects designated under ReNew Ontario 2005-2010, a $30B-plus strategic infrastructure investment plan to modernize, upgrade and expand Ontario's public infrastructure. It was delivered through a BFM contract with HIP.

Design

The design of the building for this project was not included in the private partner's contract. In this case, the design was completed before the project by a local architecture firm (Epoh Inc) and by a firm with extensive experience in the healthcare building design (Stantec Architects). However, as HIP had access to all drawings and plans during the tendering process, they were responsible for any design deficiencies, and had to rectify them at their own cost.

Procurement

With the BFM approach, HIP was required to finance the construction of the project until the facility was turned over to the Sault Area Hospital. The private sector financing costs under the AFP applied for the construction period, in this case about 36 months.

Risks/Incentives

Although the decision to deliver the project via the P3 procurement approach led to $82M more in base costs compared to the traditional approach, the private consortium was obligated to accept all design, construction, environmental, financial, and approval risks. It was also liable for any financial penalties and delay costs associated with coordination errors and deficiencies.

[10] "Value for Money Assessment: Sault Area Hospital Project," Infrastructure Ontario, 2007, accessed 2015, http://www.infrastructureontario.ca/Templates/Projects.aspx?id=2147484707&langtype=1033.

The agreement was structured to incent the private contractors to complete the project on budget and on time. A one-time payment from the Sault Area Hospital to HIP would only be forthcoming when the project reached substantial completion (on October 2010), after which HIP would be paid in monthly installments for the remaining duration of construction as well as maintenance period. Should the state of the facility have fallen short of the performance requirements defined in the project agreement, HIP would have incurred financial deductions from the payments to which it was entitled. The consortium was also financially responsible for any costs associated with delays.

HIP was also subject to a high degree of third party oversight. To ensure that the facility met the specifications given in the contract, the private consortium was responsible for obtaining third-party independent certification prior to receiving any portion of its scheduled payments. HIP was also subject to additional oversight measures, including an independent budget review by a third-party cost consultant, monthly reporting and project monitoring by a third-party cost consultant, and the requirement that prior approval be secured for any changes made to the project budget in excess of a pre-determined threshold.

Assessment

Consistent with our framework, this P3 project was delivered on time and on budget with risks transferred to the private sector consortium. Although the design contract was separate, the risk of a coordination failure was mitigated via the BFM RFP. According to a VFM review by Deloitte & Touche, the project yielded $101.7M (18.2 percent) in cost savings in comparison to traditional procurement approach.

MONTRÉAL SUBWAY EXTENSION TO LAVAL – TRADITIONAL PROCUREMENT

Project summary

The Montréal Subway Extension to Laval project was built between 1998 and 2007. The project consisted of extending the eastern section of the Orange Line to the North Shore, adding three subway stations and connecting Laval to Montréal Island via a subterranean link.

This project was plagued with management problems and ended up costing more than 300 percent of the original budget and finishing 18 months behind schedule. Two independent reports were conducted and published in 2004 to determine what had gone wrong. The first report was prepared by the Québec Auditor General.[11] The second report was prepared by an Experts Committee established by the Québec Government.[12]

Decision making process

The Government of Québec passed an order-in-council in October 1998 authorizing the extension of the Montréal subway to Laval. The initial cost estimate of $179M, was not based on any detailed feasibility study. The Government revised the approved project budget to $378.8M in June 2000, and again to $547.7M in 2003. Following the independent studies conducted in 2004, the government agreed to increase the budget to $804M, which exceeded the final project cost of $745M.

The decision-making process during the construction phase was severely deficient. The Montréal Metropolitan Agency (AMT) issued an RFP in 2002 to contract with a consortium for the engineering, procurement and construction management (EPCM) of the project but the resulting contract did not include an appropriate remuneration system or governance and accountability clauses.

[11] Québec Auditor General, *Rapport de vérification concernant la gestion du projet de prolongement du réseau de métro sur le territoire de la Ville de Laval*, Quebec, 2014.

[12] Yvon Marcoux and Joel Gauthier, "Comité d'experts sur le projet de prolongement du réseau de métro sur le territoire de la ville de Laval," October 13, 2004, accessed 2015, http://www.bv.transports.gouv.qc.ca/mono/0936380.pdf.

The AMT CEO would later assign blame for the premature nature of the initial announcement on politicians, describing a hurried announcement of a large and politically popular infrastructure project that took place without the benefit of appropriate feasibility studies.

Design

According to the Auditor General of Québec, one factor explaining the multiple increases in the budget between 1998 and 2003 was that the government did not have all the relevant technical information to make an informed decision until 2004, by which time more than 50 percent of the costs had already been committed. For example, it was revealed that a basic calculation error affected the detailed plans and specifications for some years: engineers had miscalculated the tunnel's length by more than a kilometer (over 20 percent of the actual 5.3km) because the scale on a map had been wrong from the outset. In addition, design-related decisions were made as the project progressed, including adding a second entrance to a subway station very late in the construction phase.

Procurement

Launching construction before the full costs were known was obviously problematic. This put the Government in a difficult position when confronted with cost overruns. The 2004 Experts' Report was commissioned by the Government to provide options on how to proceed, but with 70 percent of the budget having been committed, options were limited.
The Auditor General's report also pointed to several deficiencies in the management of professional service contracts. Some contracts were split into smaller ones to avoid public tendering processes, while other were given prior to obtaining the approvals from the Ministry of Transportation (MTQ). However, construction contracts appear to have been otherwise executed competently and no material delay or cost overruns could be attributed to them.

Finance

This project was financed in a traditional manner, with funding money coming from MTQ. The Transportation Minister was required to go to Cabinet three times to ask for budget increases.

Risks/Incentives

The EPCM contract could have provided a vehicle for the AMT to transfer risks and accountabilities to the private sector. Unfortunately, the contract was poorly designed and no clauses on either risk transfer or incentives (i.e. penalties or bonuses) were judged enforceable in the end.

The Auditor General specifically blamed the AMT for not having included a risk assessment strategy in the EPCM contract. The inclusion of bonuses and penalties linked to the performance of the EPCM firm was initially discussed when the project was estimated to cost $378.8M but as costs exploded further, the EPCM firm argued that their contract was no longer valid and asked for an increase in their professional fees from $45M to over $100M, with no allowance for the AMT to penalize them for the project cost overruns or delays.

Assessment

The Montréal Subway extension exhibited many of the problems that can occur under the traditional approach: the political announcement was not supported by any detailed cost studies; weak due diligence allowed a basic calculation error to add millions of dollars in costs; and deficient project management governance failed to provide a proper risk transfer and incentive system.

TORONTO-YORK SPADINA SUBWAY EXTENSION – TRADITIONAL PROCUREMENT

Project summary

The Toronto-York Spadina Subway Extension (TYSSE) project is still underway, extending the Spadina line from Downsview Station in Toronto to the Vaughan Metropolitan Center. When completed, this will be the first Toronto Transit Commission (TTC) line to cross municipal boundaries, with six new stops that are projected to accommodate 30M additional TTC trips annually by 2021.[13]

The TTC was appointed as TYSSE's project manager in 2007. Its responsibilities included: general project management, defining the project scope, recommending delivery options and strategy, and contract management. Project operations, including construction, contracts and administration, would apply TTC's existing procurement and contract administration policies and procedures. An Executive Task Force (ETF) consisting of three representatives from each of the City of Toronto and York Region was formed to work with the TTC. The ETF would provide general project oversight, approve the project delivery strategy, and make budget recommendations. They were also to be provided with separate professional advice by an auditor and an engineer.

The project has been plagued with numerous challenges since the outset, including funding delays, technical complexities, and a fatal work-related incident on a construction site.[14] Since its announcement in March 2006, the budget has risen from $1.6B to approximately $2.75B and the projected completion date has slipped from December 2015 to December 2017.[15] In 2014, the TTC was replaced as contract manager and a private engineering firm was contracted to manage and oversee the completion of the project.

Decision making process

The decision making process was structured to ensure that public representatives held a voice in the process proportionate to the degree of financial risks for which each municipality would be liable. Any decision that could cause a budget overrun or delay the eventual opening of the subway line requires the joint approval of the municipal governments of Toronto, and the Regional Municipality of York (including the City of Vaughan). Some financial decisions also have to be made at provincial and federal government levels, adding to the complexity.

The project has also been hampered by a fragmented project management structure. Each of the six new stations was subject to its own separate competitive bidding process and thereby carried out and managed by different project contractors. While this had the advantage of improving the competitiveness of the bidding process, a delay on one contractor's part may have a knock-on effect on the work of other parties.

Design

The lack of integration between the design process and all other stages of the project has been a key contributor to project delays. For instance, the architect who was been commissioned to design the project created a design proposal that was too costly for the initial overall budget. The design process was also poorly coordinated with the planning for the relocation of utilities (responsibility of the City of Toronto), and as a result created unintended delays for many project contractors. The design process was hampered by the need to address the requirements of many regulatory stakeholders (e.g. the TTC, Parc Downsview Park, City of Toronto, York University, GO Transit, Ministry of Transportation Ontario, Region of York and City of Vaughan) for each individual station.

[13] Tess Kalinowski, "Spadina subway extension $400M over budget," *Toronto Star*, March 6, 2015, accessed 2015, http://www.thestar.com/news/queenspark/2015/03/06/spadina-subway-extension-400m-over-budget.html.

[14] Don Peat, "Spadina subway extension delayed," *Toronto Sun*, October 22, 2012, accessed 2015, http://www.torontosun.com/2012/10/22/spadina-subway-extension-delayed.

[15] City of Toronto, *Staff report for action on TYSSE - Schedule and Budget Change*, 2015.

Another design factor that had an impact on the costs and delays relates to the subsequent decision to extend the endpoint of the line from York University to Vaughan Center. This, along with an inflationary adjustment, resulted in the revision of estimated costs from $1.6B to $2.1B.

Procurement

As noted above, each station in the overall TYSSE project was managed on the basis of many different contracts. Not only did this lead to inefficiencies, it also created the risk of conflict between its many contractors, and competitive bidding for labour and other inputs, which in turn had a detrimental effect on project performance. By the middle of 2013, contractor performance and relationships among them deteriorated to the point that the TTC CEO became involved in direct discussions with some contractors to mitigate further schedule and cost impacts. The CEO met with contractors on 27 occasions in an attempt to resolve issues around premiums, incentives, and schedule adherence. In order to restore better working relations among all parties, contractors also took steps to reallocate staff.

Following a review in mid-2014 conducted by external experts from three different groups – a team of transit agencies convened by the American Public Transit Association (APTA), Parsons Brinkerhoff (consulting firm), and Bechtel (engineering firm) – identified "resetting" working relations between the TYSSE and the project contractors as one of the conditions to meet a deadline of December 2017.

Finance

The TYSSE project was originally budgeted at $1.6B. According to the Capital Cost Allocation MOU between the Regional Municipality of York and City of Toronto, project costs were allocated as follows – $1.059B to be contributed by the Provincial Government, $697M by the Federal Government, $526M by the City of Toronto, and $351.6M by the Region of York (plus an additional contribution of $30M to cover costs of further infrastructure upgrades to accommodate the increased rider traffic). By the TTC's own admission, the funding agreement was overly complex and the various approval processes took 18 months.

Risks/Incentives

Project contractors were paid at the completion of each project milestone. The financial liability for cost overruns, however, remained with the Regional Municipality of York and City of Toronto. As a result, there was minimal risk sharing between the public and private sectors.

Assessment

The TYSSE project can provide only preliminary insights given that the project is not yet fully completed and it is too early to reach any definitive assessments. However, outcomes to date are consistent with our framework for a traditionally-procured project: a major scope change boosted costs and delayed completion and major coordination failures and an overly-complex public sector governance structure were contributing factors.

CANADA LINE PROJECT, VANCOUVER – P3 PROCUREMENT

Project summary

Completed in 2009, the Canada Line project is a $2.1B, Elevated Rapid Transit (ERT) system connecting downtown Vancouver, the Vancouver International Airport and central Richmond, British Columbia. It consists of 16 stations, 2 bridges and 9km of tunnel, serving a transportation corridor that connects one-third of the region's jobs and 20 percent of its population.[16] It was also the first P3-based transit project in North America, and one of the largest infrastructure undertakings ever completed in British Columbia, with a capacity equivalent to that of 10 additional road lanes. The Canada Line was built to synchronize its service with Vancouver's other metro lines (run by the regional government agency TransLink).

[16] Partnerships BC, *Canada Line Final Project Report*, Victoria, 2006

A private sector consortium (InTransitBC) consisting of SNC-Lavalin Inc., B.C. Investment Management Corporation, and Caisse de dépot et placement du Québec, was responsible for implementing and partially financing the project. A subcontractor, Protrans BC, a subsidiary of SNC-Lavalin, is in charge of ongoing maintenance and ensuring that trains run on schedule.

Despite the many complexities associated with a project of this nature, InTransitBC managed to complete the Canada Line three months ahead of schedule due to the strong collaboration and communication among all public and private sector parties, including the equity provider, designer, constructor and operations and maintenance team (SNC-Lavalin). Other contributing factors include integrated management of the entire project lifecycle, and incentives stemming from InTransitBC's obligations to put a substantial amount of capital at risk.

Decision making process

The project's initiation was designed to address the need to service the transportation corridor between downtown Vancouver and downtown Richmond, one of Canada's fastest growing transportation corridors and was completed in advance of the 2010 Vancouver Winter Olympics. A study demonstrated the strong likelihood that such a project could achieve its technical and financial objectives.

Construction began in 2005, after several years of feasibility, engineering and economic studies. This allowed InTransitBC, the selected consortium, to have all the necessary decisions and contracts in place to minimize scope creep once the construction had started. For the inevitable change orders that came up between 2005 and 2009, a subsidiary body, Canada Line Rapid Transit Inc. (CLCO), was created involving all financial stakeholders.

Through a transparent and accountable governance model, CLCO was responsible to oversee project design, procurement, construction, and implementation. The advantages of having CLCO as part of the project's governance model included clear definition of responsibilities for all parties involved and effective single-point of communication with the concessionaire and the general public, resulting in enhanced transparency.

Design

The design component of the project was included in the P3 contract. Ultimately, InTransitBC built what they had themselves designed, allowing for design consistency (Canada Line stations vary only slightly in appearance, designed to blend in with the surrounding neighbourhood) and innovation. For example, InTransitBC's designers rejected a government proposal to build luggage racks on each train, arguing that passengers generally prefer to be close to their bags. Instead, the trains were designed with cantilevered seats to accommodate underseat bag storage, as well as large open spaces where riders can stand next to their luggage (Bula, 2014a[17]).

The Canada line project has won critical acclaim including Infrastructure Journal's (2010) 100 most innovative and socially significant infrastructure projects in the world. The Canada Line includes innovative features such as the North Arm Bridge, North America's first "extra-dosed", double-cabled bridge. The project was also awarded the Gold National Award for Innovation and Excellence by the Canadian Council of Public Private Partnerships (2009), and Project Finance's award for North American Transport Deal of the Year.

[17] Frances Bula, "How Vancouver's Olympic legacy is shaping the future of transit," CityLab, accessed 2015, http://citiscope.org/story/2014/how-vancouvers-olympic-legacy-shaping-future-transit.

Procurement

The Canada Line Project is a 35-year Design-Build-Finance-Operate (DBFO) agreement in which InTransitBC Inc. owns the train vehicles, operates, and maintains the Line under an operating license through to the end of the agreement. Throughout the lifetime of the contract, InTransitBC receives payments from local governments on a periodic basis upon meeting pre-defined performance and quality milestones (determined by a federally-appointed independent engineer).

During the line's construction from 2005 to 2009, the private concessionaire received $1.14B in milestone payments. While Translink, the Province of BC, the City of Vancouver, and the Vancouver Airport made payments according to an established schedule, the Federal government only released payments equal to a percentage of the value of completed milestones each month.

Finance

The project was jointly funded by the Government of Canada, the Province of British Columbia, the Greater Vancouver Transportation Authority (GVTA), Vancouver International Airport Authority (VIAA), and the City of Vancouver. The private partner, InTransitBC, was required to contribute equity and debt capital as well as being responsible for any construction cost overruns. The final price tag was $2.054B, within the approved budget.

Risks/Incentives

To ensure the effective transfer of risks, the agreement was structured such that InTransitBC would have sufficient capital at risk ($720M) to fund the costs of completing the project in the event of cost overruns or poor operating performance. There were also corporate guarantees and financial letters of credit to secure the performance of InTransitBC and its construction contractor (SNC-Lavalin) during the construction and operating periods. This ensured that the public sector would be insulated from the risks of poor performance by InTransitBC.

By assuming the obligation of constructing the line at a fixed cost, InTransitBC effectively bore full responsibility for any cost overruns (with the exception of costs associated with specified risks that were retained by CLCO). InTransitBC also bore most of the project's construction cost, operating cost and maintenance risks. As the main project sponsor, TransLink also bore a substantial portion of public sector financial risks. Construction risks such as property acquisition and utility relocation costs were covered by specific contingency funds. The GVTA currently retains the majority of ridership revenue risk. During the RFP stage, there was also a high degree of consultation on project input requirements between bidders and GVTA to optimize their proposals and hence reduce design error risk.

Assessment

Consistent with our framework, the success of the Canada Line project is a best-in-class example of the efficiencies, innovation, and strong management rigour that can result from a collaborative partnership and clear assignment of risks between the private and public sector when delivering highly complex infrastructure projects.

BOX 3
P3s ARE NOT ALWAYS THE ANSWER

The importance of the VFM analysis is to determine when a P3 mode of delivery offers more value to taxpayers than a traditional project. But even before a VFM is conducted, a project–specific P3 suitability assessment is in order as it is understood that not all projects are suitable for a P3 approach. The benefits of the P3 approach are maximized when a project meets as many of the following criteria as possible:[18]

- Investment Size: P3s are more suitable for larger projects. Some provinces have a $50M threshold while access to the Building Canada Fund is for projects with capital costs of more than $100M.
- Complexity: P3s lend themselves to complex investments. Complexity can arise as a result of the nature of the asset, the site on which it will be constructed, or the number of distinct asset classes involved in the investment. However, P3s may not be suitable in the case of projects where regulatory approvals or ownership issues may be unusually difficult to assess (for eg. in cases of sites of potential historical significance, or of First Nations Land Claims), which in turn affects the pricing of risk transfers for project management and completion.
- Scope for Private Sector Innovation Gains: The scope for private sector innovation is inversely related to the public sector's need to be prescriptive.
- Private Sector Expertise: The availability of private sector expertise is critical for two reasons: (1) ensuring a competitive bidding environment; and (2) ensuring that there is private sector capacity to perform the functions and manage the risks envisioned in the P3.
- Greenfield Site: In general, investments involving all new construction on previously undeveloped sites lend themselves to maximizing risk transfer to the private sector.
- Potential for Contract Integration: One of the mechanism by which P3s generate value is the integration of various elements of the potential P3 (i.e., design, build, finance, operate/maintain). The greater the potential for integration, the more likely a P3 will be viable.

[18] Some elements from PPP Canada, *The Guide to the New Building Canada Fund P3 Screen - Suitability Assessment*, 2014, accessed 2015, http://www.p3canada.ca/en/about-p3s/p3-resource-library/the-guide-to-the-new-building-canada-fund-p3-screen---suitability-assessment/.

5. LESSONS LEARNED

Based on our framework for decision-making, and its application to a selection of Canadian case studies, we now return to the core questions of our study: Do P3s tend to achieve improved outcomes for publicly-owned infrastructure projects due to superior management abilities in the private sector that could be replicated in the public sector? Or are these outcomes a result of the contract structure and risk management practices that are uniquely characteristic of the P3 approach?

The case for the public sector to buy rather than own the capacity to manage infrastructure projects lies in the fact that the accountability structure and time horizons of the public sector are poorly suited to the long-term nature of most P3 projects. The smooth execution of infrastructure projects, whose service lives typically measure up to decades, requires a matching perspective in planning, design, budgeting and accountability.

While end-to-end budgeting on a top-down basis is conceptually possible with the traditional procurement approach, it does not provide a single point of accountability that would generate appropriate incentives to properly internalize and manage the project over its entire, multi-decade lifecycle. Further, the need to transfer public oversight and accountability for infrastructure projects from one political administration to the next introduces significant political uncertainty, which can hinder the effective implementation of complex, large-scale projects.

Another important issue is the retention of in-house project expertise within the public sector, where, due to personnel turnover, employees usually only experience a limited number of large infrastructure procurement projects in their career. In addition, public sector employees tend to manage multiple responsibilities simultaneously, limiting the development of the specialist knowledge that is essential to providing infrastructure assets that provide the best-value-for-money to taxpayers.

A key reason public infrastructure requires a long-term perspective is that project costs are usually distributed among a mix of current taxpayers, future users, future taxpayers, and future governments. While most traditional contracts involve a deferral of some payments, most payments are made up front and during the design and construction phases.

With P3 projects, the need for private financing ensures that banks, bond-holders, and private financiers have a strong incentive to exercise active project oversight over and above what the public sector is capable of when assessing the initial financial contract over the project's lifetime. Thus, private sector involvement encourages a long-term financial and operational perspective. The involvement of private finance may accelerate the termination of bad projects, even when public-sector developers would continue such projects for political reasons. Private lenders also contribute to efficiency gains by bringing their expertise to the project monitoring effort.

Taken together, it appears that while the private sector is better placed to assemble and retain the necessary expertise to execute large public infrastructure projects, the incentives and risk management practices embedded in P3 projects are a separate and essential ingredient. The private sector's comparative advantage in retention of in-house expertise, robust oversight structure, and better alignment of incentives to minimize whole-of-life costs of a particular project give it a unique edge in fulfilling project obligations on schedule and on budget.

REFERENCES

Atlus Group. *Infrastructure Ontario AFP Track Record Report*. 2014. Toronto.

Boardman, Anthony E. and Aidan R. Vining. "P3s in North America: renting the money (in Canada), selling the roads (in the USA)." In *International Handbook on Public-Private Partnerships*, edited by Graeme A. Hodge, Carsten Greve and Anthony E. Boardman, 354-399. Cheltenham: Edward Elgar, 2010.

Bula, Frances. "How Vancouver's Olympic legacy is shaping the future of transit." CityLab. Accessed 2015. http://citiscope.org/story/2014/how-vancouvers-olympic-legacy-shaping-future-transit.

City of Toronto. *Staff report for action on TYSSE - Schedule and Budget Change*. 2015.

Dobbs, Richard, Herbert Pohl, Diaan-Yi Lin, Jan Mischke, Nicklas Garemo, Jimmy Hexter, Stefan Matzinger, Robert Palter and Rushad Nanvatty. "Infrastructure productivity: How to save $1 trillion a year." McKinsey Global Institute Report. 2013. Accessed 2015. http://www.mckinsey.com/insights/engineering_construction/infrastructure_productivity.

Dominion Bond Rating Service. *Methodology: Rating Public-Private Partnerships*. 2015. Toronto.

Hodge, Graeme A. "Review Public-Private Partnerships: some thoughts on evaluation." In *International Handbook on Public-Private Partnerships*, edited by Graeme A. Hodge, Carsten Greve and Anthony E. Boardman, 81-112. Cheltenham: Edward Elgar, 2010.

Hodge, Graeme A. and Colin F. Duffield. "The Australian PPP Experience: Observations and Reflections." In *International Handbook on Public-Private Partnerships*, edited by Graeme A. Hodge, Carsten Greve and Anthony E. Boardman, 399-438. Cheltenham: Edward Elgar, 2010.

Iacobacci, Mario. *Dispelling the Myths: A Pan-Canadian Assessment of Public-Private Partnerships for Infrastructure Investments*. Ottawa: The Conference Board of Canada, 2010.

Infrastructure Ontario. "Value for Money Assessment: Sault Area Hospital Project." 2007. Accessed 2015. http://www.infrastructureontario.ca/Templates/Projects.aspx?id=2147484707&langtype=1033.

Infrastructure Partnerships Australia. "Performance of PPPs and Traditional Procurement in Australia." Accessed 2015. http://www.infrastructure.org.au/Content/PPP.aspx.

Kalinowski, Tess. "Spadina subway extension $400M over budget." *Toronto Star*, March 6, 2015. Accessed 2015. http://www.thestar.com/news/queenspark/2015/03/06/spadina-subway-extension-400m-over-budget.html.

Levy, Sidney M. *Public-Private Partnerships: Case Studies on Infrastructure Development*. Virginia: ASCE Press, 2011).

Macdonald, Mott. *Review of Large Public Procurement in the UK*. 2002. London: Mott MacDonald.

Marcoux, Yvon and Joel Gauthier. "Comité d'experts sur le projet de prolongement du réseau de métro sur le territoire de la ville de Laval." October 13, 2004. Accessed 2015. http://www.bv.transports.gouv.qc.ca/mono/0936380.pdf.

Office of Auditor General. "Reports on Value-for-money Audits (Introduction)." In *Annual Report of the Office of Auditor-General*, 193-218. 2014.

Ontario Chamber of Commerce. *Building Ontario's Infrastructure Advantage: A Follow-up Report*. 2015.

Partnerships BC. *Canada Line Final Project Report*. 2006. Victoria.

PCL Construction Inc. "Bridgepoint Active Healthcare." Accessed 2015. http://www.pcl.com/Projects-that-Inspire/Pages/Bridgepoint-Hospital-Redevelopment.aspx.

Peat, Don. "Spadina subway extension delayed." *Toronto Sun*, October 22, 2012. Accessed 2015. http://www.torontosun.com/2012/10/22/spadina-subway-extension-delayed.

PPP Canada. *The Guide to the New Building Canada Fund P3 Screen - Suitability Assessment*. 2014. Accessed 2015. http://www.p3canada.ca/en/about-p3s/p3-resource-library/the-guide-to-the-new-building-canada-fund-p3-screen---suitability-assessment/.

Québec Auditor General. *Rapport de vérification concernant la gestion du projet de prolongement du réseau de métro sur le territoire de la Ville de Laval*. 2004. Quebec.

Thunder Bay Regional Health Sciences Center. *Thunder Bay Regional Health Sciences Center Capital Redevelopment Review*. 2004. Thunder Bay.

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