PLANNING THE EXPO LINE: UNDERSTANDING THE TECHNOLOGY
CHOICE BEHIND VANCOUVER'S FIRST RAIL RAPID TRANSIT LINE

by

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BA, University of New Brunswick, 2008

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ABSTRACT

This project investigates the factors behind transit technology choices in Canada. Specifically, I examine the case of the Expo Line in the Greater Vancouver Regional District (GVRD)- the region’s first Rail Rapid Transit Line. The literature suggests that a transportation system can be evaluated from a political optimality or a technical optimality. I provide definitions for both of these perspectives.

In this case, the GVRD’s plans for light rail were replaced with the new technology of Advanced Light Rapid Transit by the province. An evaluation from a technical perspective would have raised questions of reliability, safety and cost. Thus, the system is more politically efficient than technically efficient. The result is that the region is left with a technology that has, in the subsequent 25 years, sold very poorly and has only one supplier.

Keywords: Expo Line; transportation planning; transportation technology; megaprojects
DEDICATION

I dedicate my project to my fellow “Murbsters”- my classmates in the Urban Studies Program- and especially to Carolyn Ruhland, whose never ending willingness to talk transportation policy minutia was an unbelievable gift and asset. I am indebted to her for her generosity, kindness and friendship and for all her help in getting this project finished.
ACKNOWLEDGEMENTS

I am eternally grateful to my senior supervisor, Dr. Anthony Perl for his patience and guidance as well as for his thoughtful advice throughout my entire degree. His dedication to his students is unparalleled and his knowledge of transportation policy immense. I especially thank him for his encouragement and support throughout the formulation and completion of this project. Dr. Peter Hall has provided sound advice and recommendations throughout the conception and completion of this project. And I thank Dr. Karen Ferguson, who has been supportive and challenging throughout this degree- I thoroughly enjoyed it and am very grateful.

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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

Introduction ..................................................................................................................... 1

1 Methodology ............................................................................................................... 3
   1.1 Selection of Data Sources and Analysis Plan ...................................................... 3
       1.1.1 Interviews .................................................................................................... 4
       1.1.2 Hansard ...................................................................................................... 5
       1.1.3 Local Planning Documents ....................................................................... 6
       1.1.4 UTDC Documents .................................................................................... 7
       1.1.5 Media Sources ......................................................................................... 8
       1.1.6 Books ........................................................................................................ 8
   1.2 Vancouver’s need for rapid transit ..................................................................... 8

2 Transit Technology and Mode choice: Theory ......................................................... 11
   2.1 Introduction ........................................................................................................ 11
   2.2 Defining Rail Rapid Transit Technology .......................................................... 13
       2.2.1 Streetcars, Heavy Rail, Light Rail ............................................................. 14
       2.2.2 The Electric Traction Motor .................................................................... 17
       2.2.3 Automated Guideway Transit .................................................................. 18
       2.2.4 The implications of proprietary systems ............................................... 20
       2.2.5 Unique features of ALRT ......................................................................... 27
   2.3 Examining Costs and Benefits ....................................................................... 29
   2.4 Selecting the Optimal System .......................................................................... 35
       2.4.1 Technical optimality ................................................................................. 36
       2.4.2 New Technology ....................................................................................... 37
       2.4.3 Political Optimality .................................................................................. 40
3 The Urban Transportation Development Corporation.................................44
  3.1 Background ............................................................................................44
  3.2 Content Analysis: Technological merit of ALRT ........................................45
  3.3 Building and selling ALRT .......................................................................52
    3.3.1 ALRT: Other Applications .................................................................56
  3.4 Summary ..................................................................................................60

4 Regional Governments: GVRD and City of Vancouver ..................................62
  4.1 Background ............................................................................................62
    4.1.1 Early LRT plans ................................................................................64
    4.1.2 Expo and New Funding .....................................................................65
  4.2 Transpo and Transit ................................................................................66
  4.3 Response to ALRT ..................................................................................70
  4.4 Summary ..................................................................................................72

5 The Provincial Government ..........................................................................74
  5.1.1 Social Credit Philosophy .....................................................................74
  5.1.2 Sacred Transportation philosophy .......................................................75
  5.2 ALRT: appeal of technology .....................................................................79
    5.2.1 Grade Separation ...............................................................................79
    5.2.2 Job Creation .....................................................................................81
    5.2.3 Buy Canadian ....................................................................................83
    5.2.4 Leaders in technology, the world .......................................................85
  5.3 Summary ..................................................................................................87

6 Conclusion ...................................................................................................89

Appendix A .......................................................................................................93

Works Cited ......................................................................................................96
LIST OF FIGURES

Figure 1: Technical Characteristics of some Automated Guideway Transit systems .... 21
Figure 2: Conventional motor and Linear motor diagram ............................................. 26
Figure 3: Calculated Heavy Rail Capacities ................................................................. 28
LIST OF TABLES

Table 1: Features of rail rapid transit systems .......................................................... 14
Table 2: Cost/Benefits of Rail Rapid Transit Systems ................................................. 31
Table 3: Sample of Methodology for collecting Hansard references .................... 93
# GLOSSARY

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AGT</td>
<td>Automated Guideway Transit</td>
</tr>
<tr>
<td>ALRT</td>
<td>Advanced Light Rapid Transit</td>
</tr>
<tr>
<td>GVRD</td>
<td>Greater Vancouver Regional District (now Metro Vancouver)</td>
</tr>
<tr>
<td>LIM</td>
<td>Linear Induction Motor</td>
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<tr>
<td>LRT</td>
<td>Light Rapid Transit</td>
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<td>OTDC</td>
<td>Ontario Transportation Development Corporation</td>
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<td>UTDC</td>
<td>Urban Transportation Development Corporation</td>
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<td>RRT</td>
<td>Rail Rapid Transit</td>
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INTRODUCTION

This project seeks to answer the question: Why was SkyTrain (or Advanced Light Rapid Transit, ALRT) chosen as the technology for Vancouver’s rail rapid transit system? It is an investigation into the principal stakeholders and policy actors in the decision and the implications the decision has had. While the SkyTrain may appear similar to other forms of rapid transit around the world, it is a system that is almost exclusive to Metro Vancouver. Only a few other cities around the world feature the same technology, and Vancouver was the first to choose it for their main rapid transit system.

This project does not examine the technological merits or disadvantages of Advanced Light Rapid Transit. I do not have the engineering background, nor do I think it the most interesting question in this planning decision. Instead, the question is “why.” Why did the provincial government decide to support and purchase a system that was virtually untested? And why were plans for a proven LRT system cast aside in favour of this new technology?

Ultimately the story of the SkyTrain is an example of a transportation planning decision that was heavily influenced by the context surrounding it. It is a ‘perfect storm’ of Vancouver’s first mega-event, the ‘wow factor’ of a new technology, political differences between city and province and the influence of “buy-Canadian” technology. These are the factors that were the most influential in the decision to acquire ALRT.
Proving that these factors exist and that they were influential means evaluating the stories of the different actors, and examining just what their role really was.

Before addressing the specifics of Vancouver’s SkyTrain story I must first properly introduce the various types of transit that were considered for the city. The literature review section introduces the available technology options and provides the historical context preceding the invention of ALRT. It answers the question: what makes SkyTrain so unique that it merits this investigation? I then present a framework of how optimal transit systems are selected for cities- both what is considered “technically optimal” and what is “politically optimal”. Once this literature is presented I will move on to the data I have collected from the various policy actors and apply my framework to examine what the biggest influences in the decision were.
1 METHODOLOGY

1.1 Selection of Data Sources and Analysis Plan

The following chapter outlines how my data was collected. To begin with, I will describe how I decided where sources would come from. Any mega-project such as the creation of a first rapid transit line in a region will involve the three levels of government in Canada: municipal, provincial and federal. This project focuses on the municipal and provincial levels and therefore I looked for sources from these levels. Knowing what I already did about transportation planning in Metro Vancouver, I also knew that I would need to involve the GVRD (Greater Vancouver Regional District, now known as Metro Vancouver) as well as the manufacturer- the Urban Transportation Development Corporation (UTDC). I did a content analysis of the various documents that I found.

With the large scope of varied sources I would be facing, I chose not to use coding. Early on in this research project, I examined an article by Low and Astle entitled “Path Dependence in Urban Transport: An institutional analysis of passenger transport in Melbourne, Australia, 1956-2006”. I have used this article as precedent for my own methodology. Similar to their article, I have had to piece together the story of transportation planning in a region that spans a variety of government levels undergoing institutional changes. However, I found that Low and Astle failed to discuss where their sources of information came from in piecing this story together. The story of Vancouver’s first rapid transit system was controversial then and continues to be so
today. As the adage goes, “history is written by the winners” and I had to acknowledge from the beginning that there could be (and are) biases in each of the data sources I collect. Thus, in addition to piecing together the story, I have taken into account the influence and role of each policy actor. As data were collected, I entered each piece into a spreadsheet, defining what the data was, who said it, how it was used and further notes. An example of the application of this system used on the Hansard documents can be found in Appendix A.

1.1.1 Interviews

Primary data collection was in the form of interviews. The benefits of studying an event that occurred thirty years ago is that people are likely more willing to discuss the issue frankly. The downside is that many key players are no longer around. Selection of interview participants was relatively simple as I decided to interview those who were the most involved and still available. In some cases, I identified these participants only after discovering names during the research process. This is the case with Dr. Richard Soberman, a former executive with the UTDC. It is a representation not only of who was still available, but who would be able to provide me directly with the best first-hand knowledge for my topic. The interview process has given me good insight- not only into the historical facts of the time, but also into how the decision is viewed thirty years later by those who were involved in it.
1.1.2 Hansard

I have placed a great deal of weight on my findings from the British Columbian Legislative Hansard documents. There are a number of reasons for this. As mentioned previously, many of those who participated in the debates in the legislature are no longer alive to be interviewed. Also, thirty years is a long time and memories may have faded on the more nuanced details of the story. Hansard provides a source for quotes pertaining to the funding, rationale and planning process of SkyTrain amongst other things. There are, of course, downsides to relying too heavily on Hansard. Debates in legislative assemblies are influenced by party lines. It is not necessarily an accurate source to obtain an individual’s true thoughts on an issue. The Social Credit government and New Democratic Party opposition approached issues from very different points of view. These differing points of view are often simplified to a few slogans (e.g.: “Buy Canadian”) rather than a detailed debate. Therefore, I acknowledge these downsides to this data source and use it cautiously. I also use information gained from other sources such as third party books on the Social Credit government, newspaper articles and other interviews to back up or contradict Hansard where appropriate.

Having acknowledged the limitations of this source, I still consider it to be a crucial component of my research. My reasoning for this is as follows. Firstly, the basis of my argument in this project will be that the SkyTrain decision was influenced by a political agenda. Hansard provides my most direct insight into the public political debate at the time. I also consider it a reliable indicator of the larger debate happening outside the legislature. The opposition frequently raises points it claims are from
constituents. As anyone who has attended a debate in legislature knows, it is not always the most professional or polite of exchanges. In my examination of the transcripts, I have found references to inside jokes, past scandals and other accusations that I consider valuable to my topic. For all of these reasons, I believe this source to be one of great importance in this project

I began my Hansard data collection in the legislative sessions of 1979 which is when the topic of Transpo (later Expo) was first raised. My process was to examine all indexed topics pertaining to Transportation, Vancouver, Transpo, Expo and Vander Zalm. Inevitably there was overlap, as many debates included multiple of these search terms. I would then copy the entire debate into a word document and use a series of highlighting colours to emphasize the most important quotations. I stopped collecting in 1984, well after SkyTrain construction was underway\(^1\).

### 1.1.3 Local Planning Documents

Planning documents owned by the GVRD are located at the Metro Vancouver Library. While the planning function for transit would move from the control of the GVRD in the late 1970s, early 80s to be under provincial control, the GVRD library maintains a number of transportation planning documents from its era of transit planning. At this library I was able to locate feasibility studies for LRT, including in depth analysis of costs and location. In addition, I was able to find early documents from the UTDC and their proposals for the ALRT. A study of later transportation planning

\(^1\) In addition to Hansard, I attempted an Freedom of Information request to obtain provincial government documents between the premiers of Ontario and BC pertaining to the SkyTrain decision. I was unsuccessful in obtaining anything but do not consider the search exhausted.
decisions would have a harder time finding data at the Metro Vancouver Library because of the afore-mentioned shift in control.

1.1.4 UTDC Documents

The Urban Transportation Development Corporation from Ontario is a key player in this story. Originally the Ontario Transportation Development Corporation, it was a crown corporation and was sold by the Ontario government in 1987. Tracking down documents from this organization was important to understand the impetus behind the construction of ALRT technology. I have also compared the rhetoric from UTDC documents with the language and arguments used in BC for the technology. Collection of these documents was challenging and what I was able to track down was done in a necessarily haphazard way. I had the greatest success using the National Library and Archives AMICUS collection, providing me access to libraries across Canada, as well as the National Archives and the SFU library.

I have been unable to track down a complete collection of all reports put out by the UTDC. However, what I have found represents a cross section in the chronology of the UTDC, from the early 1970s to 1980 when the technology was selected for Vancouver. The documents I have are also consistent in the way that they talk about the corporation, the technology and the benefits. Therefore, it is reasonable to conclude that further reports would discuss the technology in a similar way.
1.1.5 Media Sources

My main source of media data are newspaper articles. They were collected for a variety of purposes. I began my initial data collection with a preliminary search through the Vancouver Public Library clippings files. I also accessed media documents from Ontario to provide me with information from the UTDC. I accessed the Hamilton Spectator and the Kingston Whig-Standard because of those cities’ close ties to the UTDC. The crown corporation was therefore frequently in the news and its progress was heavily monitored by an interested Ontario public. There is considerable editorial coverage as well that helps to frame the actual UTDC documents I also collected.

1.1.6 Books

My knowledge on the topic of SkyTrain is informed by a number of books and articles on the subject. However, in terms of books that I have used specifically for their relevance to this project, there are two that I relied on heavily as sources. The first is Mike Harcourt and Ken Cameron’s “City Making in Paradise. The other is Stan Persky’s “Son of Socred”. Persky’s book provides a detailed account of the Social Credit party during Bill Bennett’s years. It is useful in its description of transportation decisions, attitudes towards labour and provides portraits of the top politicians who were heavily involved in the SkyTrain and Expo.

1.2 Vancouver’s need for rapid transit

Fundamental to this case study is the understanding something needed to be done to improve the transit problems in Metro Vancouver. By the late 1970s,
Vancouver’s newspapers were full of references to the increasingly degrading transit service in the region. The famous battle over the freeway through downtown Vancouver was over, with many Vancouverites considering themselves victorious that the freeway plans had finally been set aside. The election in 1972 produced a change in provincial government that stayed away from any more auto-oriented construction. However, this left downtown Vancouver in a tight spot; the bus system was unable to keep up with demand. The only solution had been the SeaBus, a passenger ferry system crossing the Burrard Inlet. This ferry continues to be well used and is a respected public transit alternative to a bridge. SeaBus was introduced by the NDP government in the early 1970s. However, transit between the CBD and the outlying neighbourhoods and cities of the region remained ineffective.

By 1983 there would be approximately 425,000 commuter trips during morning peak period, of which at least 75% were made by car (GVRD, 1983: 3). Transit ridership within the central business district of Vancouver was higher than surrounding areas, covering around 46% of all peak period trips (ibid.). A report produced by the GVRD in 1983 discusses the transit and land use strategy and the importance of further investment in transportation:

“The transportation strategy is based upon growth management (improving the job and labour force balance), fully utilizing existing facilities (through better traffic management), and providing new facilities as needed. For a number of reasons the emphasis was placed on public transit rather than highway improvements to carry much of the increase in demand” (Ibid: 4).
It was recognized amongst the regional government that a public transportation solution was needed. This is when the GVRD began considering its options to present to the province for funding. Before examining the solutions proposed by the various levels of government involved I must first examine the broad collection of literature surrounding these topics in order to better frame the motivations behind the different transit proposals as well as their technological merits. The following chapter defines the technology featured in this project as well as the influences behind planning transportation megaprojects.
2 TRANSIT TECHNOLOGY AND MODE CHOICE: THEORY

2.1 Introduction

The research and analysis in this project is important is because the choice of Advanced Light Rapid Transit (ALRT, the technology that became SkyTrain) is still debated in the region, especially when expansions are discussed. SkyTrain remains a unique choice 25 years after opening because the technology has only been used limited applications in other locations. Only Kuala Lumpur features ALRT as a rapid transit system- it was installed in 1998 and at 23km is currently shorter than Vancouver’s Expo Line. Vancouver was only the second installation of ALRT after Toronto’s Scarborough RT line\(^2\), and was the first application of the technology as the only rapid transit system in a region.

The decision to build SkyTrain was the result of a number of influential factors. As Vuchic states in his article “The Great Debate: Potential Roles of Different Transit Modes”, the process of selecting a transit mode is not straightforward and rarely is it based solely on technological merit. “...the decision process is too often plagued by biased or faulty arguments for or against particular modes. Transit ‘fashions’ have swept the world decade after decade” (Vuchic, 1989: 62). Proponents of SkyTrain argue

\(^2\) At this time, it is likely that the Scarborough RT will be de-commissioned- arguably a political decision associated with Toronto Mayor Rob Ford’s decision to cancel Transit City Plans. However, it should be noted that the RT line in Scarborough has never been very popular due of the inability to update the cars or increase capacity which results from the way the line was constructed.
that it is a highly functional system for the region, and I acknowledge this is true. But I also argue that it has proven itself to be a ‘transit fashion’, as 25 years later no region has bought it as a main line rapid transit system. Thus, since other cities have failed to find it as advantageous as the province of B.C did, it raises an interesting question: what was considered so advantageous about ALRT that it led the region to abandon plans for an LRT system in favour of taking on the risk of an untested technology?

To answer the above question I have developed two frameworks. The first framework is the transit technology assessment framework. This framework asks: how does it (rail rapid transit) work? It outlines the distinguishing feature of each RRT system and helps to provide a basis for later evaluation of transit modes. It also helps distinguish what makes ALRT so unique and I use this framework to provide the generally accepted costs and benefits of each Rail Rapid Transit (RRT) system from a technical perspective.

The other framework is the efficiency framework. This is broken down into two categories: technical efficiency and political efficiency. I examine how the ‘optimal system’ is defined in each of these viewpoints. It is important to consider the definitions separately between the technical and political frameworks. Depending on the perspective of the level of government, the rationale for choosing one technology or another could fall in either the technical or the political frameworks. One framework is prioritized over another, and thus the rationale can be characterized as either politically optimal or technically optimal. All of the literature will then be used in the subsequent chapters of analysis and results to help frame and contextualize my findings.
2.2 Defining Rail Rapid Transit Technology

There are two transit systems that I will use to compare to ALRT. These are Light Rapid Transit (LRT) and Heavy Rail. Collectively, I have chosen to refer to these three systems as Rail Rapid Transit or RRT. I include LRT because it was the only other option seriously considered for the region. I use Heavy Rail as a comparison because many of the features of ALRT overlap with those of heavy rail. Referring to all three as RRT is slightly unconventional. Typically LRT is a category of its own, while heavy rail systems are referred to as RRT (Vuchic, 2007: 72). However, with the confusion in classification of ALRT and the varied speeds and grade separation of LRT systems, I argue that it is appropriate (and simpler) to refer to all three under the same category. I do, however, recognize that there are distinct features of each system. I give a brief overview of the basic features of each rail rapid transit system below in Table 1. I have also included traditional streetcars to clarify the differences between them and LRT.
<table>
<thead>
<tr>
<th>Type of System</th>
<th>Elevated, At-Grade, Underground?</th>
<th>Right of Way (exclusive or shared?)</th>
<th>Typical Propulsion Method</th>
<th>Capacity (spaces/hr)</th>
<th>Speed (km/h)</th>
</tr>
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<tbody>
<tr>
<td>Heavy Rail (Subways)</td>
<td>Underground or elevated</td>
<td>Exclusive</td>
<td>Electric Traction</td>
<td>10,000-70,000</td>
<td>25-60</td>
</tr>
<tr>
<td>Light Rail Transit (LRT)</td>
<td>Underground, At-Grade or Elevated</td>
<td>Exclusive, Shared</td>
<td>Electric traction</td>
<td>6,000-20,000</td>
<td>20-45</td>
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<td>Streetcar or Tram</td>
<td>At-Grade</td>
<td>Shared</td>
<td>Electric Traction</td>
<td>4,000-15,000</td>
<td>12-20</td>
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<tr>
<td>Automated Guideway Transit (AGT)</td>
<td>Underground, Elevated</td>
<td>Exclusive</td>
<td>Electric Traction, Linear Induction Motor</td>
<td>4,800-28,000</td>
<td>25-60</td>
</tr>
<tr>
<td>UTDC’s ALRT (SkyTrain)</td>
<td>Underground, Elevated</td>
<td>Exclusive</td>
<td>Linear Induction Motor</td>
<td>10,000-28,000</td>
<td>25-60</td>
</tr>
</tbody>
</table>

Sources: Vuchic, 2007 and Grava, 2003

2.2.1 Streetcars, Heavy Rail, Light Rail

The streetcar was once a very popular method of public transit that began to fall out of favour in the middle of the 20th century (Vuchic, 2007: 68). Many cities felt that buses and trolley buses were more flexible, with their ability to cut into the curb to pick up passengers and general lack of restriction to tracks (ibid). Vuchic notes, however that there are some cities that have chosen to retain streetcars, particularly in high density areas, such as downtowns and that their routes and appearance generally make them “...very popular with passengers” (Ibid). Ultimately streetcars do not play a large role in this project, as Vancouver was looking for something faster with a higher capacity and their streetcar system had been removed decades earlier.

Heavy rail is the largest of the systems with the highest capacity, fastest trains, and the largest stations on average. Many of these benefits are related to its exclusive
right-of-way combined with the size of the train cars. These features tend to make heavy rail the more efficient system for transporting people over greater distances (Grava, 2003: 538, 561):

Rail rapid transit is characterized by fully grade-separated rights-of-way, high-level platforms and high-performance, electric multiple-unit (EMU) cars. The expeditious handling of passengers is enabled through the use of long trains of up to 11 cars running a frequent service. Loading and unloading of passengers at stations is rapid due to level access and multiple double-stream doors. (Parkinson, 1996: 3)

However, the grade separation also makes this type of system costly (Grava, 2003: 566). Typically heavy rail is buried and tunnelling is the most expensive right-of-way option for transit. The alternative of elevating the tracks is less expensive than tunnelling but more so than at-grade systems: “Aerial rail transit structures require approximately two to three times higher investment than at-grade alignments, while tunnel construction is at least two to three times more expensive than construction of tracks on aerial structures” (Vuchic, 2007: 427). Further, many cities and regions may not require the capacity provided by heavy rail, while finding buses and streetcars insufficient. Thus many regions are constructing the more flexible, generally less-expensive Light Rail Transit (LRT).

LRT was developed in the 1960s when cities began to upgrade their streetcars and trams: “Light rail transit (LRT) started as a modification of streetcar operation to allow higher speeds by separating it from street traffic” (Parkinson, 1996:1). Trains became larger, with dedicated stations instead of small stops like bus stops and eventually featured guided vehicle technology, allowing it the flexibility of sharing its
right of way with traffic as well as running at higher speeds at grade-separated exclusive rights of way.

Street running is least desirable because of the disadvantages described above for streetcar operation; fully controlled R/W is the most desirable, but the most capital-intensive one. A typical LRT network, therefore would have tunnels under the most congested central area, while its degree of separation decreases toward outlying areas where congestion is not a problem” (Vuchic, 2007: 90-91)

A growing trend in LRT is that many systems are reducing the amount of shared rights of way to improve operations. Many new LRT systems run down boulevards on streets or highways, rather than on the streets themselves:

Variability due to traffic congestion has been reduced as a factor as almost all recently built on-street light rail lines operate on reserved lanes. A number of older systems still have extensive operation in mixed traffic and so are subjected to the variability in train throughput this causes by reducing $g$, the effective green time for trains. Traffic queuing, left turns and parallel parking can all serve to reduce light rail transit capacity (Parkinson, 1996: 90).

The variety in capacity as well as its ability to run on a number of rights of way makes LRT the most flexible of the three RRT systems and a popular choice for many cities. The benefits and costs of light rail and heavy rail will be examined and compared with SkyTrain and greater detail later in the chapter. While there are differences between light and heavy rail, they share a common element in their propulsion technology; both are propelled by electric traction. This technology will play a key role in this study of SkyTrain, as that system deviated from the traditional propulsion method. In order to better understand what makes SkyTrain different, I will now introduce the basic concepts of the electric traction motor.
2.2.2 The Electric Traction Motor

The electric traction motor is now the most common propulsion method in rail rapid transit. However, prior to its invention and subsequent widespread adoption there were a number of alternative technologies developed. Much of my focus on SkyTrain relates to the unique technology it uses and its contrast to the conventional electric traction. This section examines not only the invention of electric traction but also what options were available at the time of its invention and subsequent widespread adoption. Because this paper focuses on the development of a new type of technology as a solution to a transportation problem, it is of interest to note the other ideas that were floating around at the time of electric traction.

One such option, involving moving cables, was introduced in 1883. This technique would see the train cars attach “...to a continuously moving, endless cable, detaching themselves when they wanted to stop at a station” (Halliday, 2001:45). While cable cars fared well in some applications, they failed to work in the underground subway system and so this propulsion method ran into difficulties, particularly with the turns and curves found in subway systems (Ibid 46). There were also brief experiments with pneumatic power – including a pneumatic power underground mail delivery system in London. However, the railway could never develop an effective airtight seal, and the project was dropped (Ibid 60).

At the same time as these less successful methods were being developed, an American named Frank Sprague was developing electric traction. Originally a sailor in the U.S Navy, Sprague left to work for Edison then moving on to form the Sprague
Electric Railway and Motor Company in the mid 1880s (Brittain, 1997: 1183). In 1887 he installed a 12-mile electric street railway in the city of Richmond VA- the first to use electric traction. Electric traction (or electric propulsion) obtains its power through continuous connection with a wayside source. For rail systems this is generally a third rail but is sometimes an overhead wire (Vuchic, 2007: 101). The use of electricity made this method cleaner than steam and more reliable than pneumatic tubes or cables, ridding the transit systems of the noisy and hazardous steam. In London, this new electric traction technique was an important companion to the new deep tunnelling techniques that would run underneath the existing pipes and sewers and which would not allow for sufficient venting of the steam engines (Halliday, 2001: 40). This propulsion method is also suited to frequent stopping and acceleration, making it a natural choice with public transit vehicles (Vuchic, 2007: 100). Both Sprague and the public realized that this was the most reliable, clean, consistent method to date. To this day electric traction is still the most popular technology- making the linear induction motor of SkyTrain something of an anomaly.

2.2.3 Automated Guideway Transit

Advancement in technology, particularly of computers, led to more attempts at automated trains. The ALRT system is only one type of a number of proprietary automated systems, thus to begin with I will examine automated systems as a whole. While there are examples of automated transit as far back as the 1960s (in Morgantown, WV), the trend of automated transit began in earnest in the 1970s, with
the more frequent use of AGT use within airports. During the 1980s approximately six systems were built with the intent of being public transportation options.

The first general application of AGT was as airport transporters. Here, Vuchic makes a distinction between Automated Guideway Transit and Automated People Movers (APMs), specifying that APMs are used for short loops such as airports. “As of 2005, there are APM systems at 26 airports around the world, ranging in length from 0.7 km in Pittsburgh to 10 km in San Francisco, with most in the range of 1 to 4km” (Vuchic, 2007: 457). There are many other applications of APM in amusement parks, hospitals, sports grounds and university campuses – such as Morgantown WV. The first application of AGT as a transit system was in 1983 with the opening of the VAL line in Lille, France. This system, built by Siemens, uses rubber tires for support and guidance. The cars are narrow, only 2.06m wide, making it narrower than any other rail vehicle (Vuchic, 2007: 459). Another line was constructed in Lille and the VAL technology is also featured in Toulouse and Rennes as well as in a number of APMs (ibid). Vuchic’s table of technical characteristics of several AGT/APM systems, replicated below as Figure 1, demonstrates the differences among types of AGT. While this figure does not represent all existing automated transit systems, it is effective at displaying how different each system can be. These differences were often proprietary- owned by the individual company that developed each technology. The following section will examine some of the problems with these proprietary systems.
2.2.4 The implications of proprietary systems

The preceding literature has shown that there are fundamentals that remain consistent amongst traditional transit systems. Companies can put some individualism into the design, but because they all use electric traction and track gauge there is consistency. Electric traction and conventional guidance systems are referred to as open architecture- meaning that they are non-proprietary and can be reproduced by any transit company. This is in contrast to the automated systems. Each automated system is proprietary- each firm owns the technology it develops. This contributes to the differences found in Figure 1 (below) of support, guidance, size, power supply, speeds and capacities.
### Figure 1: Technical Characteristics of some Automated Guideway Transit systems

<table>
<thead>
<tr>
<th>Model</th>
<th>Support</th>
<th>Guidance</th>
<th>Length × Width (m)</th>
<th>Weight Empty (kg)</th>
<th>Weight/Area (kg/m²)</th>
<th>Capacity: Seats/Space (kg/sp)</th>
<th>Motor Power/Supply</th>
<th>Cars/Train</th>
<th>Maximum Speed (km/h)</th>
<th>Theoretical Line Capacity (sps/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombardier CX-100</td>
<td>4 double tires</td>
<td>8 horizontal tires on center beam</td>
<td>12.75 × 2.85</td>
<td>14878</td>
<td>409</td>
<td>8/100</td>
<td>149</td>
<td>1–3</td>
<td>70</td>
<td>11,500</td>
</tr>
<tr>
<td>Siemens VAL-Lille</td>
<td>4 single tires</td>
<td>8 horizontal tires on side guidebeams</td>
<td>12.70 × 2.08</td>
<td>13850</td>
<td>524</td>
<td>22/90</td>
<td>154</td>
<td>1–2</td>
<td>80</td>
<td>10,800</td>
</tr>
<tr>
<td>Bombardier Mark II-New York-JFK</td>
<td>Two 2 axle trucks (8 steels wheels)</td>
<td>Conventional rails</td>
<td>17.60 × 3.20</td>
<td>24000</td>
<td>482</td>
<td>25/160</td>
<td>150</td>
<td>1–4</td>
<td>100</td>
<td>27,000</td>
</tr>
<tr>
<td>Airtrans-Dallas-Fort Worth 1974</td>
<td>4 single tires</td>
<td>4 horizontal tires on side guidebeams</td>
<td>6.48 × 2.24</td>
<td>5350</td>
<td>369</td>
<td>16/40</td>
<td>134</td>
<td>2</td>
<td>27</td>
<td>4,800</td>
</tr>
<tr>
<td>Kobe-Portliner</td>
<td>4 steerable tires on 2 axles</td>
<td>4 horizontal tires on side guidebeams</td>
<td>8.00 × 2.39</td>
<td>10500</td>
<td>549</td>
<td>16/63</td>
<td>198</td>
<td>6</td>
<td>60</td>
<td>7,632</td>
</tr>
<tr>
<td>Mitsubishi CrystalMover-Singapore</td>
<td>4 steerable tires on 2 axles</td>
<td>4 horizontal tires on side guidebeams</td>
<td>11.20 × 2.70</td>
<td>14300</td>
<td>473</td>
<td>18/105</td>
<td>136</td>
<td>2</td>
<td>70</td>
<td>12,600</td>
</tr>
<tr>
<td>UTDC SkyTrain-Vancouver</td>
<td>Two 2 axle trucks (8 steels wheels) with steerable axles</td>
<td>Conventional rails</td>
<td>17.40 × 2.65</td>
<td>21500</td>
<td>466</td>
<td>42/130</td>
<td>165</td>
<td>4–5</td>
<td>90</td>
<td>28,000</td>
</tr>
<tr>
<td>Bombardier Mark VI Monorail</td>
<td>4 double tires</td>
<td>16 horizontal tires</td>
<td>11.80 × 2.64</td>
<td>8,000</td>
<td>257</td>
<td>84/224</td>
<td>36</td>
<td>3–6</td>
<td>85</td>
<td>13,440</td>
</tr>
</tbody>
</table>

Source: Vuchic, 2007: 468
Purchasing proprietary technology poses a risk to buyers. If the company goes out of business, or phases out the technology, consumers could be stuck with an obsolete product. A common example of this is the well-known failure of Sony’s proprietary Betamax and the triumph of the open-sourced JVC-developed VCR.

Betamax was not a flawed product - it played Betamax tapes very well. The problem for Betamax was the development of rental movies. With the open-sourced VCR, competing companies could develop their own VCRs and video cassettes, creating great competition in the market, lower prices and greater popularity. Cusumano et al’s article “Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta claims that the perceived benefit to consumers of owning these VHS tapes was more important than the technical superiority of the Betamax:

The support for one standard over another can become especially dynamic and self-reinforcing if, for reasons apart from the main product itself (such as the need for and relative availability of a complementary product like software programs for computers or prerecorded tapes for VCRs), customers perceive value in owning the standard that becomes the most commonly available in the industry (Cusumano et al, 1996: 56).

Stores began to carry the more popular VHS tapes, reinforcing the idea to consumers that the platform was more popularity (Ibid:57). Eventually this led to the downfall of the Betamax: “The dearth of Betamax tapes ‘tipped’ the market to VHS, which became the de facto standard in 1988” (Gandal et al, 2000: 44)

SkyTrain is a proprietary system, including the design of the train cars. This limits any buyer to only one option when procuring additional cars or expanding the system.
In his article “A comparison of some new light rail and automated-guideway systems”, Fox notes the risk of proprietary systems and automated transit, stating:

“Being proprietary systems in limited use, they [AGT systems] may experience future procurement problems, particularly if the promoter goes out of business. Being a contemporary, high-technology product, there is also a high risk of obsolescence in future years.” (Fox, 1989: 98).

A publication on choosing transportation systems by the Transit Cooperative Research Program also warns against the allure of one-off technologies: “As transit systems explore available technologies, it is wise to require technology that has an open architecture or uses generally accepted standards in order to maximize connectivity to other technology products and systems” (Institute for Transportation Research and Education, 2002: 39). A region should understand and acknowledge the risks of acquiring a proprietary system, especially later expansions costs. Also, an evaluation should be done to confirm that the benefits purported by the proprietary system outweigh the disadvantages listed above, or at least that the benefits and disadvantages are properly understood. An evaluative framework will be discussed later.

Once a proprietary transit system has been chosen, the region becomes locked in to that provider. Thus it is of great importance to transit producers that their system be chosen from the beginning, unlike traditional RRT systems where other companies can market extensions or additional cars. Claims of benefits of these systems are heavily emphasized: “...AGT systems have been enthusiastically marketed by their developers with glowing claims of efficiency and even profitability” (Fox, 1989: 110) and that general characteristics of AGT include “A number of competing proprietary
technologies, mutually incompatible, and in some cases, aggressively marketed” (ibid, 99). Vuchic notes that the purported benefits of the automated systems are sometimes exaggerated rumours. Discussing the number of new (particularly automated) technologies being developed in the 1980s, he says:

“It is obvious from this review of conceptual developments, promotions, limitations, and implementations of different modes that evaluations and opinions about different modes consist partly of realistic, factual, quantitative, and qualitative arguments and partly of subjective, sometimes exaggerated ones.” (Vuchic, 1989: 65)

He goes on to list an example of a rumour that the rubber tired AGT systems are lighter in weight, requiring less concrete and therefore lower construction costs and his disappointment that this rumour is even being perpetuated by experts in the field.

The data will demonstrate that SkyTrain’s “new technology“ was marketed by its proponents as an advantage because it provides a technological solution to the problems of LRT. Critics, on the other hand, were wary of the brand new technology, its limited applications to date and the lack of competition in purchasing. Before getting into the debates surrounding the decision, I must first explain the features of ALRT that made it a brand new option. Most unique to ALRT is its use of the Linear Induction Motor rather than the traditional electric traction. Thus the following section will examine how the LIM is different.

2.2.4.1 The Linear Induction Motor

To outline the main features of the Linear Induction Motor, I have relied heavily on Vuchic’s text. I have found other sources that discuss the benefits of LIM, but they
are related to the UTDC, or Bombardier and therefore used as data rather than unbiased literature.

Linear induction motors are primarily associated with maglev trains. Maglev trains hover above the track while they run. Magnets provide both this hovering ability and the propulsion: “Four propulsion-levitation modules are located on each side of each vehicle that wrap around the guideway levitation-reaction rail. Each vehicle module contains a LIM motor above the aluminium reaction rail and four levitation magnets that pull the vehicle up to the steel section of the guideway rail.” (Kaye and Masada, 2004: 4-5). I present later that the original concept for ALRT included levitation, resulting in the use of the LIM. However, once the idea for levitation was abandoned, the UTDC continued with the motor they had chosen. SkyTrain runs in a similar manner to that above, but without the additional levitation magnets. A simplified explanation of the linear induction motor is that it is being pulled along the track by electrified magnets, rather than creating the propulsion itself in the car. It takes the conventional rotary motor and stretches it out. The two components of the conventional electric motor, the rotor and the stator are separated, with the stator being mounted in the vehicle and the rotor is laid between the track rails: “the equivalent of the rotor is laid between track rails and stator windings are attached to the vehicle trucks at a small distance above the unrolled rotor. The motor then acts directly on vehicle trucks and pulls (or decelerates) them, resulting in vehicle movement.” (Vuchic, 2007: 112).
Thus, the track plays an active role in the propulsion of the LIM system, where in a conventional motor, all acceleration and deceleration is done on the vehicle. On the SkyTrain system, the rotor can be viewed as a wide flat panel between the rails.

One of the main described advantages of the LIM is its braking ability. In a typical electric traction vehicle, adhesion of the wheels to the rail is required to ensure braking, while the LIM uses the magnets in the track and on the cars. Adhesion in braking is especially important when considering the geographical location of system.

Byers cites the LIM as being superior for the Canadian winters:

Largely because of the operational requirements for the high-grade capability (6% or greater) and short headway automatic operation, the LIM, with its independence from wheel/rail adhesion, was selected as the traction system. Other factors that influenced this decision were the LIM’s superior positioning accuracy, better all weather performance, and the potential for long wheel life, low noise levels, and lower maintenance.” (Byers, 1996, p.966)
The other major perceived benefit is the size of the LIM. “LIM has considerably smaller vehicle dimension than rotary motors. The metro lines with LIMs therefore have smaller-profile vehicles, resulting in lower tunnel construction costs” (Vuchic, 2007,112). However, there are other implications for the size. Smaller-profile vehicles result in a lower capacity than heavy rail systems, as well as less space for wheelchairs, strollers and luggage. Figure 3 (below) demonstrates SkyTrain’s significantly lower carrying capacity than other generic heavy rail applications, despite its many similarities to heavy rail.

It remains unique to the UTDC (now Bombardier) that LIM is used as the propulsion method for its automated, non mag-lev system. However, while they are the only inventors of the LIM-operated ALRT there are many other applications of automated trains. For example, the new Canada Line in Vancouver is a fully automated train like ALRT, but features electric traction propulsion and standard gauge track. This makes it noticeably wider and more spacious as well as quieter than ALRT.

2.2.5 Unique features of ALRT

Linear Induction Motors are arguably the most significant original feature in ALRT. As well as its capacity, size and name. Thus I must first examine the difficulty of classifying ALRT. The name Advanced Light Rapid Transit was coined by its developers: the UTDC. The term “Advanced Light Rapid Transit” is used to imply that the system combines the benefits speed and efficiency with the familiar (and often associated with less expensive) LRT. The name ALRT leads one to think that it is a version of LRT but
perhaps its name is more reflective of a marketing technique than engineering fact. In reality it more closely resembles heavy rail. Support for this is found in a 1996 publication on “Rail Transit Capacity” by the Transportation Research Board in which the authors classify SkyTrain as heavy rail: “BC Transit’s SkyTrain is included in the rail rapid transit category rather than light rail or automated guideway categories. It most closely resembles rail rapid transit system in operating practices and right-of-way characteristics.” (Parkinson and Fisher, 1996:3)

Much of the evidence I have produced thus far has indicated that the purpose of LRT and its main advantage is its flexibility to handle a variety of rights of way. Yet the automation of ALRT prohibits this, making it less flexible. When you compare SkyTrain to heavy rail systems, the capacity of SkyTrain is considerably lower. Thus, the flexibility advantage of LRT is not present and the capacity advantage of heavy rail on fixed lines is diminished.

Figure 3: Calculated Heavy Rail Capacities

<table>
<thead>
<tr>
<th>RAIL MODE</th>
<th>EXTERIOR WIDTH (Wc m)</th>
<th>EXTERIOR LENGTH (Lo m)</th>
<th>STANDING SPACE (Sp m²)</th>
<th>DOOR NUMBER (Dn)</th>
<th>SEATING FACTOR (N)</th>
<th>SEATS (Sc)</th>
<th>STAND PASS (Ps)</th>
<th>TOTAL PASS (Vc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.2</td>
<td>4</td>
<td>4</td>
<td>60</td>
<td>192</td>
<td>252</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.4</td>
<td>4</td>
<td>4</td>
<td>60</td>
<td>196</td>
<td>156</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.2</td>
<td>3</td>
<td>4</td>
<td>80</td>
<td>157</td>
<td>237</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.3</td>
<td>3</td>
<td>4</td>
<td>80</td>
<td>104</td>
<td>184</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.4</td>
<td>3</td>
<td>4</td>
<td>80</td>
<td>78</td>
<td>158</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.2</td>
<td>4</td>
<td>2</td>
<td>60</td>
<td>207</td>
<td>267</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.3</td>
<td>4</td>
<td>2</td>
<td>60</td>
<td>138</td>
<td>198</td>
</tr>
<tr>
<td>Generic</td>
<td>3.1</td>
<td>23</td>
<td>0.4</td>
<td>4</td>
<td>2</td>
<td>60</td>
<td>103</td>
<td>163</td>
</tr>
<tr>
<td>Vancouver</td>
<td>2.6</td>
<td>13</td>
<td>0.2</td>
<td>2</td>
<td>4</td>
<td>36</td>
<td>75</td>
<td>111</td>
</tr>
<tr>
<td>Vancouver</td>
<td>2.6</td>
<td>13</td>
<td>0.3</td>
<td>2</td>
<td>4</td>
<td>36</td>
<td>50</td>
<td>86</td>
</tr>
<tr>
<td>Vancouver</td>
<td>2.6</td>
<td>13</td>
<td>0.4</td>
<td>2</td>
<td>4</td>
<td>36</td>
<td>37</td>
<td>73</td>
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<tr>
<td>Chicago</td>
<td>2.84</td>
<td>14.7</td>
<td>0.2</td>
<td>2</td>
<td>3</td>
<td>36</td>
<td>98</td>
<td>134</td>
</tr>
<tr>
<td>Chicago</td>
<td>2.84</td>
<td>14.7</td>
<td>0.3</td>
<td>2</td>
<td>3</td>
<td>36</td>
<td>65</td>
<td>101</td>
</tr>
<tr>
<td>Chicago</td>
<td>2.84</td>
<td>14.7</td>
<td>0.4</td>
<td>2</td>
<td>3</td>
<td>36</td>
<td>49</td>
<td>85</td>
</tr>
</tbody>
</table>

Source: Parkinson and Fisher, 1996: 59
Many proponents of the system argue that the automation allows trains to run on shorter headways and that the lower capacity is less of a concern because of the high frequency of trains. Headways are defined as the measurement of time between trains. Thus, the case made for ALRT is that the eliminating the cost of transit drivers means that shorter headways are more practical. Smaller cars can be run more frequently because the cost of adding cars is negligible. The implication of this classification of ALRT as well as the benefits used to sell the system will be examined later in this project. What is hopefully evident by now is that there are a number of different features to be considered when classifying rail rapid transit. Each of these transit systems differs in travel times, capacities, rights of way, etc. and in each system there are both benefits and costs to its resulting performance. Therefore my next step in understanding each system is to compare all three using a series of typical transit features.

2.3 Examining Costs and Benefits

Table 2 (below) provides a summary of generally accepted costs and benefits of my three categories of rail rapid transit: heavy rail, light rail and ALRT. The data for this table is based on information from the leading textbooks and articles on the subject.\(^3\) Assessing costs and benefits of transit systems is not an exact science. In many of the cases, each feature is associated with both a benefit and a cost. This demonstrates that

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\(^3\) I have relied most heavily on Vuchic’s *Urban Transit: Systems and Technology*, Grava’s *Urban Transportation Systems: Choices for Communities* with additional information provided by Pastor’s “The Case for Automated-Guideway Transit”, Hutchison’s *Principles of Urban Transport Systems Planning* and Fox’s “A comparison of some new light rail and automated-guideway systems”
a transportation system cannot be properly evaluated without context: that a small transit car with a shorter headway might be more advantageous in some cases than a high capacity subway with more significant infrastructure costs etc. The purpose of the following table is to provide a basic overview of the features of each of the three rail rapid transit options.
<table>
<thead>
<tr>
<th>Features</th>
<th>Heavy Rail</th>
<th>Light Rail</th>
<th>ALRT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size (Cars, tracks, stations)</strong></td>
<td>• Larger cars allow for more seating room while covering longer distances</td>
<td>• Larger trains and large stations result in higher construction costs</td>
<td>• Lower capacity than heavy rail can have negative impact if demand is higher than supply</td>
</tr>
<tr>
<td></td>
<td><strong>Benefits</strong></td>
<td><strong>Benefits</strong></td>
<td><strong>Benefits</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Costs</strong></td>
<td><strong>Costs</strong></td>
<td><strong>Costs</strong></td>
</tr>
<tr>
<td>Technology and propulsion method</td>
<td>• Electric traction motor is the most commonly used transit propulsion method and is highly reliable</td>
<td>• Requires complete grade separation, resulting in longer construction times, higher cost.</td>
<td>• LIM makes vehicles smaller and lighter, reduced costs on tunneling and a smaller elevated structure</td>
</tr>
<tr>
<td></td>
<td>• Can be automated</td>
<td>• When cut and cover construction is used construction is highly disruptive.</td>
<td>• Reduced seating to maximize space in cars means more standees for long trips</td>
</tr>
<tr>
<td></td>
<td>• Steel wheel rolling on steel track requires very little energy to maintain motion, low consumption of energy</td>
<td>• Electric traction has limits to the possible steepness of grade and the ability to handle inclement weather for above ground guideways</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Benefits</strong></td>
<td><strong>Benefits</strong></td>
<td><strong>Benefits</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Costs</strong></td>
<td><strong>Costs</strong></td>
<td><strong>Costs</strong></td>
</tr>
<tr>
<td></td>
<td>• Concerns of the appearance of overhead wires by the public</td>
<td>• LIM superior to electric traction on hills, in inclement weather</td>
<td>• Requires complete grade separation, resulting in longer construction times, higher cost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Construction is highly disruptive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• No competition amongst suppliers, leads to potentially greater expense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fewer applications of this technology make it less tested, and potentially less reliable</td>
</tr>
<tr>
<td>Capacity</td>
<td>• Highest capacity of all three options</td>
<td>• If capacity is underused, system can be very expensive</td>
<td>• Capacity can be adjusted by adding/removing cars</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Cost (Construction, Labour, Operating)</td>
<td>• Systems are built to last because of the stress of rapid rail operations, tunnels very permanent</td>
<td>• High construction costs mean project has to be of relatively large scale to make it worth while</td>
<td>• High operating costs as well due to large fixed costs and staffing</td>
</tr>
<tr>
<td>Right of Way</td>
<td>• Avoids surface congestion, moves unimpeded</td>
<td>• High costs associated with separated rights of way (especially tunneling)</td>
<td>• Grade separation is harder on accessibility due of elevators, stairs and escalators</td>
</tr>
<tr>
<td>Travel Times</td>
<td>• Fast travel times compete with private cars, often exceeds car speeds in congested urban areas</td>
<td>• Significantly faster than traditional inner city streetcars, providing easier access to outlying suburbs or other towns/cities</td>
<td>• Slower travel time when sharing the street than grade-separated systems</td>
</tr>
<tr>
<td>Headways (Measurement of distance/time between headways)</td>
<td>• Headways generally longer than LRT, ALRT, but high capacities compensate</td>
<td>• Large carrying capacity usually means that there is a longer wait between trains • Systems with drivers typically have longer</td>
<td>• Portions that are grade-separated have smaller trains than heavy rail, generally meaning shorter headways</td>
</tr>
<tr>
<td>Visual and Perceived local Impacts</td>
<td>headways than automated</td>
<td>Systems carry a favorable civic image</td>
<td>Potentially frustrates drivers, pedestrians who feel impeded</td>
</tr>
</tbody>
</table>

Chart sources: Vuchic, 2007; Grava, 2003; Pastor, 1988; Hutchison, 1974; Fox, 1989
2.4 Selecting the Optimal System

Table 2 demonstrates that determining of the “best system” is heavily related to the environment in which the system is constructed and operated. Each feature of each system’s resulting benefit and/or cost is dependent on perspective and context, meaning that there are many potential trade offs in choosing a system. What is the optimal system for a region, and how is that decided? In their article “The political economy of urban transport-system choice”, Brueckner and Selod (2006) address the question of choosing an optimal system, framing the decision in the trade offs of cost and time: “Transport systems pose a continuous trade-off between time and money cost, so that a city can choose a fast system with a high money cost per mile or a slower, cheaper system” (2006: 983). Their article sets up a comparison between what would be most ideal for the residents and what citizens chose through a voting process. Like Brueckner and Selod’s study, the Vancouver case is often framed similarly: the debate of LRT- slower and cheaper and ALRT- faster and more expensive. However, the case study is more nuanced than that, due to the numerous levels of government involved and their differing priorities and objectives.

Rather than framing the optimal system as either fast and expensive or slow and cheap, I am instead looking at defining the optimality from two viewpoints. The technical optimality examines the best system from the perspective of a technical evaluation. This uses literature from engineers and transportation experts. The political optimality examines why systems are chosen based on perceived optics over technical
merit. When comparing LRT and ALRT, do they do better in one perspective than another? Or is there a system that represents the best from both perspectives? The remainder of this chapter will introduce literature on optimization from these two perspectives. I begin with the technical experts- the engineers and transport planners-investigating how they evaluate optimal transport system. This leads into the larger question of new technology. How is new technology approached from a technical perspective? This will lead into the political perspective of optimal and the allure of new, futuristic technology. Finally I will look for common ground between the two perspectives- to examine if the decision to build SkyTrain was derived equally from both perspectives, or if one perspective dominated the other.

2.4.1 Technical optimality

Defining the optimal system from a technical point of view is difficult because of the number of features of RRT. I begin with the issue of headways and frequency. Larger trains that run at shorter intervals are less expensive as they require fewer drivers than more frequent trains. Vuchic notes that there is a balance that needs to be struck between what is cost effective and yet works for passengers: “... headways are usually determined as a compromise between passenger travel time and convenience, and the cost of operation” (2007, 10). Pastor’s 1988 argument against LRT and in favour of AGT argues that short trip times are paramount to rider acceptability, arguing that this can only be achieved with fixed guideways with reserved rights-of-way making the LRT with shared rights of way less attractive. He claims this is becoming the trend: “Even busway and light rail transit (LRT) systems today are trying to minimize the
shared, or nonexclusive, portions of their routes.” (Pastor, 1988: 80). However, short
trip times are not exclusive to systems that only feature reserved rights-of-way. Many
LRT systems do have sections that are grade separated, allowing them to travel at
higher speeds. The ability for LRT to feature portions of track that are not shared rights
of way will become important in evaluating the technical merit of the two systems later.

Ultimately, the general consensus amongst the technical articles are that the
optimal systems would be well networked, feature short headways and have large grade
separated portions. However, all articles acknowledge the need for practicality- that
there are tradeoffs between what is optimal and what is reasonable fiscally and within a
practical amount of time. This should include the practicality of expanding a system.
Nash suggests that a transit system is not evaluated solely on speed of the train or
headways but instead on the number of connections it provides: “Travellers care about
total travel time, not maximum speed. Thus, system access and network possibilities
often play a more important role in travel decisions than maximum speed does” (Nash
et al, 2007: 21). This means that the cost of expansion of the system plays an important
role, as a larger network provides more options for transport riders

2.4.2 New Technology

In addition to these definitions of optimal is the consideration of the new
technology. The province of British Columbia’s decision to be the first to implement the
new technology on such a large scale as well as to be the first to feature only ALRT in its
RRT system should be examined through a technical evaluation of the risks. Here, I refer
back to Vuchic and Casello and a series of evaluative questions taken from his article “An Evaluation of MagLev Technology and Its Comparison with High Speed Rail” from 2002. Vuchic and Casello pose the following four questions for evaluating whether it is appropriate to use a new mode of transit rather than the traditional technology:

1) Is there a demand for the new mode?
2) Is the proposed new mode feasible, and shown to be operationally ready for implementation?
3) What is the current state of existing modes serving this demand?
4) Does the proposed mode as a package of benefits and costs, improve on current modes? (2007: 33)

These questions get at the selection of the technically optimal system. They will form the basis of my evaluation of the technical merit behind the choice of ALRT instead of LRT. However, evaluating from these questions alone fails to examine the attraction of new technology. There is an undeniable attraction to fancy and new technology.

Steven Schnaars discusses the pitfalls of this in his book Megamistakes: Forecasting and the Myth of Rapid Technological Change (1989). Schnaars argues that the benefits of waiting to implement a technology until it has been properly proven effective may be less popular and less sexy, but is much more pragmatic in the long run:

“... it is better to wait until the potential of a new technological product becomes apparent, then enter the market after someone else has pioneered it, than it is to attempt to forecast which technologies will result in successful products and which will not. It is a strategy that avoids innovation and seems downright un-American. But it has been widely used and has worked very well in the past...” (1989: 169).

In the business world, technology that is so new and un-tested that it is beyond cutting-edge is referred to as “bleeding edge”. In an industry newsletter on brand new
technology in the computer business, John Boline talks about the dangers of being on the bleeding edge:

Being on the bleeding edge is not a good thing. This is because “bleeding edge” refers to technology that is so new the end-user may be at risk of technology that is unstable, may cost productivity and in most cases is much more expensive than the tried-and-true technology of the day. (2006).

As Schnaars also points out, it is very difficult to anticipate in advance which technologies will take off, and which will fizzle out: “Forecasting the emergence of growth markets is a perilous, but irresistible, endeavour. Some new products go on to spawn huge growth markets while others sail straight in oblivion” (1989: 169). Nash et al (2007) also argue that while many of these more risky systems purport to substantially improve past models, these claims are often exaggerated while the costs are greatly understated. They refer to the fact that often these new systems hold significant appeal to the politicians (the decision makers) while the engineers may be more wary. This difference is the reason for examining the optimum system from the two perspectives of technical and optimal. Ultimately they call for better analysis by all parties when choosing a transit system: “In any case, feasibility analyses of megaprojects need better and more rational information along with better institutional arrangements to reduce the number of underperforming and over expensive transport projects” (Nash and Andrew, 2007:17).
2.4.3 Political Optimality

The political optimality examines the selection of a system evaluated on the benefits from the perceived optics rather than the technical merit. In the previous section I presented the way the technical experts approach system selection. This could also be the way a political organization selects a system. The political optimality and the technical optimality are not inherently opposed. Instead, I present that there is the potential for the political optimality to displace the technical, or at least be prioritized over it. The following literature helps me to define the political optimality.

In discussing the positivist policy approach of destructive competition, Howlett et al (2009) discuss the various administrative levels that policy must pass through in order to achieve implementation:

“Given this diversity of actors and interests involved in addressing problems, the possibility increases that multiple and not necessarily commensurable analytical frameworks will have been applied to a policy issue (Howlett et al, 2009: 25)

Due to the nature of politics there are often multiple reasons behind mega-project decisions. Re-election and party popularity must always be in the back of a party’s mind when it comes to spending the large infrastructure dollars required for a transportation project.

There is also the influence of the attraction of the mega-project. Flyvbjerg et al (2003) note how in planning large-scale mega projects planners, politicians and the public can get caught up in the thrill of a new technology or other solution without properly reflecting on the implications of their choice:
The pro and con positions [on a project] tend to be based on only some aspects of the problem, and rarely take all features into account [...] it is in this early stage that the interested and involved groups make up their minds in ways that often do not change later, even if better and more relevant information is made available. Hence it is important to develop a planning process that is less concerned with technical solutions and information about these, and has more focus in the early stages on the requirements with respect to the economic performance, environmental sustainability and safety performance required of the project. (Flyvbjerg et al, 2003: 89-90)

Gray and Hoel’s 1979 publication “Public Transportation: Planning, Operations and Management” acknowledges that mega-projects have the ability to capture emotions and pride in citizens, and that sometimes ideas can be sold solely on their size and scale rather than other merits:

Successful implementation of a new transit plan is more easily achieved with a system that is big, bold, glamorous, fast, extensive, and, above all, which appears to serve as much of the affected area as possible from the day the system first opens ... it is much easier to sell the full system if it appears to serve more people. In short, in major urban areas it is easier to sell a $1 billion project than a $100 million project (Gray and Hoel, 1979: 272-73).

While LRT may have lower expansion costs, Gray and Hoel suggest that this is a far less influential factor on citizens and politicians than the capacity of the line actually under construction. This represents what I have called the political optimality. Selecting a system based more on its ability to gain political advantage (the positive media coverage, the glamour of bigger projects, the appeal of being on the cutting edge)

I also present that this has the potential to lead to the government failure of organizational displacement:
**Organizational displacement** is the situation in which an administrative agency charged with producing a particular good or service eventually displaces publicly sanctioned goals with its own ‘private’ or ‘organizational’ ones (Howlett et al, 2009: 25)

Gray and Hoel argued that a system that “…appears to serve as much of the affected area as possible from the day the system first opens..” (Gray and Hoel, 1979: 272) is an easier sell politically than one that might be smaller initially but with greater potential for expansion. Thus the power of appearance favours the larger system even if a more technical analysis might find the system more difficult to expand and more expensive to run over time. The system with immediate gratification has the potential to be more enticing, especially to the political actors who ultimately decide on the policy.

Public policy decisions are ultimately made by politicians. However, these decisions are not necessarily representative of the political optimality. The technical literature favours well-connected transit systems with the most efficient trade off between speed and cost possible and with the most proven reliable technology possible. A system that is properly evaluated by government and selected would be considered, in this framework, to represent the technical optimality. The political optimality refers to the literature evaluating the mega-project suggesting that politicians and policy makers are often swayed by large investments and flashy new technology (Gray and Hoel, 1979). A project selected for these merits, without proper consideration of a technical evaluation would be represent the political optimality.
The following section examines agenda setting in the public policy process. This will provide context for evaluating later what agendas dominated in the decision to build SkyTrain
3 THE URBAN TRANSPORTATION DEVELOPMENT CORPORATION

I begin the presentation of data with the Urban Transportation Development Corporation- the creator and vendor of the technology. I use the technology framework to examine why ALRT was invented and then examine how the vendor promoted it for the sale to British Columbia.

3.1 Background

The Urban Transportation Development Corporation was originally formed as the Ontario Transportation Development Corporation (OTDC). It was established by an act of the Ontario Government, under Progressive Conservative Ontario Premier, Bill Davis in 1972. The impetus for the creation of this organization was the decision to halt construction on the Spadina Expressway in Toronto (Soberman, email: March 25, 2010). Recognizing the demand for better public transit system by Torontonians, and expecting demand from other cities in Ontario, the Premier decided that a Crown Corporation would be tasked with designing a transit system that could handle intermediate capacity- higher capacity than the streetcar system, but less capital intensive than the Toronto subways. Dr. Richard Soberman, former VP of Planning with the UTDC remembers the set up as follows:
Around 1975 the Ontario Government established the Ontario Transportation Development Corporation (OTDC), subsequently renamed the Urban Transportation Corporation (UTDC) which, among other things, was to develop and implement a ‘revolutionary’ Intermediate Capacity Transit System (ICTS) based on a German (Kraus-Maffei) firm’s technology characterized by: magnetic levitation (no wheels), linear induction motors (no moving parts), and automatic train operation and control. Maglev really wasn’t practical (or even workable) so when I moved to UTDC, maglev was replaced by wheels. (Soberman, email, March 25, 2010).

While the UTDC would also go on to design a number of other more traditional technologies (streetcars and buses) it is this ICTS solution that I will focus on. From the beginning, the technical solution to the problem of ICTS was to build an automated system.

The fact that UTDC was a Canadian company, an Ontario crown corporation and the inventor of ALRT will prove to be very important. Each of these three factors shows up in the UTDC rhetoric to deploy the product as well as the province of BC’s rhetoric for acquiring. The following section is a content analysis organized by the three types of discussion found in the UTDC data: technological advancement and superiority, ALRT as a solution for Vancouver and UTDC’s viability as a corporation.

### 3.2 Content Analysis: Technological merit of ALRT

From their very first corporate report in 1973, the OTDC is focused on the development of the Krauss-Maffei system into a viable ICTS system. Then referred to as GO-Urban, it was intended to carry more passengers than LRT, while at the same time being less expensive than the Toronto subway system. The following is taken directly from the 1973 report:
In 1969, the Government of Ontario initiated a world-wide study of developments in intermediate capacity transit systems. It was seeking an alternative to LRT technology.

The Ontario Government was looking for a transit system which would best meet the following criteria:

- High standards of service with a minimum visual, ecological and noise impact on neighbourhood environments
- High frequency of service and minimization of overall travel time between points of origin and destination of passengers;
- High levels of passenger comfort and safety
- High reliability of service;
- Acceptable capital and operating costs;
- Ability to integrate with existing transit systems;
- Flexibility to provide public transit in corridors of future urban development, thus assisting in shaping desirable urban development (OTDC, 1973: 13)

This is an document from early on in the process as it is still proposing magnetic levitation. This partially explains the first goal of minimal impact on the neighbourhood, as mag-lev is not very loud. In regards to the other goals of the project, many of them are comparable to the framework’s description of the advantages of the ALRT system.

This corporate report does not describe any potential pitfalls or negative aspects of developing this system, nor does it go into detail as to how these goals will specifically be met by this system. This is especially true for the claim of “acceptable capital and operating costs”. Because it has to be grade separated these costs are substantial even if the cars are smaller than the traditional subways of Toronto.

In its Corporate Report from 1975, the newly re-named UTDC provides an update on the ICTS program. It describes a funding announcement from the Ontario
Minister of Transportation and Communications of $6.1 million for Phases 1 and 2 of a five-phase program:

The proposed Intermediate Capacity Transit System comprises small trains operating at high service frequency on separated rights-of-way. The vehicles will use steel wheel suspension systems designed for much quieter operation than any existing transit system. A high degree of automation will allow high frequency of train operation and thus small trains for a given capacity requirement. The system is being designed for maximum community acceptability at-grade or on elevated structures to avoid the high cost of underground construction to the greatest extent possible. The system can, however, be built underground in places where the density of existing development precludes above ground alignment. (Corporate Report, 1975: 8).

The above quote demonstrates the ways in which the UTDC approached the concept of an intermediate capacity system. In order to make the system less expensive, the most important approach was to avoid underground tunnelling by using aerial structures. The language and description addresses the fact that these structures are generally less popular. Thirty-five years later, Dr. Richard Soberman maintains the same rationale for designing the system- finding a way to construct elevated rail in a way that wouldn’t be obtrusive:
When the guys were developing the technology, I don’t think they understood why they were developing it. It’s pretty simple - to avoid the cost of underground construction, go with an elevated structure. But people all over the world were tearing elevated construction down. The only ones in America left were in Chicago. So the idea was that you would be able to build a very elegant looking elevated structure that everyone would love - if you could have an elevated structure that was sort of visually acceptable or aesthetically acceptable, then you would be able to save a lot of money by not going underground. Usually when people show you visuals or schematics of what these things [proposed transit lines] are going to look like, they never show you the station, it’s overpowering. So you put it over an intersection and you’d never see it. So to achieve that goal you’d want a train with a smaller station footprint, then you’d have to run it more frequently, that’s why you automate it so you can run many small trains rather than a few big trains. That was really the rationale behind it.” (Soberman, interview: 2010)

Not only was this the position of the UTDC, but after Bombardier bought out the UTDC, the same rationale is still being used by that corporation. At a conference in 1998 on rapid transit systems that promoted the benefits of ALRT, Donald Byers from Bombardier presented the following arguments in favour of the technology:

The objectives of the principal operational requirements included reducing system cost by using environmentally acceptable elevated operation (slender guideways, maximum urban integration, low noise levels); achieving a high level of service (short trip times, frequent service, reliable all-weather service, improved ride comfort); and reducing system operation costs (modular design, innovative maintenance techniques, automation).” (Byers, 2009: 966)

There is also technical support for this new style of elevated structure. Vuchic’s 1981 text on transportation technology praised the new concrete elevated structures as opposed to the old steel elevated rail of Chicago and New York:
The advent of prestressed concrete led to a radical change in the characteristics of elevated transit structures. Instead of the heavy steel designs, modern ‘aerial’ structures have a sleek, aesthetically pleasing appearance [...] The opposition to construction of aerial rail transit structures frequently found in neighborhoods or entire cities is based primarily on experience with the old type of steel elevated structures. Such objections are not applicable to the modern aerial structures. Once the public becomes fully aware of the drastic differences between the two, it is likely that the use of aerial transit structures in cities will greatly increase. (Vuchic, 1981: 397-98)

However, while the concrete structures may be an improvement on the old steel structures, it seems an exaggeration to imply that there could be no reason to complain about these new structures. UTDC documents claim “maximum community acceptability” (Corporate report, 1975: 8) rather than outright promises that these structures will be controversy-free.

When all of this is considered in the context of Vancouver, the debate over tunnelling versus elevating becomes moot. Vancouver never considered tunnelling the system beyond the use of the existing tunnels downtown. As demonstrated in the cost/benefit table in Chapter 2.3, elevating is cheaper than tunnelling, but elevating is far more expensive than building at-grade. At-grade was impossible for ALRT and therefore is not mentioned by the UTDC. The UTDC could not sell a system to Vancouver that only required tunnelling because of the extreme cost, especially when the system is only built for intermediate capacity which makes off-setting the cost of tunnelling even more difficult.

Automated technology was considered cutting edge at the time of the design of ALRT. As the first report indicated, automation was one of the most important features
to achieve the goals of the system. The automation depended greatly on the success of the propulsion mechanism for these trains:

Essential to the provision of high quality service is the ability to operate high performance trains safely and quietly at short intervals. This is achieved by an innovative control system in combination with a Linear Induction Motor (LIM) mounted on a steerable-axle truck.” (UTDC, 1980: 4)

The ‘innovative’ system is also proprietary. The proprietary system’s patents originally held by the UTDC and now by Bombardier mean that expansion of this system can only be purchased through this company. In its documents, the UTDC is making claims that the LIM is required for the automated system. However, as I presented earlier, there were a number of other automated systems built in the 1970s and 80s that used other propulsion technologies, meaning they are not tied together.

The case of the UTDC’s connection with the LIM is also one of technological lock-in. Just as Vancouver got locked-into ALRT instead of an open-sourced technology, the UTDC’s initial dedication to maglev got them locked into making the LIM work. The technology was originally purchased from Krauss-Maffei in 1969 after a selection process because they considered the mag lev technology to be “...the most promising for further development” (UTDC, 1973: 13). This led to production of the LIMs in Toronto and the initial planning for a test track at the National Exhibition grounds in Toronto with cars provided by Krauss-Maffei (ibid). However, Krauss-Maffei’s revoked its financial support for the test track in Toronto after the corporation lost its backing from the West German government, so the track was never built (Bow, 2011). Instead
the UTDC would go on to build a test track in Kingston, ON and supply its own cars for the track.

By 1975, the concept of maglev had been replaced with steerable wheels on steel axles to reduce noise (UTDC 1975: 8). But the linear induction motor remained. The decision not to abandon the propulsion method when the idea of maglev was abandoned suggests that the UTDC was too invested in the technology to let it go. The original intention to develop a superior technology was arguably compromised by the fact that they didn’t apparently have the finances or the time to go back and reconsider propulsion alternatives. I argue that this represents organizational displacement theory in practice; that they were locked-in and forced to replace the original goals of developing a new technology with the goal of making the LIM work. Because of the amount of money already invested in the purchasing and developing of the technology, they could not abandon the technology but instead continued with it. The influence of the initial purchase of the LIM resulted in it being one of the most distinctive features of the ALRT. In Cowan and Hulten’s article “Escaping Lock-in: the Case of the Electric Vehicle” they describe how one event early on can lock-in a technology:

The path that leads to the lock-in of a technology often starts with a small historical event or a sequence of such events. The historical event is often an accident, a haphazard marketing gadget or a political problem demanding immediate action. In standard models of path-dependence an initial advantage gained by one technology can create a snowballing effect, based on learning-by-doing, learning-by-using and learning-about-pay-offs, which quickly makes the technology preferred to others (1996: 62).
The technology certainly became preferred by the UTDC as their annual reports make no mention of considering switching propulsion methods. The proprietary system has, thus far, been no match in popularity for the electric traction motor, which continues to be developed in a variety of forms by all transportation companies around the world.

3.3 Building and selling ALRT

After designing ALRT, a test track was constructed in Kingston, ON. There were discussions for a true implementation of the system, but nothing was concrete until the Toronto Transit Commission (TTC) agreed to use the technology in its upcoming Scarborough extension. The announcement was made on April 25, 1975 and the system opened on March 24, 1985 (DeKort, 1986: E4). In a letter dated March 18, 1976 from R Michael Warren, Chief General Manager of the TTC to Kirk Foley, President of the UTDC, Warren states:

The commission considers that an Advanced Light Guideway Transit system is desirable to meet the emerging requirements of the future in the intermediate capacity range. Productivity improvements in terms of lower capital and operating costs, better community acceptability and higher levels of passenger service and comfort are desired, compared with the existing systems and vehicle designs (UTDC, 1976, Appendix 2)

The line had been slated to either feature traditional LRT technology or be expanded into a subway system. Less than five years after the system opened, its critics were growing. The system was expensive and noisy. The choice of ALRT was criticized for being political rather than technical:
Publicly, TTC officials say the RT is a good, reliable - albeit expensive - system. Privately, they grumble a lot about it, calling it a colossal mistake and a money-waster. They believe it would have been far smarter to build a subway along the line in the first place, as Scarborough and Metro originally wanted. But it's not what the province wanted, and the province traditionally pays 75 per cent of transit capital costs. "They're the funders and you can't bite the hand that feeds you," said TTC vice-chairman Mike Colle, who is leading the charge to have the RT replaced. "If you raise flak, the province will be difficult to get along with. I can't get angry with the TTC staff because they really got heavy pressure from Queen's Park to stick with the RT," said Colle, who is also the Metro councillor for York-Eglinton. "But we have to remember that what's good for the province is not necessarily good for the taxpayers of Metro" (Howell, 1989: D5).

The mayor of Scarborough from 1978-88 would also call Scarborough RT a political decision- one entirely dictated by the province.

"Harris said he agrees with TTC vice-chairman Mike Colle the line was a bad deal from the beginning. 'It's never been recommended by (TTC and Metro) staff, it's always been politicians that recommended it,' Harris said. Colle said serious consideration should be given to scrapping the line and selling it to Vancouver, the only other Canadian city using the rail technology” (Howell, 1989: A6).

Dr. Soberman also remembers the province being heavily influential in the decision to choose ALRT: “Anxious for a demonstration project to show the system worked so that it could be sold in Vancouver, the Ontario government pressured Metropolitan Toronto and the TTC to stop construction of the Scarborough LRT and replace it with UTDC’s new technology” (Soberman, 2010: interview). Because the cost of ALRT was higher than traditional LRT, the provincial government agreed to fully fund the project, instead of the partial funding promised for the original design (ibid). This gave the UTDC a real-life example test track, and would be an important factor in the successful sale to Vancouver.
A 1980 report by the UTDC entitled “Light Rapid Transit for Greater Vancouver” produces a number of insights into the selling strategy of the UTDC. To begin with, there is the fact that the title fails to include the word “advanced”- just light rapid transit. While the UTDC had been referring to this technology as ALRT for quite some time, in this document, it is “advanced LRT”. My interpretation of this is to appease those pushing for a traditional LRT system in Vancouver (to be described in detail in the next chapter). There is evidence that the system was sold to be like LRT but an improvement on it. In a speech in the legislature Bill Vander Zalm referred to ALRT as an improved LRT:

it's like, a Cadillac and a Volkswagen, in that I think we-have the Cadillac in the ALRT and the Volkswagen in the LRT as proposed with all of its level crossings. Both will get you from A to B, but the ALRT, the Cadillac, gets you there a little quicker and a little more comfortably, and it provides certain other luxuries that weren't available in the LRT approach. (Hansard: March 31, 1981)

As is the case in all UTDC documents, the Executive Summary of their document for Vancouver emphasizes the benefits of above grade construction vs. tunnelling. It focuses on the lack of delay for traffic and for the transit vehicle and emphasizes the quietness of the system:

With advance LRT, the rapid transit system would have only minor impacts in terms of property acquisition, railway relocation, community disruption and interference with existing traffic operations. There would be no level crossings or signalized intersections and therefore no delay for transit vehicles or cross traffic. Advanced LRT vehicles are also significantly quieter than other transit vehicles and, as a result, would be less intrusive in sensitive areas. (1980: 1).
However, this failed to appease some LRT supporters. For example, in response to Vander Zalm’s above statement, opposition member James Lorimer correctly points out that LRT can also be grade separated--while the Minister had made it seem like the LRT system would have to have the at-grade crossings:

Lorimer: The minister was talking about the need for 18 level crossings in Burnaby if a conventional rail system were used. That, of course, is a lot of nonsense. You don't need any level crossings. The LRT service can go underground, overground or on the ground. There's no, need whatever for level crossings. The costs of the LRT appear to be very substantially less than, the costs of the ALRT. I'm not going into any further arguments on this at this stage, because, as I mentioned earlier, I don't think anything will ever come of it anyway during the present government (Lorimer, Hansard: March 31, 1981).

In addition to the desire to appeal to the LRT supporters with its claims to be like LRT but better, the other main point in the proposal document is the connection between Expo (Transpo) ’86, technology, the future and ALRT. The first selling point listed describes ALRT not only as a reliable and necessary transportation system for the region, but also that it could be considered an “exhibit in motion”:

Implementation of a high quality, Canadian rapid transit system to link the central Transpo ’86 sites with other downtown attractions would demonstrate the Canadian capability in advanced urban transit technology and would be an exhibit in motion which provides a reliable and necessary transportation service during the exposition. In this respect, the rapid transit system would complement B.C.’s other unique transit solution — Sea Bus.” (UTDC, 1980:1)

Thus, what are the main benefits of ALRT for Vancouver from UTDC’s perspective? Highly emphasized has been the ease and convenience of an elevated system- an argument presented not only by the UTDC but also the Social Credit government.
However, as correctly pointed out by opposition member Lorimer and earlier in the framework, grade separation is not at all exclusive to ALRT. ALRT does require grade separation though and it the limitations of this requirement are never stated by the UTDC. Due to the automation of ALRT it is impossible for it to ever be on roads and a system that constantly requires grade separation will inevitably be more expensive.

There is also the question of using the new technology. The UTDC documents regularly use words like “innovative” to describe the LIM system (UTDC, “Light Rapid Transit for Greater Vancouver- Summary Report, p.4). It sells the system as being an improvement on existing technology. However when using Vuchic’s questions to evaluate the merit of new technology, it is questionable how much (if any) of an improvement the LIM is to the electric traction. Although the UTDC argues that the LIM was crucial to the automation, I have produced evidence that there were other automated systems designed at the time without LIM. Also, while the LIM may have advantages in the Canadian climate, are these advantages enough to outweigh the drawbacks of this new technology? One of the most significant drawbacks being that it is a proprietary system. This means there was great potential for expensive expansions or for the technology to become obsolete.

3.3.1 ALRT: Other Applications

All data indicates that from 1973 until the large purchase by Vancouver in 1981 the UTDC (and the province of Ontario) truly believed they were producing the next big breakthrough in transit technology. After Vancouver’s significant order, Detroit
purchased a small system for their downtown Detroit People Mover, opening in 1987.
Scarborough RT opened a year ahead of SkyTrain in 1985.

By 1985, the UTDC was running into financial trouble. The corporation was receiving much media attention in Kingston, the location of the test track facility. There had been discussions and rumours surrounding potential systems in Boston, Toronto, Santa Clara and Hamilton. There was also an idea to use ALRT as a kind of GO-Train (the regional rail system in the Greater Toronto Area). However, none of these plans got very far and the Ontario government ended up cancelling the GO-Train project, ultimately sabotaging its own crown corporation. The City of Hamilton decided that the expense was too great, that the public had not been properly consulted, that residential character would be hurt with the elevated lines and that the economic stability would not be sufficiently improved with this system (Van Lowe 1981). Soberman recalls that there was a local reaction against ALRT technology in the Hamilton area, and that the city felt the technology was being forced down their throat. He also speculates that many American cities ended up not purchasing the technology due to major cutbacks for transit in the mid 1980s in the U.S (Soberman, Interview: 2010).

Without enough orders to keep the plants busy, the UTDC was running into financial trouble. By 1991, media articles were questioning the Ontario government’s investment in the UTDC and ALRT. In an article in the Kingston Whig-Standard entitled “UTDC: the bad news since 1974, company has cost taxpayers total of $580 million” staff writer Bill Hutchison calls creation of the crown corporation “a burst of technological optimism” (Hutchison, 1991: 1) on the part of the government.
In 1987, Lavalin, a large engineering firm, purchased a majority stake in the company for $30 million, leaving the Ontario government with an estimated $519 million worth of liabilities on their own books (including the $300 million performance bond for Vancouver) (Lasonovich, 1986). Lavalin then also ran into financial difficulty, nearly bankrupting UTDC to cover a loan to another money-losing enterprise (Hutchison, 1991). The result was that the Ontario government had to provide major incentives to another company in order to maintain the plants and jobs associated with the UTDC: “A financial study by brokerage house RBC Dominion securities showed that UTDC has a negative worth of $40 to $50 million, he said. (That means that in effect, the buyer would have to spend that much to turn UTDC into a workable company)” (Hutchison, 1991). Lavalin was a conglomerate of more than 70 companies by 1991 but was over extended and losing money. SNC – its chief rival- stepped in and bought the company, making it SNC-Lavallin⁴.

Bombardier bought the company from Lavalin, and now has a UTDC division focused solely on building ALRT cars and track. The most significant alteration to the technology is their attempt to increase the capacity of these systems. While the original intention of building the system was to provide intermediate capacity for smaller regions, the economics seem not to work with those ridership numbers.

⁴ http://www.fundinguniverse.com/company-histories/SNCLavalin-Group-Inc-Company-History.html Lavalin overextended itself in the 1980s, purchasing petrochemical companies, air craft manufacturers and a hospital. All of this combined led to the takeover and the selling of the UTDC
By 1987, with three Advanced Rapid Transit (ART) automated, LIM-powered, intermediate capacity systems in revenue service, a review of the product and its market potential were undertaken. The main conclusions were that a lower capital cost vehicle were required, and that the greatest market potential lay in higher system capacities, to 40,000 [riders per hour] and beyond, but that system operating costs, reliability, and operational features were second to none. The decision was made to build upon these successes by developing a larger LIM-powered vehicle with the capability of meeting these higher capacity requirements. Subsequently the MKII vehicle with 50% more passenger capacity was developed because the vehicle equipment and manufacturing costs would not appreciably increase with the larger vehicle. As a result, the cost per passenger space would decrease substantially” (Byers, 2009: 970)

Bombardier understood that the concept of ICTS was just too expensive. This demonstrates that while the original ALRT design may have been a technological solution to the problem of maximizing capacities for intermediate sized cities, it was difficult, if not impossible, that solution economically viable. This is important to note as the technically optimal system must not only be a good technology but it must also be practical in its execution. The new MK II SkyTrain cars in Vancouver carry many more riders than the original MK I cars and most trains run at the maximum number of cars. The automation does allow for trains to run frequently, without the cost of additional labour. Part of the problem with the Scarborough RT line today is that the sharp turns on that line are unsuitable for the MK II cars. Thus, it is still using the original (lower capacity) MK I cars (Soberman, 2010: interview).

Today, Bombardier’s UTDC division is in effect the only manufacturer of automated light rapid transit in North America (Grava, 2003: 711). There are, however,
other automated systems being developed and implemented by transit companies internationally.

3.4 Summary

The creation of the UTDC led to the decision to buy mag-lev technology from Krauss-Maffei. The investment in this technology (and therefore in LIM) led to technology lock-in of the Linear Induction Motor. Even when the levitation was dropped, the unique motor design stayed. This was a deviation from the established and popular electric traction motor. According to Richard Soberman, the drive behind the creation of ALRT was the desire to find an intermediate capacity system that could be sold to smaller cities across Canada. This would require reducing costs, which led to the decision to automate the system in order to eliminate the cost of drivers. The desire to lower cost led to the idea of constructing the elevated system rather than tunnelling but designing smaller, less obtrusive stations requiring smaller trains.

The idea of ICTS proved impractical in real applications. The evidence for this is Bombardier’s decision to make the ALRT cars significantly larger. I provided evidence earlier that SkyTrain is classified by some experts as heavy rail, but Figure 3 demonstrates that it has some of the lowest capacities in that category. And while one of the advantages of LRT is its flexibility to share rights of way when convenient, ALRT does not have this feature.

The UTDC’s own selling points focus intently on the technological merit of ALRT. From the Crown Corporation’s point of view, the modernity of their new transportation
technology was a perfect fit for Vancouver. However, going behind the rhetoric of the UTDC, into the interview with Dr. Soberman as well as media articles indicate that the projects in both Scarborough and Vancouver were actually intended to provide marketplaces to launch this technology globally. I conclude that the motivation behind the choice of the Linear Induction Motor (technology lock-in) and the idea of an intermediate system that would have less capacity than heavy rail with less convenience of LRT resulted in a non-optimal system from a technical standpoint.

Thus, if technically this system appears to have flaws in it from the start, why was it chosen? I argue that consideration of ALRT from the political point of view casts it in a much better light from the perspective of the provincial government. The following section examines the role of regional government, and their existing plans for LRT.
4 REGIONAL GOVERNMENTS: GVRD AND CITY OF VANCOUVER

While the UTDC was being formed in Ontario and beginning to develop ALRT, major transitions were happening in transportation planning in Metro Vancouver. These changes in the organizational structure of transportation planning between 1975 and 1980 would lead to provincial control and the introduction of ALRT.

This section will focus on the data found pertaining to the GVRD and the City of Vancouver, and an analysis of the policy actors pertaining to these sectors. However, the following background information also gets into the provincial political scene, as it is nearly impossible to extricate that story from the local government politics.

4.1 Background

In 1975 the NDP lost power in the BC legislature. Former premier W.A.C Bennett’s son, Bill Bennett, became premier, and would lead his Social Credit party (Socreds) for the next ten years.

By 1978, the Socreds had established a crown corporation overseeing transit planning called the Urban Transit Authority (UTA). The UTA would eventually be known as BC Transit and it was responsible for transit planning and building outside of Vancouver and Victoria. For transit planning within the two largest cities, the Crown Corporation was to “negotiate responsibility for planning, marketing and funding transit service” (Yearwood-Lee, 2007: 5). This left the UTA, the GVRD and the Metropolitan
Transit Operating Company (formerly B.C. Hydro) as the three contributors to transport policy planning in Vancouver.

At the time, Clive Rock was a transportation planner with the GVRD. He describes this unusual arrangement of transit planning in BC: “Everywhere else in Canada, apart from GO Trains in Toronto, everywhere else, transit was usually a municipal responsibility rather than a provincial agency” (Interview: 2009). Rock remembers this being referred to as “the three headed monster”, with different interests from the various organizations constantly pulling in different directions. However, the GVRD went ahead with continued feasibility studies and plans for the transit system they thought best suited for the region. The region faced unique challenges with this multi-faceted approach. In 1980, the region would be given direct involvement again in the transit planning function, but that would not last long.

Despite not having total control over transportation planning decisions, the GVRD was working on developing land use plans. Ken Cameron, a planner with the GVRD remembers the situation as follows:

“All the very beginning the idea was the purpose of rapid transit was to connect regional town centres together with each other and to the core. And so, the GVRD as the planning agency had an interest although no mandate at the time in transportation. It had an interest in seeing these lines were built. So as I recalled there was a rapid transit study under way when I came in ‘78 it had a steering committee and was looking at different kinds of technologies, the proposition being that we wanted, for regional planning purposes, we wanted to get rapid transit lines built in the order that they had been indicated in the plan. (Ken Cameron interview, 2010).
The rapid transit study would conclude that LRT was the best choice for the region to bring together the regional town centres.

4.1.1 Early LRT plans

During the mid 1970s the then NDP government and the GVRD had been in discussions for LRT in the lower mainland that would connect downtown Vancouver through to East Vancouver, Burnaby and New Westminster. In 1975, a GVRD report entitled “Terms of Reference for a Preliminary Design of LRT for Greater Vancouver” discussed the progress to date, and the amount of work still required:

There has been a considerable amount of general planning for LRT in the last few years. This work has produced general agreement on the route for LRT, some ‘ballpark’ cost estimates, a first engineering look at some portions of the route, and a beginning of community planning around LRT on a ‘spot by spot’ basis. Considerable information on land use, travel patterns, station area access and right-of-way has also been collected by several agencies, including the Bureau of Transit Services, the GVRD, BC Hydro and the municipalities through which the route passes.

However, even with full use of prior work, much still remains before the Vancouver region has a design, financing and implementation program for LRT. (GVRD, 1975: 3)

The decision to choose LRT was primarily a capacity issue- the LRT system could carry more passengers than buses, and the region had neither the money nor the population to justify a full, buried, heavy rail subway system. The proposed route followed the old inter-urban streetcar line, meaning that in many places there was already track spaced cleared. Also important was that LRT would align with the GVRD’s land-use planning strategies to build regional town centres throughout the area. Attention was paid to the impact of this transportation system on the area. Planning documents warn against the
pitfalls of poor planning and design: “improperly designed LRT can cause serious problems, including noise, unwanted community growth, inflated housing costs, loss of privacy and ugly views.” (Ibid: 2) By August of 1980, plans were advancing and many of the details had been worked out. The GVRD released a document entitled “Summary of Municipal L.R.T Alignments Recommendations and Associated Costs”. This document described discussions with the various affected municipalities, concluding: “Although there is agreement amongst all of the rapid transit project participants on most of the routing and pre-engineering results of the technical work, ...specific analyses are needed to resolve outstanding questions” (GVRD, 1980: 7). The GVRD set about discussions with the municipalities about their various concerns that mainly related to tunnelling and bridges. However, it would turn out that LRT plans were not to get much further beyond this stage.

4.1.2 Expo and New Funding

In 1980, the provincial government made several large announcements. The first was the bid for Vancouver to host a world exposition. The Expo was to be named “Transpo ‘86” and would focus on the future of transportation. The second announced the creation of the Urban Transit Fund- a cost-sharing program that would begin with a $55 million investment in a ‘major transit system’, to be built to coincide with the Expo. (Bell-Irving, Hansard: 29 Feb 1980) This funding and cost-sharing arrangement would be the beginning of further removal of transportation planning power from the GVRD. By 1983 the province created B.C. Transit, a provincial agency, and transferred the remainder of the GVRD’s transit responsibilities there.
For the GVRD, it was not a positive change as this set up removed their authority on transportation infrastructure to a limited advisory role, and they released a publication in 1983 stating:

“It will be extremely difficult for this structure to function effectively, particularly in situations where local and provincial needs differ, and the reversion to strictly provincial control is a significant setback in progress towards a more rational approach to regional transit and land use planning and development” (GVRD, 1983: 7).

A report produced in 1991 by the Greater Vancouver Regional District continued to outline the problems with the arrangement and the involvement of the province: “... as a crown corporation, BC Transit’s accountability is to the Minister Responsible for Transit and not to electorates at the local or regional level. Therefore, decisions made by BC Transit within the local service area will tend to reflect provincial aspirations and not necessarily the requirements of the regional transportation network.” (GVRD, 1991: 5). The fact that a regional government like the GVRD is willing to critique the province in this public way demonstrates the conflict between the two organizations. However, the province’s financial power means that its cooperation is needed for transportation planning. This became evident as plans for Expo continued.

4.2 Transpo and Transit

The City of Vancouver was reluctant to be hosting the event. In 1980, Mike Harcourt had been elected mayor of Vancouver. The timing of this mayoral race set it in the middle of the Transpo announcement and the discussion surrounding funding and type of the rapid transit system. Harcourt himself describes his election as “horrifying”
for both provincial and federal governments of the day (Harcourt, 2010: interview).

Harcourt went on to lead the provincial NDP party to victory, becoming Premier of BC and his political leanings were well known by the Socreds in the early 1980s.

The decision to host the World Exposition in 1986 was inextricably tied to the decision to build a rapid transit system in Vancouver. According to Mike Harcourt and Ken Cameron in their book “City Making in Paradise” the Expo was lined up as follows:

This was Grace McCarthy’s show. During the fall of 1978 she had asked Ambassador Patrick Reid of Canada House about the possibility of borrowing the Mona Lisa to be showcased for Vancouver’s 1986 centennial. Reid had another idea. As it happened, he was also president of the International Bureau of Expositions, the organization responsible for choosing the world’s fair locations. ‘Why couldn’t Vancouver have one?’ McCarthy inquired at their meeting. Reid replied, ‘Because it has never asked.’ That had set in motion the process leading to this groundbreaking ceremony. The French were never going to lend Vancouver the Mona Lisa, but there was a Canadian-built rapid transit system looking for a place to demonstrate its fast, quiet technology (Harcourt et al, 2007: 94).

The 1980 Speech from the Throne announces the first step by Bill Bennett’s government to incorporate “Transpo ‘86”. This would later be changed to Expo ‘86, but the theme of the future of transportation would remain. Then lieutenant-governor of British Columbia, the Honorable Mr. Bell-Irving made the announcement:
My government is now working hard to bring to British Columbia a major world exposition, Transpo '86. This exciting and highly significant international event could draw the attention of all countries to our province, as well as serve to commemorate the 100th anniversary of the inception of Montreal-to-Vancouver rail service in Canada in 1886. Needless to say, great enthusiasm has been generated at all levels – national, provincial and civic – and British Columbia's submissions have been most favourably received by the Bureau of International Expositions. Legislation to incorporate Transpo '86 will be presented to you. Transpo '86 could well be one of the most spectacular events in British Columbia's history and provide a multiple of short-term and long-term benefits – and opportunities – which will be felt throughout the province. (Bell-Irving, Hansard: Feb 29, 1980)

It was clear that this event was high on the list of priorities for the provincial government. Often discussed was Transpo’s ability to clean up slum-like areas of Vancouver, and to build a world-class stadium (what would become BC Place). While its name changed from Transpo to Expo, the transportation theme provided excellent fodder for the critics of Vancouver’s transit. The irony was inescapable- the city with no transportation system was hosting an event focused on transportation systems.

Harcourt’s campaign for mayor had been directly involved in the discussion about Transpo. He says: “I of course ran for mayor by sending a telegram to the Bureau of International Exhibitions ... in Paris saying ‘don’t come’.” (Harcourt, Interview: 2010). Harcourt then laid out four conditions of his conditions for agreeing to host. Included in these conditions was the caveat that the province install and fund an operational transit system before the beginning of Transpo in 1986.: “I don’t want to embarrass us by showing off the worst transit system in Canada ... so they had to deal with me and they had to deal with all these conditions” (Harcourt, interview: 2010).
By late 1980, the debate about funding for transit was in the local media. It seemed that a transit system for Vancouver would only go ahead if the city (mainly Harcourt) acquiesced to Expo. A *Vancouver Sun* article from November 25, 1980 described both the animosity between premier and mayor as well as the ongoing debate of whether Vancouver would in fact get rapid transit:

Mayor-elect Mike Harcourt said today that the message he got from provincial officials last week was that a rapid transit system for the Lower Mainland was dependent on Transpo 86 going ahead.

Not wanting to jeopardize rapid transit, he drew back from his outright opposition to the world class transportation fair, he explained to a news conference at city hall.

“We have left the options open. I think we’ve been very cautious and very careful to not jeopardize bringing in that light rapid transit”, Harcourt said.

Premier Bill Bennett said Monday in Victoria that a transit system is unrelated to Transpo ‘86 and the province is committed to rapid transit regardless of the fate of the fair.

Asked about the Bennett statement today, Harcourt said, “it’s up to the provincial government to speak with one voice,” and he expressed the hope that by the time he visits Victoria next week, the government will be able to give him a clear answer about its position.

He repeated that he is still opposed to Transpo, and that it could still be cancelled if it turns out that money for rapid transit is not dependent on the fair. (Lindsay, 1980: A1)

Mayor Harcourt and the NDP’s concerns about the embarrassment for Vancouver were echoed in letters and editorials in newspapers. A *Vancouver Sun* article by freelance writer John Kirkwood was entitled: “City with transportation nightmare hosts Transpo. Charming: Is Vancouver ready for Snafu ‘86?”

Actually it makes a lot of sense to stage an international fair about transportation in our little old timber town in the West Coast rain forest. It would, after all, be too obvious to hold it in cities like Montreal, Toronto, or Edmonton, all of which have efficient transportation systems.” (Kirkwood, 1980)
Thus, even before the announcement of the technology choice, City of Vancouver leaders as well as citizens were skeptical of the provincial interest and motives for building a transit system.

### 4.3 Response to ALRT

In March of 1981, the announcement came that a transportation system had been chosen. As outlined in the UTDC chapter, the technology was not only brand new, but at the time didn’t exist beyond the Kingston test track. Ken Cameron (then planner with the GVRD) called the introduction of this new technology a “bolt from the blue”:

“The push for that technology [ALRT] came from the province, and there was something of an effort to persuade the GVRD people to go along with it, and I did accompany the chairman of the board to Kingston, at one point because I was going back to a conference with him anyway and so we went and took a ride on the test track in Kingston.” (Cameron, Interview: 2010).

By this point, it was evident that the GVRD’s plans for LRT were falling by the wayside. The intention was to keep the same route (more or less) of their plan, but otherwise, the province was starting afresh.

The existing GVRD Light Rail plans were mentioned and raised frequently in the legislature by the opposition party. Certainly the Socred’s “bolt from the blue” transportation planning was a political point for the NDP. NDP member Charles Barber quipped that the technology was so unheard of that even the government couldn’t seem to remember the name of it:
Well, in a very undemocratic way, he [Vander Zalm] has simply
demanded that the GVRD roll over and play dead duck to his scheme to
bring in a system. Today he called it "advanced light rapid transit"; on
other occasions he has referred to it as "automated light rapid transit."
Whatever label he currently uses, we'll call it ALRT (Barber, Hansard:
March 30 1981)

The Socreds focused on the relationship between Mayor Mike Harcourt and the official
opposition party, suggesting that neither was acting in the best interests of those along
the transit route.

I agree with what was said yesterday by the first member for Victoria
(Mr. Barber), that their spokesman in Vancouver, Mayor Harcourt -
whom he said, of course, made no secret about his speaking out on
behalf of the NDP; he went on and on at some length about this, and I
can well understand that much of the opposition, which was led by the
mayor of Vancouver, whom the first member for Victoria says is the NDP
spokesman, was political in nature. I think we should all be big enough to
look beyond politics and be concerned about those people in Burnaby,
and assure everyone that the people of Burnaby have the best possible
system for all time. (Vander Zalm, Hansard: March 31 1981).

Both Cameron and Rock remember the province being adamant about the type of
technology chosen. Their involvement with the GVRD and the more regional aspect of
planning, and perhaps as well their lack of later involvement in politics means that they
both speak frankly about the surprise at the ALRT choice. This isn’t to say that today
they view it as a failure. Certainly the most in favour of the system is Harcourt:

... one of the shakedowns of it all [Expo planning] was that the federal
and provincial governments wanted a Canadian system to demonstrate
show off Transpo, and so they chose Bombardier, which has great
political clout, as you know and we ended up with the ALRT system. And
ironically I’ve come to be a convert because it actually works (Harcourt,
interview: 2010).
Cameron is more critical of the appearance of the grade separation, calling it a
“...divisive and ugly system and Vancouverites continue to be appalled at how ugly it is”
(Cameron, Interview: 2010). Harcourt dismisses the appearance of the system, saying that it has become part of the fabric of Vancouver. I suggest that at least part of this difference of opinion is that Harcourt went on to expand the SkyTrain line using the same technology while he was Premier.

4.4 Summary

The goals of the GVRD and the city of Vancouver were to build an effective transit system that would connect the planned regional town centres. The SkyTrain route successfully connects many of the town centres there have been tradeoffs for this success. I present that the GVRD’s preference of LRT is based on rationale from the technically optimal system. As presented in Chapter 2.4.1, LRT represents the best balance of travel time and money cost. Even though the GVRD is a political entity, comprised of representatives from the regions surrounding Vancouver, I found numerous reports that demonstrate that the region understood the technology it was selecting. It was a practical, well-planned and feasible transportation solution. However, it was also unfeasible for the region without the financial help of the provincial government. And there failed to be interest from the province until the introduction of a mega-event. Despite Harcourt’s attempts to go ahead with the LRT plans, it seems evident from the data that the options were ALRT or no transit funding. Ken Cameron even remembers that there were threats of building the system in other parts of the region that might be more ‘appreciative’: “I remember Vander Zalm musing
that if Vancouver doesn’t want this, then maybe we’ll build a rapid transit line from Surrey to Richmond” (Cameron, interview: 2010).

Overall, there was a lack of consensus during the planning process. Priemus, in his article “Decision-making on Mega-projects: Drifting on Political Discontinuity and Market Dynamics” (2010) discusses the need for problem analysis and consensus:

As problems are often perceived differently by different players, it is not only essential to conduct a problem analysis but also to reach the strongest possible consensus. A shared problem analysis enhances the possibility that the selected alternative will still be endorsed by everyone farther down the line and survive changes in government coalitions. If there is still a difference of opinion on the analysis, it is usually the authorised political body (parliament, regional or municipal council) that decides on the problems that will form the departure point” (Priemus, 2010: 21).

From the point of view of the GVRD and the City, not only was the Expo being dictated to them, but also the type of transit system. From the perspective of the province, there is little need for consensus building when there is no motivation to require the GVRD’s approval on a project in the city. It is evident that the province holds the most power in this arrangement. The following section will examine how the optimal system was defined from the perspective of the Social Credit party.
5 THE PROVINCIAL GOVERNMENT

5.1.1 Social Credit Philosophy

British Columbian politics are often considered to be unique compared in the Canadian context. Geographically the province is very removed from the country, and there is less of a connection to the federal government than other provinces to the East. In addition, the geography of British Columbia and its population dispersion makes Vancouver a concentration of voters. It generally attracts a lot of attention from the provincial government. Numerous former mayors of Vancouver have gone on to run for or become Premier, and the city is often referred to as “Downtown B.C.”5. There is a tendency for provincial party leaders to be ‘mavericks’. While the Social Credit party of British Columbia was initially formed from the same mould as the Alberta Party it became a driving force in provincial politics from its first election at a minority government in 1952 onwards. The Socrads became the dominant representatives of the political right in the province: “The collapse of the coalition and the subsequent election of a minority Social Credit government in 1952 marked a new stage in the development of polarization. Before the decade was out, Social Credit had emerged as the strongest party in the system, the Liberals were reduced to a small rump group in the legislature, and the Conservatives were eliminated altogether” (Blake et al, 1991: 5). The polarization in B.C politics is especially evident in the makeup of the legislature from

5 Mentioned by Ken Cameron in the interview
1979-83 the Social Credit party and the B.C New Democratic Party. The following examines the perspectives of the government that would introduce and implement ALRT.

5.1.2 Socred Transportation philosophy

The various sources of information on the Socred party of the time seems to demonstrate confusion within the party on how to discuss public transit in general, and also how to promote the investment in ALRT.

In 1978, then Minister of Transportation, Jack Davis, outlined the Socred position on public transit expenditures. He emphasized the need for them to be focused and concentrated, with the highest possible level of user pay:

I could point out the advantages of several commuter trains running on CP Rail's tracks from Mission to Coquitlam, the SeaBus terminal at the foot of Granville Street in Vancouver. I could talk about the advantages of light rapid transit on the lower mainland. But these are all subsidized operations and my main theme is competition. I believe in more competition rather than less. I believe in the principle of user pay, especially where people have a choice as to how they can get themselves and their goods from one place to another. I believe that government subsidies where they exist should be specific. They should be limited primarily to big-city situations and frontier areas where no proper means of transportation exists. Regulation of the private sector, meanwhile, should be kept to a minimum. This way we will not only hold public expenditures down but we will put the interests of the user of our transportation services ahead of those of the carriers which are supposed to serve them. (Davis, Hansard: 26 July 1978)

There is little here indicating a desire to work on public projects of the magnitude of public transportation, or to subsidize what some would consider a greater good. Insults of the NDP in the provincial legislature frequently included the world ‘socialist’, as there
was no worse fate in the eyes of the Socreds. This quote by Jack Davis is an echo of a
series of similar statements. After their win in 1975, the Socreds set about restructuring
many of the crown corporations and other government services. Reasons given
frequently included accusations of gross mismanagement and spending on the part of
the NDP. In 1976, Robert Bonner, former Social Credit attorney-general and MacMillan
Bloedel president, was hired to run B.C. Hydro.

The Hydro chairman was particularly concerned about the money-losing bus business. By then, some of the regime had acquired the rudiments of civility and learned that price hikes should be announced well in advance and with a modicum of sensitivity. ‘Of course transit cannot just be considered in cost terms; there are social factors, and believe me, we are aware of them.’ See, we’re not just a bunch of heartless accountants, Bonner seemed to be saying. Then he had to spoil it. ‘But transit users are enjoying a bargain which can’t last’ (Persky, 1979: 101-102).

In one breath, Jack Davis mentions the benefits of public transit, while in the next
criticizing the immense cost and questioning the benefits. Also important in this quote
is that the importance of the private individual frequently translates into the protection
of the individual’s right to automobile access. Many Socred statements defend the right
to driving. This could also be because so many Social Credit MLAs were car dealers.
They were not a party known for their public transportation policies. Overall, the
conflicting approach to transit as a government subsidized program reflects the Social
Credit’s populist political philosophy. Donald Blake discussed the stark differences
between the NDP and the Socreds in BC politics:
Left/right differences between parties were much more clearcut. Social Credit was the party preferred by more ‘individualistic’ citizens, those more hostile to government regulation and more likely to believe that individuals rather than government must assume responsibility for their own economic well-being” (Blake, 2004: 5)

And yet at the same time, the party seemed trying to ensure that it did not go overboard with the individualist sentiment. This could perhaps be attributed to the fact that the long Socred run had recently been broken up by NDP government. Certainly leader Bill Bennett had once called the party “slightly right of centre” while the NDP were “slightly left” because Bennett acknowledged that “no party of the extreme right or the extreme left can survive” (Ibid). However there is no ignoring the economic philosophy of the party- it was definitely focused on the individual, as well as on the strength and support of small town BC (Ibid).

All of this evidence of Socred philosophy begs the question: why would a government so concerned about public spending with little to no interest in public transportation suddenly choose such an expensive RRT system? The previous chapter introduced the mega-event. The Socreds wanted the attention of a national exhibition and there was no way to do it in Vancouver without fixing the transportation system. But it goes beyond the mega-event and back to the mavericks of B.C politics. There are many rumours surrounding Bill Vander Zalm and his connection to ALRT. The story behind Minister of Municipal Affairs Bill Vander Zalm and his relation to the ALRT technology for SkyTrain is a difficult one to prove. As with many political stories there is the public side and then the rumoured private side. The proof of this aspect of my story, therefore, is dependent on some public documents- Hansard, newspaper
references and then information gleaned from interviews of players involved in the process.

There are a few haphazard references to Vander Zalm’s past attraction to interesting transit technology. In 1980 while defending the special funds act for the Urban Transportation Fund (UTF), he mentions monorails in the legislature:

We have here the opportunity of providing a very necessary link in the overall transit system. Certainly the Pattullo Bridge may be a good carrier for a rail line or a monorail line or whatever mode of rapid transit is adopted for that part of the region (Vander Zalm, Hansard: April 9 1980)

By July of that year, the opposition has picked up on his interest in the technology, and criticizes it. NDP member Charles Barber states:

The Minister of Municipal Affairs (Hon. Mr. Vander Zalm) may, for instance, want to show us models of his monorail scheme that no one has asked for, that cannot be afforded, that no one wants and that will cost far more than it ever should. If he gets ahead with that particular scheme, the Minister of Municipal Affairs may show up with his monorail models in some small room (Barber, Hansard: July 25 1980).

Thus, the rumour about Vander Zalm’s interest in monorails was around back then as well. He was also the first person from the government to test out the ALRT at the facility in Kingston. Vander Zalm remembers that this was at the suggestion of his ministry:
So after a whole lot of searching, for the better part of six or eight months, they came back with the recommendation for what’s now called the Skytrain, which at the time was called ALRT, Advanced Light Rapid Transit. The ALRT system was built in Ontario, the government of Ontario had major involvement in the factory that was building the ALRT, so Jack Davis and myself and several people from the ministry took a trip out to-Jack was an engineer and we took a trip out to Ontario to assess what it was they had. We were very impressed. They had a trial track a stretch of track that we rode on. An we were very impressed with the system, and suggested they should make a presentation to cabinet and to caucus in Victoria (Vander Zalm, Interview: 2009).

And thus the concept of ALRT was introduced to British Columbians. Once it was discovered and introduced, the appeal is often framed in the technological advantages of ALRT. The rationale appeared to be that if the Socreds were going to invest in a transit system they were going to choose the newest, best, fanciest system available.

5.2 ALRT: appeal of technology

The public legislative debate on the choice of technology came down to the Socreds defending the technological advances of ALRT and the NDP defending the preference of the GVRD. The following section lists the ‘selling points’ of the Socreds that appeared most frequently in debate.

5.2.1 Grade Separation

It seems that for the provincial government, the benefits of the transit system avoiding level crossings could not be overemphasized. The discussion about elevated versus at-grade systems seemed always to focus on the fact that the original LRT case suggested multiple level crossings along Kingsway. When asked by NDP member
Charles Barber about the differences in cost in the system between LRT and the ALRT, Vander Zalm stated:

It’s apples and oranges. If you were to compare the two systems and attempt to determine what the difference in price might be, you would have to design one like the other and ensure that there were no level crossings. In fact, if level crossings were accepted as satisfactory, then a conventional system would be cheaper. On the other hand, if you didn’t accept 28 or 30 level crossings, with their gates coming down every few minutes - and the tremendous chaos that would create, particularly through the Burnaby-Vancouver corridor - and if you elevated the conventional system, you would spend a whole lot more than what you’re spending on ALRT. (Vander Zalm, Hansard: June 10 1982, afternoon sitting)

Vander Zalm maintains that this was the primary reason for choosing this system- that the plan for LRT would be disadvantageous to both the auto user and the transit user.

“We decided that really we should send the report back, because “we saw one major flaw in the report- at least in our view. Mr. Harcourt and the committee was basically of the view that level crossings didn’t matter much, because if you could make things a little bit difficult for the automobile, then people would be inclined to take transit a lot more quickly. And our view was that the only way that we could really make transit very appealing to people would be to make it very comfortable, and very fast, and very convenient (Vander Zalm, 2009: interview).

Thus, the greatest emphasis was placed on grade separation. Yet the LRT could have been elevated to avoid the level crossings at Kingsway if the province had wanted. The NDP had even pointed this out in the legislature (Lorimer, Hansard: 31 March, 1981).

Even in his 2009 interview, Vander Zalm focused on elevation as a primary reason for choosing ALRT. Today many LRT systems have elevated portions. By constantly repeating the combination of ALRT and grade-separation for ease of traffic the Socreds strongly associated the two ideas. They essentially turned a feature that can be found in
many different kinds of transit systems and focused it only on the system that they had chosen. This contradicts the technical definitions I provided earlier but made their argument highly successful.

5.2.2 Job Creation

An automated system means cars can be added for peak periods (two or three hours) without having to pay for extra labour. However, understandably the government had little interest in announcing this savings as a benefit of the system—particularly in the slow early 1980s economy. Thus, construction and maintenance jobs were heavily emphasized to promote the job creation that this transit system would bring. Premier Bill Bennett promoted the system by saying: “A transit system that's not just lip service, but a transit system in which we made a conscious decision not only to provide transit, but, because we are Canadians, to assist with the development and use of Canadian technology, thereby creating new industries and jobs here in British Columbia.” (Bennett, Hansard: Dec 1 1981). The opposition was quick to jump on the many promises being made to the provinces of Ontario and British Columbia regarding jobs. This is related to where the facility for construction of future systems would be built. There are references to this facility being built in BC, but there was already a Kingston, ON facility where SkyTrain was being built:
Lauk: The people in Ontario have been told by their Premier that this deal with British Columbia is going to provide lots of jobs to Ontario. This minister has been going around saying to the people of British Columbia that this deal is going to provide lots of jobs for the people of British Columbia. Who's telling the truth, Mr. Chairman? Who is going to get these jobs? It sounds to me like a little bit of flim-flam on both sides of the Rockies. This minister is willingly playing that flim-flam game. Kingston thinks it's getting the jobs; Vancouver thinks it's getting the jobs.

I understand that this turnkey operation, in not going to tender, will be completely and utterly controlled by the UTDC, without any say or input in planning, except rights-of-way - in place in a way which at any time . . .

HON. MR. VANDER ZALM: You're a disaster.

MR. LAUK: Mr. Minister, you're a disaster. The GVRD spent $600, 000 in developing a plan for transit at your request, Mr. Minister. What we ended up with was back-of-the-hand treatment from the minister, to put in place your little toy train from Pier B-C to B.C. Place. That's what it's going to be. It's going to be a little toy train, running about six or seven kilometres, because I know the minister will never build a transit system as long as he's minister. Thank God, that won't be very long at all (Hansard: 31 March 1981).

There are many references in Hansard to the NDP's doubt that a system will ever be constructed, or that it will go beyond a test track. In that case they turned out to be very wrong, but they do bring up a number of important critiques in the purported benefits. The facility discussed above was not built in Vancouver. It wasn't until the expansion of the Millennium Line that Bombardier brought transit construction jobs to the region.

In addition to the jobs created by construction and design, there are rumours that the Social Credit party was frustrated with the unionized bus drivers and had little desire to create more of these jobs for the RRT system. Because the TTC in Toronto
already had a union for the subway conductors, the union required that the automated trains be staffed but because Vancouver had no existing RRT, there was no union for these drivers. However, without discussion in Hansard or other data to present on this issue I can only point out that the construction jobs were heavily emphasized but that the longer-term operating jobs were rarely mentioned.

5.2.3 Buy Canadian

The fact that ALRT is a Canadian technology and system is the most frequently brought up argument in favour of the technology. The following statement given by Premier Bill Bennett in July of 1981 summarizes most of the terminology used:

I also want to say that I'm pleased that we in British Columbia can use Canadian technology. It's true that many people said that we should not buy Canadian technology, that we should be purchasing European technology of existing transit systems and looking internationally for alternatives, because the transit technology we're purchasing has one demonstration project developed in Ontario and one in Hamilton at the present time, and the price might be slightly higher because of the higher costs of Canadians developing it. While we're great Canadians, we also have an obligation to get the best value for a dollar.
The reason we were enticed into looking at the Canadian technology developed in Ontario by the Ontario government's transit development agency was that the federal government had promised a $31 million grant to the transit agency of the Ontario government for the second use of that transit in a viable way in a part of Canada other than Ontario. So they were able to reduce that price. The Minister of Human Resources and others negotiating for the UTA were able to get the federal government to increase their subsidy to the Ontario government and Ontario transit technology to $60 million rather than $31 million - I believe that is the figure - and also to make it part of the agreement that we would get approximately 60 percent of the fabrication of the system within British Columbia, with the opportunity to sell this technology in the future. It means we will be developing not only a modern transit system; we'll be creating industry and jobs in the private sector in British Columbia. I believe the first contract has already been awarded to a small firm in Richmond. Also we were able to buy Canadian. That serves a number of needs (Bill Bennett, Hansard: July 7, 1981).

This kind of rationale makes it difficult for the opposition to find fault with the system. It would be highly politically dangerous to argue in favour of investing the money elsewhere. And while some NDP members pick up on the fact that other technologies are manufactured in Canada, the Socreds continue to emphasize that the UTDC invented the technology and that this means that it's even more Canadian than other technologies. In actuality, earlier chapters have pointed out that the technology was actually German- that the Linear Induction Motor and initial mag-lev concept were purchased from Krauss-Maffei and only developed in Canada. However the Hansard debates never get into the nuances of this debate- instead the opposition tends to leave the Government alone when they talk about supporting Canadian innovation- misplaced as it might be.
5.2.4 Leaders in technology, the world

If the Expo was a chance to bring the world stage to Vancouver, the SkyTrain would be the perfect vehicle to demonstrate B.C’s technological superiority. It was the provincial government that did the bidding for a world exposition, and the suggestions by the UTDC that this brand new technology - the “next big thing” in transportation could find its first home in Vancouver could only improve the image of the province. The title of a 2-page spread advertisement purchased by the province in December 11, 1985- the official opening of SkyTrain- says it all: “SkyTrain! Today, British Columbia takes off for the future”. The article in the ad says: “...SkyTrain has opened up new opportunities for high technology development in B.C. Rapid Transit technology first applied in Vancouver is now being marketed around the world. SkyTrain is quite simply Canada’s most exciting new transit innovation. And together, we made it all happen” (Vancouver Sun, Dec 11, 1989). This fit in perfectly with inviting the world to see the rest of the advancements in BC. All of this is aligned with the political optimal outlined in Chapter 2.4. The public appeal of a futuristic system was emphasized as heavily as possible.

The problem with the flashiness of the new technology, however, is that it left the government open to criticisms of the risks they were taking. Government tried to focus on British Columbia’s place on the ‘cutting edge’ while at the same time, attempted to deflect criticisms that go along with untested systems. In 1980, shortly after the announcement of ALRT, Bill Vander Zalm turns on the critics by arguing that they’ve forgotten how well tested the system actually is:
Some of the negative members from the other side have stated publicly that perhaps we should not be risking something untried. They forget this system has been developed over the last seven years, and they forget that it's been tested on the Kingston track for the last several years. They forget as well that there's a guarantee that goes with the system to ensure that it will perform to our expectations, and the test period is as long as five years. (Vander Zalm, Hansard: Dec 10, 1980).

He dismisses the concerns about the lack of testing, arguing that there has been sufficient testing. Despite this, criticisms from the opposition continued: “The automated transit system may work well. It works well in their back yard where they do their experimenting. But it has never been tested. There's no guarantee that this will work any better” (Barber, Hansard: 31 March 1981) Two years later, Minister Jack Davis would still be defending that while the system may be innovative and brand new it was also highly reliable. He backed this up with claims of all the other future construction of the system- that so many other projects wouldn’t be taking off if the system wasn’t reliable:

We'll be supplying not only our own rapid transit system with a unique motor - the electric induction motor - for light rapid transit, but also Ontario and the United States. The Detroit system will use this motor. We'll produce it here in the lower mainland. The same is true of the steering mechanisms and much of the electronics in that system. (Davis, Hansard: July 18, 1982 Afternoon sitting)

As discussed earlier, the systems in the United States all failed to take off beyond the conceptual stage. Also, just because other regions were interested in the technology, that does little to assuage concerns of reliability. In reality, the only certain projects by 1982 were SkyTrain, the small Scarborough RT and the downtown loop in Detroit. From
a technical perspective neither of these other systems provide enough evidence of reliability.

5.3 Summary

Despite all the debate in the provincial legislature, it was never likely that the Socreds were going to change their minds about SkyTrain. They held a majority government, they had a tight timeline due to Expo and they had control of the funds. Just as the literature indicated earlier in Chapter 2, a system like ALRT with its automation, its speed and it being the first construction of RRT in Vancouver meant that it was very attractive to residents of the city. The NDP approach to the debates in Hansard seems scattered. At times there are highly rational, well-informed questions that touch on questions of risk, cost, claims about technology and regional governance. However, at other times, the debate falls into name-calling and idle threats and continued claims that the Socreds would never end up building any transit system.

Ultimately, the speed at which the government moved on the project was so great that there was no time for meaningful debate. All debate occurs after announcements- for example, the technology choice is announced, and then ALRT is debated. This leaves the opposition party with little to do other than to find fault with the actions of the government, and complain about them.

The arguments presented in favour of SkyTrain by the provincial government fall under the category of political optimality. The main forum for public debate- the legislature, failed to get into the more nuanced issues of reliability, proprietary system,
later expansion and technical features. The repeated answer to all criticism is that ALRT is the ultimate technological solution, the best of the best, and is therefore what Vancouver deserves. This over emphasis on technology and lack of consideration of the technical deficiencies has led to a system that works but which has failed to be adopted by any other region.
6 CONCLUSION

The literature related to transit planning and selection of optimal transit systems is diverse in the number of potential approaches. I used the literature available to create two distinct frameworks. The first framework collected together the technical features of the three rail rapid transit options for the region. The second framework collected literature relating to how the ‘optimal’ transportation system is defined from both a technical and a political perspective and what differences are present between the two. My data collection involved approaching the three major players in the SkyTrain story: the UTDC, the regional government (GVRD) and the provincial government. I compared my findings from this data to what I had compiled in the literature and then defined the perspective of each of these policy actors based on the political or technical framework. My findings are that a political body can use a technical framework to select an optimal system, as evidenced by the GVRD’s selection of LRT as the best system for the region. However, because of the need for funding from higher levels of government there is a greater chance that systems are chosen based on their political appeal. This has the potential to result in a lack of proper consideration of the benefits and disadvantages of any given transit system.

The limitations of this research are related to my limitations in data collection. I had difficulty interviewing some key players from the case study due to death or lack of contact information due to the amount of time passed. Also, I was unable to prove
some theories that I came across during my research due to lack of data. I attempted to access data through the Freedom of Information Act but was unsuccessful because I could not narrow down where the correspondence I was seeking was located. Also, because so much of my analysis is based on what was in Hansard, I understand that I could be missing out on private discussions and debates within the Sacred party itself. A further attempt to access documents through freedom of information could yield more information on this case study- including the rationale behind the selection of ALRT and any incentives from the Ontario government for choosing it.

The implications for urban policy from this research include the need for better structure in transportation planning between the regional government and the province. Even without better communication between these two levels of government, this project demonstrates the need for transit construction to be properly evaluated through a technical framework. My findings are that the decision was too heavily influenced by the politics of a few individuals rather than the technical merit of the system. A large investment in infrastructure should not be left to chance or whim, and a new technical evaluation should be done for all expansions and line construction- even expansions of existing SkyTrain lines.

Transit systems are megaprojects, requiring large investments and, especially in Canada, multiple levels of government. This makes them highly attractive to governments because of the media attention and public support that often comes from the construction of a transit system. However, this attention can lead to distractions in the decision-making process. I conclude that a region’s decision on a transportation
mode should be based on the technically optimal framework and that the transportation planners and the politicians should be well-versed in the all abilities of the different transit options. Ultimately the Socred government got too caught up in what was best for them politically: the attractive, new, futuristic transit system and dismissed the technically optimal alternative of LRT.

It is not necessarily the case that the political and the technical optimal be contradictory. The GVRD had already conceived of the LRT plan before the introduction of ALRT. For Vancouver, a city without any rail rapid transit, the construction of LRT would still have been a mega-event. It would have required large financial investment, ground-breaking opportunities and have likely been well-received by the public. I argue that it was not necessary to introduce as futuristic (and therefore untested) a system as ALRT just to capture the public’s imagination as Gray and Hoel (2007) argued that bigger transportation systems do.

The Social Credit government presented numerous arguments in favour of ALRT throughout multiple data sources. However, each of the arguments they presented in favour was just as applicable to the alternative of LRT. It can be grade separated, it would have created numerous construction and operation jobs, it could be purchased in Canada. The idea that BC would become a world leader in transportation technology was again based in political ideals rather than on any technical evaluation of the product.

The Urban Transportation Development Corporation was a politically run organization disguised as a technical transportation developer. The organization got
locked-in to a technology and a concept there were impractical. They built a system with a linear induction motor that is better suited to maglev applications. Their concept of an intermediate capacity system that required expensive infrastructure costs like elevation failed to become popular.

On August 17, 2009, thousands of people lined up at Vancouver’s Waterfront Station to ride the brand new Canada Line. Those familiar with the other two SkyTrain routes were likely surprised to by the look and features of the new trains. The cars on the Canada Line are significantly wider than those on the Expo and Millennium Lines. From the inside of the cars the ride is much quieter than that of the SkyTrain ride. Many riders will also notice that while the new Canada Line is in the same station as the Expo Line, the two lines are disjointed- the trains do not run on the same tracks and riders must transfer from one set of tracks to another. All of these features are due to the fact that the Canada Line is a reversion back to the original heavy rail technology. After 25 years of relying on ALRT, the region changed technology and technology suppliers, joining many other cities in the construction of heavy rail. On the day SkyTrain opened in 1985, the headlines declared: “SkyTrain! Today British Columbia takes off for the future”. In 2009 SkyTrain abandoned the ‘future’ in favour of the less expensive and more widely sourced electric traction.
# APPENDIX A

## Table 3: Sample of Methodology for collecting Hansard references

<table>
<thead>
<tr>
<th>Title/Year</th>
<th>Author (Who Said it)</th>
<th>Context</th>
<th>What was Said</th>
</tr>
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<tbody>
<tr>
<td>1982 Legislative Session: 4th Session, 32nd Parliament</td>
<td>Curtis, Hugh Austin (Minister, SC, Saanich and the Islands)</td>
<td>Budget Announcement</td>
<td><strong>Keywords:</strong> projects underway, $3.6 billion capital spending program, 40,000 jobs, including LRT system for greater Vancouver region, province with leadership role, Expo 86, light rapid transit system, historic undertaking, Annacis Island Crossing, substantially ease traffic congestion in southern part of Vancouver urban region, grants for transit less than 12%, high quality transit services not jeopardized. <strong>How it's used:</strong> LRT mentioned in passing in budget speech - in reference to jobs, investment, there are limitation to transit grants, but that services should not be affected.</td>
</tr>
<tr>
<td>1982 Legislative Session: 4th Session, 32nd Parliament</td>
<td>Hewitt, James J (Honorable, SC, Boundary-Similkameen)</td>
<td>Gov't support: Budget</td>
<td><strong>Keywords:</strong> ALRT (automated light rapid transit system), $718 million between 1981 and 1986, 1,700 on-site construction jobs, 1,000 jobs in manufacturing sector, Bill Vander Zalm, ALRT, modern transportation, modern city. <strong>How it's used:</strong> Discussion of the items above to support the budget - extremely positive.</td>
</tr>
<tr>
<td>Year</td>
<td>Session</td>
<td>Parliament</td>
<td>Official Report Reference</td>
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| 1982                | 4th Session  | 32nd       | HANSARD                   | Thursday, April 15, 1982 | Ritchie, William S (SC, Central Fraser Valley) | Gov't support: Budget       | **Keywords:** great projects, ALRT, 1,700 jobs, oppose NDP motion of non-confidence  
**How it's used:** Passing reference to why the budget should be supported regarding the mega projects of the gov't and the jobs that are going to come about with these projects. Also makes passing reference to the NDP motion of non-confidence that must have come about from the budget?                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                           |
| 1982                | 4th Session  | 32nd       | HANSARD                   | Thursday, April 15, 1982 | King, William Stewart (NDP, Shuswap-Revelstoke) | Budget discussion; NDP non-confidence motion | **Keywords:** billion dollars necessary for development in Vancouver, Transpo 86, askew priorities, exhaustion of provincial and federal funds, rural communities, equity,  
**How it's used:** Argues that the NDP position is that the Social credit p.o.v is askew, and that the money being given to these mega projects should be spent on other important issues, and makes emphasis of rural communities                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                           |
| 1982                | 4th Session  | 32nd       | HANSARD                   | Friday, June 4, 1982   | Lorimer, James (NDP, Burnaby-Willingdon) | Bill debate (Special Fund)  | **Keywords:** UTF, $55 million for transit, get publicity, Social Credit Party, lack of commitment to transit problems  
**How it's used:** Questions about the UTF and whether it was for anything other than publicity                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                           |
| 1982 Legislative Session: 4th Session, 32nd Parliament | Davis, Jack (minister, SC, North Vancouver-Seymour) | response | Keywords: $39 million on 114 cars, physical work, $11 million for 1 km of line, $50 million into a $400 or $500 million expenditure, all rights-of-way decided on, exception: 4 block section on Commercial drive in Vancouver East, 1/3 of the way into the program, on budget, on time, $350 million contract with Metro-Canada, binding provincial authorities and Ontario, commitments made, no turning back  
How it's used: Explains the financial commitments to date, and how those demonstrate that the project is obviously going ahead. gives an estimate on total expenditure, that there is a contract with Metro-Canada binding the two provinces, there's no real way to turn back |
| --- | --- | --- | --- |
| 1982 Legislative Session: 4th Session, 32nd Parliament | Lorimer, James (NDP, Burnaby-Willingdon) | response | Keywords: transit not priority, what is budget, what's the time frame, proper rail system would have been in, no movement on transit  
How it's used: questions commitment to transit, asks about budget and time frame: "I've watched this cabinet for seven years, and the top priority isn't transit" |
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