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Occasioning Dialogic Spaces of Innovation: The pan-Canadian EHR, Infoway and the Re-Scripting of Healthcare

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Graduate Program in Business

A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy

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OCCASIONING DIALOGIC SPACES OF INNOVATION:
The pan-Canadian EHR, Infoway and the Re-Scripting of Healthcare

(Spine title: Occasioning Dialogic Spaces of Innovation)
(Thesis format: Monograph)

by

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Graduate Program in Business Administration

A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

The School of Graduate and Postdoctoral Studies
The University of Western Ontario
London, Ontario, Canada

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School of Graduate and Postdoctoral Studies

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The pan-Canadian EHR, Infoway and the Re-Scripting of Healthcare**

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Chair of the Thesis Examination Board

Abstract and Keywords

The Canadian public healthcare system, well known internationally for its pioneering role in socialized medicare, currently appears to be under considerable strain. Escalating costs, dwindling budgets, growing patient dissatisfaction, aging baby-boomers, and increasing levels of chronic disease are just a few of the systemic pressures that have called into question our current ways of delivering healthcare. As a consequence, there is a growing recognition that renewal is needed, and that this renewal, to be successful, should meet the needs of a wide array of stakeholders, hence calling for unprecedented levels of consultation among increasingly fragmented interests.

In order to bring about this renewal, the federal government seems to be intent on implementing a pan-Canadian electronic health record (EHR) system. To that end, in 2001, Canada Health Infoway was born out of a novel collaboration between federal and jurisdictional health ministries with the specific mandate to accelerate the implementation of EHRs across Canada. In this thesis, I use material-semiotic and dialogic approaches to gain a more nuanced understanding of how the pan-Canadian EHR system is unfolding and in what ways Infoway is trying to accelerate that unfolding.

My analysis suggests that a seemingly uncontested focus on an IT-oriented solution depends on the understanding that the healthcare system's problems are mainly informational by nature. Hence, Infoway initially played the role of a strategic investor by investing specifically in those projects that promoted pan-Canadian interests. However, it seems that in recent years Infoway has come to the realization that any process of innovating should be inherently dialogic. Using the pan-Canadian EHR to occasion dialogic spaces and materialize new meaning seems to be one way that Infoway is initiating such a dialogic process, but there also appears to be others.

I conclude by suggesting that a more dialogic approach to innovating, in which the innovator focuses on finding various ways to occasion dialogic spaces, may better foster the creation of new meanings of the innovation and therefore result in a more, and not less, harmonious change process. In this way, innovation becomes accelerated. Furthermore, through these dialogic spaces, it is not just multiple meanings of the innovation that are being occasioned, but the innovation itself seems to become more meaningful.

Keywords

collaborative change, cultivation, dialogic spaces, electronic health records, technology-based innovation

*All else is means; dialogue is the end.
A single voice ends nothing and resolves nothing.
Two voices is the minimum for life.*
Mikhail Bakhtin

*For Tabasum, Imaan, Aqsa and Ali...
... Without saying a word,
You have been my oh so gentle other voices,
Nudging me on and on and on...
Yet leaving me space to imagine and draw out my own meaning,
And in this process, I got to better know myself,
And then, and then only, was this matter ready to be resolved...*

Acknowledgements

When you take seven years to finish a dissertation, you have many people to thank. In my case, I have many human and non-human actors that enabled me to produce what has materialized before you. Without them, I would never have been able to finish and in many ways, this has really been a joint effort.

I must begin by thanking my dear teacher Dr. Abhijit Gopal. From Day One he treated me as an equal by respecting me for my potential and by nurturing the inner curiosity that he recognized within me. Through the course of writing this thesis, he was not only my mentor but he became my closest friend and life coach. He brought new spirit to the word teacher, a spirit that I will take forward as I come to have my own students. We went through a lot together to get here. Many coffee shop meetings and countless other crises along the way, but in the end, we learned a lot and we lived a lot. I look forward to what the future holds for the both of us as we chart our own entangled destiny.

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request for me to go to the website www.saynotothesis.com. In his own way, he was telling me that enough was enough. Thank God I listened. I am so looking forward to being there for them in the future and helping them grow into the kind of responsible human beings that I know they will one day become.

I must also thank with all my heart my dear and very wise parents, Hadi and Niloufer Saeed. They have always inspired me to be the best that I can, but to do it in a respectful and loving way. My father has taught me that you do what needs to be done to get the job done but in a proper way. My mother has supported me, financially and emotionally, whenever I need her shoulder. In Islam, we have a saying that ‘Paradise lies at the feet of the mother’. Now, I am really starting to understand what that means. My brothers Asker and Haider have also been inspiring, as I have enjoyed their many successes. My in-laws were always willing to look after my children to give me the space I needed to work on my thesis. I owe them a lot and as my dear brother-in-law Musharaf would say, I owe him a lot of babysitting.

Next, I must thank my colleagues, only a few of which I will mention now. I have chosen to divide them up (in no particular order) according to the dialogic spaces that I would usually encounter them in: My Desi Inner Circle: Arjun, Hari, Manpreet, Chetan, Bharat, Dev, Suhaib, Israr, Fuad and Saqib. My Ivey Mates: Yinglei, Zeying, Dan, Sunil, Marie-Claude, Hannah, Eric, James, Geoff, Laura and Teresa. My Shee-sha brothers: Samer and Pouya. My ANTERS: Farrukh, Richard and Julia. My Laurier Brantford colleagues: Rosemary and Lamine. A special thanks to Chetan and Arjun for helping me get the final manuscript ready. Also, a special thanks to Mahillah for always taking the time to offer me some useful advice. Finally, a very special thanks to Samer Abdelnour who through this thesis writing process became my brother from another mother.

I must also thank those many non-human actors who contributed to my success, only a few of which I will mention now. My notebook (immutable mobile) that I carried around everywhere I went. My whiteboard (mutable immobile) upon which I scribbled down insights and then gained intellectual freedom by being able to erase those insights days later. The countless dialogic spaces, mostly located in coffee shops, where Abhijit and I

had very spirited and thought provoking dialogues about my thesis but even moreso about life and purpose. He listened to me and I listened to him. This thesis is the end result.

Above all, I must thank the Higher Power, which is not just out there but within all of us. I know that there must be some reason why I was attracted to Ivey and why despite all adversities stuck behind Abhijit as my supervisor. Besides my new formal designation, most importantly, I now have the self-confidence to go out into the world and make my voice heard. My journey has just begun. It is with this one brave act that I have come to realize who I am. And, frankly, I am starting to like what I see.



Source: eHealth Ontario

Figure 1: We're Modernizing Healthcare

*There is nothing more difficult to handle, more doubtful of success
and more dangerous to carry through than initiating changes...
The innovator makes enemies of all those who prospered under the old order,
and only lukewarm support is forthcoming
from those who would prosper under the new.
Their support is lukewarm partly from fear of their adversaries,
who have the existing law on their side,
and partly because men are generally incredulous,
never really trusting new things unless they have tested them by experience
(Machiavelli, The Prince, 1515)*

TABLE OF CONTENTS

CERTIFICATE OF EXAMINATION	ii
Abstract and Keywords.....	iii
Acknowledgements	vii
TABLE OF CONTENTS	xi
List of Tables	xiv
List of Figures.....	xv
List of Appendices.....	xvi
The Cast: three principle* and many secondary actors.....	xvii
A Preliminary Note on the Organization of this Dissertation	xx
Chapter One: Controversy.....	1
<i>‘Contract scandal \$451,000 exit’</i>	<i>4</i>
<i>‘eHealth operation bled \$1B’</i>	<i>5</i>
<i>Auditor General of Ontario’s Report</i>	<i>11</i>
Chapter Two: The Setting.....	17
2.1 The Canadian Healthcare System	19
Canada Health Act.....	19
Major Stakeholders.....	23
2.2 The pan-Canadian EHR	24
First Translation: From Paper to Digital.....	27
Second Translation: From Local to pan-Canadian.....	33
2.3 Canada Health Infoway	36
Governance Structure	36
Business Strategy	38
Strategic investor role.....	39
Other roles.....	42
Vision 2015.....	45
Chapter Three: Mapping Controversy	47
General Research Approach	48
Actor-Network Theory	50
Some Nuances of Actor-Networks.....	52
Decentering the Object	53
Drawing with a Pencil	55
Describing the Collective.....	58
Research Questions.....	60
A New Research Question Emerges	65

Data Collection	67
The Scope and Scale of this Research.....	70
Data Sources used for this Research.....	71
A Note On My Research Method	77
Chapter Four: Locating Meaning in the Innovation Process	79
4.1 Diffusion of Innovation	81
4.2 Technology Adoption.....	85
4.3 Narratives of Organization	87
4.4 Boundary Objects.....	90
4.5 Visions of Innovation	92
4.6 Affordances	93
4.7 Locating Meaning Elsewhere?	97
Chapter Five: The Mattering of Innovation.....	99
<i>Narrative #1: A Coke bottle in the Kalahari.....</i>	<i>104</i>
<i>Narrative #2: Bush pumps in Zimbabwe</i>	<i>110</i>
<i>Narrative #3: Bridge Building</i>	<i>112</i>
<i>Narrative #4: British freezers</i>	<i>114</i>
Chapter Six: Settling the Matter - Making an Indisputable Case for EHRs	118
Fact 1: <i>Health care is fragmented, <u>We</u> must collaborate!</i>	119
Fact 2: <i>This fragmentation problem is informational by nature, <u>We</u> need I.T.!</i>	123
Fact 3: <i>The EHR will integrate healthcare information, <u>We</u> will get reformed!</i>	128
<i>And now, for the indisputable conclusion: If <u>We</u> accelerate EHR implementation, reform will be accelerated!</i>	140
Chapter Seven: Doing Innovation – Re-Scripting the Healthcare System.....	142
Inscribing the pan-Canadian Vision.....	146
Intermediaries.....	147
Scripting Infoway.....	148
Infoway Scripting.....	153
Scripting Human Agents	154
Scripting Non-Human Agents.....	156
Scripting Money	157
Scripting Texts.....	159
Scripting Technical Artifacts	164
Chapter Eight: Undoing Innovation – Occasioning More Dialogic Spaces.....	170
Innovation Translation	171
Heterogeneous Engineering.....	176
Infoway’s Problematization of the Pan-Canadian Vision	178
Occasioning More Dialogic Spaces	185
MARC HI project	189
Pan-Canadian Standards Collaborative.....	193
Re-Inventing Infoway.....	197

Re-organization	200
Looking for new sources of funding.....	201
Reflecting on core competence.....	201
A More Dialogic Approach to Innovating	202
Chapter Nine: The Future is Now!.....	206
9.1 Practical Insights	209
Activating the Vision.....	211
Cultivating for Emergence.....	212
Being a Mindful Innovator.....	215
9.2 Theoretical Insights.....	221
Thinking Condition Effect	223
Occasioning Dialogic Spaces of Innovation.....	232
Technology as a Materialization of Meaning.....	234
9.3 Methodological Insights	236
Visions of the Present not the Future.....	237
Mapping Controversy	238
The Dialogic Dissertation.....	239
9.4 Conclusion.....	242
Briefly Revisiting the Research Questions	243
Limitations and Future Research	246
Abnormal Discourse	247
<i>A Short Reflection on the Thesis of My Meaning</i>	251
Appendix 1: Infoway’s ‘Knowing is Better than not Knowing’ campaign.....	252
Appendix 2: Working Definitions of some ANT Concepts	253
Appendix 3: Corollary questions pertaining to Sociologics	255
Appendix 4: Infoway’s Problematization	257
References	261
VITA.....	282

List of Tables

Table 1: Chapter Mapping	xxi
Table 2: Canada Health Act	20
Table 3: Stakeholder Concerns	24
Table 4: Infoway's Various Roles	44
Table 5: Five Key Priorities	45
Table 6: Research Interviews.....	73
Table 7: Supplementary Reports.....	74
Table 8: Collaborative Vision.....	146
Table 9: Translation Perspective.....	173
Table 10: Monologic & Dialogic Spaces.....	188
Table 11: Standards Collaborative Corporate Members.....	193
Table 12: Pan-Canadian Standards	195
Table 13: Project Characteristics	197

List of Figures

Figure 1: We're Modernizing Healthcare	x
Figure 2: Obligatory Point of Passage	129
Figure 3: Infoway's Problematization	182

List of Appendices

Appendix 1: Infoway's 'Knowing is Better than not Knowing' campaign	252
Appendix 2: Working Definitions of some ANT Concepts.....	253
Appendix 3: Corollary questions pertaining to Sociologics	255
Appendix 4: Infoway's Problematization	257

The Cast: three principle* and many secondary actors¹

Canada Health Act: Canada's federal legislation for publicly funded health care insurance. The CHA embodies the spirit of universal healthcare in Canada.

Canada Health Infoway*²: An independent not-for-profit corporation created by Canada's First Ministers in 2001 to foster and accelerate the development and adoption of electronic health record (EHR) systems with compatible standards and communications technologies across Canada.

Canadian Public: The Canadian public has an extremely important role to play in the renewal of the Canadian healthcare system. Unfortunately, at the present time, they seem to have been relatively uninvolved in any kind of meaningful dialogue. More often than not, it is others who seem to be representing their views and interests. Whether those others are the media or doctors or whoever, the question remains as to whether this representation is in fact 'good'³ representation.

EMR: The Electronic Medical Record is a local version of a patient's health record that is usually kept in a hospital or a doctor's office. It is not usually compatible across the healthcare system and thus does not have the capacity to follow the patient.

eHealth Ontario: An Ontario based provincial agency with the mandate to harness IT and innovation to improve patient care, safety and access in support of the Ontario government's health strategy.

¹ Actors are "entities that do things" (Latour, 1992a, p. 241) and, as such, can be of a human or non-human nature.

² I realize that when I discuss Infoway, in this thesis, I tend to assume that it is a unitary body. I do this simply for the ease of getting my points across to the reader. I fully acknowledge that Infoway itself is made up various interests, some formal and others informal. My intent has been to present an overview of how I see innovation happening in this sector and what Infoway's role has been. As a result, I acknowledge my own bias towards painting a more formal picture of how things are unfolding.

³ By good representation, I mean authentic representation i.e. in the best interest of the public. I realize that I am somewhat reifying the public as if it was a unitary body, however I do acknowledge that there are many types of interests held by many different groups in the public. My point is simply that their interests, whatever they may be, are being represented by others (in a good or bad way) and will continue to be as long as the public is unable to find a way to voice their opinions and be involved in the dialogic space.

HL7v3: An international set of open standards for communication that allows health information systems developed independently to automatically "talk" with one another. Even though version 2 is the most commonly used in the world, version 3 is the most advanced as it includes, among other things, object-oriented principles. Canada has made the decision to adopt version 3.

Innovation: A new or better way of doing something. It is not limited exclusively to products, but may also include improved processes, practices, ideas, policies, standards and models.

MARC HI Project: (Mohawk Applied Research Center in Health Informatics). Housed at Mohawk college in Ontario, the project focuses on testing pan-Canadian standards in order to help them become Stable for Use.

Pan-Canadian EHR*: Canada's Electronic Health Record will be a secure and comprehensive electronic record of a person's critical health history that can be accessed and shared by authorized health care providers - doctors, nurses, lab technicians, and so on - in provinces and territories across Canada. This record will contain a subset of the information contained in the EMR i.e. only that information that has direct relevance to a patient's encounter with the healthcare system. No pan-Canadian EHRs are in use at the present time.

Pan-Canadian Vision of Healthcare*: The pan-Canadian vision of healthcare involves collaboration, cooperation and integration of healthcare information and care practice across jurisdictions. In my narrative, the pan-Canadian vision will be competing for survival against the more fragmented and established working script in healthcare.

Standards Collaborative: A collaborative made up of public and private stakeholders that are supporting and sustaining pan-Canadian health information standards. Various working groups have specific responsibilities for different areas of the standard.

Vision 2015: A document commissioned by Infoway, and created by McKinsey, to communicate their vision of what the healthcare system could look like in 2015 if

everyone was to do their part. Importantly, it also presents a strategic plan of what needs to be done to get there. This document is available publicly at Infoway's website: www.infoway-inforoute.ca.

A Preliminary Note on the Organization of this Dissertation

⁴Before getting started, I feel that the organization of this dissertation deserves a brief word since it tends to deviate a little from the usual way that a thesis is written. Usually, a thesis follows an explicit structure of introduction, literature review, theory and methods, data, analysis, discussion and then conclusions. Even though I have tried to retain some semblance of this general order, I have preferred to let the narrative unfold in a way that reflects my own journey of discovery as I attempted to understand how the pan-Canadian EHR system was unfolding and what role Infoway was endeavoring to play in that unfolding. My hope is that this approach will entice the reader to follow along with me, step by step, also discovering as we go along.

One of the consequences of letting the narrative unfold in its own way is that the thesis document has become rather lengthy to accommodate a fair amount of meandering. The reader will also find that the chapters are somewhat curiously named. Therefore, I am providing below (Table 1) a chapter mapping to help readers maintain their overall bearings while navigating the content of this thesis. This overview indicates how the chapters in my thesis relate back to the chapters that you would expect in a more traditional-looking thesis. A short description is included.

Latour makes a useful distinction between complexity and complicatedness that I think nicely helps to clarify my overall intent for this thesis:

"Complex" will signify the simultaneous presence in all interactions of a great number of variables, which cannot be treated discretely.
"Complicated" will mean the successive presence of discrete variables, which can be treated one by one, and folded into one another in the form of

⁴ At particular times in this thesis, indicated by italics, I may address the reader directly in a less formal way. My intention is to provide some road markers to help the reader navigate the more formal sections of the thesis. In this way, I hope the reader is also able to gain some access to my thinking as I worked my way through this thesis.

a black box. Complicated is just as different from complex as simple is.
(Latour 1996b: 233)

My primary intent is not to simplify what I consider to be an inherently complex topic area by cutting away much of the story that is critically relevant. I do, however, wish to tell a ‘complicated’ story, preserving much of the inherent richness of the situation, but relating it to the reader in such a way so as to make it more comprehensible. Therefore, I ask my reader to be patient with me and with my thesis, trusting that it will all come together in the end. In other words, there may be times when the reader will feel like they are ‘out in the desert’ with no signposts to be found (as one of my preliminary readers has already pointed out to me). In my mind, a little space is not necessarily a bad thing.

Usual Thesis	My Thesis	Description
Chp 1: Introduction	<i>Chp 1: Controversy</i>	<i>A narrative that navigates through some of the current controversy in the healthcare sector</i>
	<i>Chp 2: The Setting</i>	<i>Introduction of the Canadian healthcare system, the pan-Canadian EHR and Canada Health Infoway</i>
Chp 2: Literature Review	<i>Chp 4: Locating Meaning in the Innovation Process</i>	<i>Review of how we have come to understand meaning in the innovation process</i>
Chp 3: Theory and Methods	<i>Chp 3: Mapping Controversy</i>	<i>Research approach, method and questions</i>
	<i>Chp 5: The Mattering of Innovation</i>	<i>Four narratives that gently introduce an entanglement view of innovation</i>
Chp 4: Data	<i>Chp 6: Settling the Matter</i>	<i>How an indisputable case has been made for EHRs</i>
Chp 5: Analysis		<i>How the healthcare system is being re-scripted</i>
Chp 6: Discussion		<i>An argument for occasioning more dialogic spaces in the innovation process</i>
Chp 7: Conclusion	<i>Chp 9: The Future is Now!</i>	<i>Practical, theoretical and methodological insights that emerge from this thesis work</i>

Table 1: Chapter Mapping

Overall, I hope to present a relatively coherent narrative in which there is ample room for my reader to arrive at his/her own conclusions about the evidence and arguments that I have presented. In this way, I hope that my dissertation is able to enter into some form of 'hybrid utterance' (Bakhtin 1975) that manifests itself somewhere between my intention and my reader's interpretation. When all is said and done, I think I will have succeeded if I am able to relate a reasonable but complicated and thought-provoking narrative not according to some super-imposed explicate order, but by helping the innovation reveal itself, on its own implicate terms, in its intra-active becoming (Barad 2003).

Chapter One: Controversy

By way of introduction to my general topic area, I have chosen to focus on two particular controversies surrounding the eHealth reform initiative. I do not claim that these two controversies are necessarily representative of the larger field of controversy in the healthcare sector. More simply, they both came to my attention at the same point in time, in a mundane setting, and they therefore made me reflect a little upon their meaning. Hence, they are both significant to me in my story as in some ways they helped to write me as I wrote this thesis. As I dig deeper into these controversies, I hope to present some of the positions held by various stakeholders and to also give the unfamiliar reader a better sense of some of the inherent tensions that exist in this sector. I request the reader to remember that this is my dig and therefore is by no means a definitive dig...it is simply one possible dig. I hope that this narrative will also serve to place me not just as inquisitive researcher but also as concerned stakeholder squarely within a healthcare system that I am not only tasked to understand but in which I too am an integral part of and value so very much. Therefore, my own reactions to what I experience as I write this thesis are important to account for as I struggle to understand others and myself. Above all, in the process of my thesis work, I have come to gain confidence in my academic voice and now feel that I am ready to share it with others.

con·tro·ver·sy [kon-truh-vur-see] *a debate surrounding a technique or scientific fact that has not yet been determined*⁵

London⁶ Free Press front-page headline: ‘**Contract scandal \$451,000 exit**’

Toronto Star front-page headline: ‘**eHealth operation bled \$1B**’

It was September 30⁷ and I had just finished picking up my daughter from her karate lesson when she asked me for a drink from the convenience store next door. I do not usually walk into that particular convenience store, but on this day I was drawn to it by circumstance. Upon entering, my attention was caught by the front-page headlines of two major newspapers on a rack by the front door. I thought it was somewhat peculiar... to see something related to eHealth on the front page of both newspapers on the same day and describing two different but related controversies. After reading the headlines, my immediate thought was *why does there continue to be so much controversy in trying to implement something that seemed so good for the healthcare system in this country? What was really going on here?*

Having extensively researched the government’s efforts to bring about IT-based change in the healthcare system, I knew very well the promised benefits of eHealth in terms of multiple improvements in efficiency and effectiveness. Granted, some benefits may be questionable but others seemed to have been already partially realized in several jurisdictions. I also intuitively knew that an eHealth system could help reduce some of the approximately nine thousand to twenty-four thousand deaths that were apparently occurring each year in Canada due to medical error⁸. As one of my private sector informants had emphatically put it, ‘if there was a jumbo jet going down every week and we could stop it from happening, there would be protests on Parliament Hill until

⁵ <http://www.demoscience.org/controversies/description.php>

⁶ This is London, Ontario, Canada (my hometown).

⁷ The year was 2009.

⁸ http://www.cbc.ca/health/story/2004/06/09/med_errors040609.html

something was done about it!’ (17-15)⁹. Was this not motivation enough for everyone to work together and change the system? Was it simply that they were not seeing what I was seeing? For some time, I had been feeling that there must be a better way to go about promoting change in the system without relying almost entirely on information technology. My research background had taught me that controversies like this could be very telling, if only I was able to see through to what was really going on without being confounded by the meanings others sought to impose on the situation. In this way, I could perhaps gain some insight into the issues and therefore better understand why things were unfolding in the way that they were.

Interestingly, one of these newspaper headlines referred to a local controversy and the other one was more provincial. One was close to home and the other far, but felt close. They were not related and yet they were related. The controversies did not involve me directly but somehow it felt like they did. I did not care but I did really care. I was not connected but I was. I came to realize that the eHealth initiative was imbued with paradox, perhaps an important clue as to why it had been so difficult to bring about change in the system. I wondered if we had adequately understood the elusive nature of this paradox? Intuitively, I sensed that I would have to reflect on this paradoxical nature in a more careful and nuanced way in order to bring the root of the paradox into awareness. It seemed like this could not only help me gain insight into the controversy that I was seeing being played out in eHealth but also, importantly, insight into my own reaction to it.

I knew that I should try to resist the desire to come to any quick conclusions about what was going on, as ‘when you draw that conclusion, you terminate that insight...[you] act from the conclusion and not from the insight’ (Krishnamurti 2005: 17). Therefore, I wanted to approach this controversy without necessarily believing, as many others had done, that the contract scandals were simply a sign of widespread abuse that could be rectified with stricter policy and more bureaucracy. In this way, I would be able to better attend to the evidence of *what* was going on by suspending my inclination to conclude

⁹ I will be using this notation (x:y) to denote the interview number and page number in the transcript that contains the particular quote.

why it was going on. Intuitively, I knew the why question that interested me was to ‘understand why’ this was happening by closely attending to effects, rather than to ‘explain why’ this was happening by searching for causes.

‘Contract scandal \$451,000 exit’

The first headline referred to a local contract scandal that had occurred at the London Health Science Centre (LHSC), which resulted in the CIO, Diane Beattie, losing her job. She was entitled to receive severance pay amounting to \$451,000, hence the newspaper headline. In the past, Beattie had been lauded as an outstanding executive who played a key role in creating one of the country’s leading region-wide systems of electronic health records. As a forward thinking innovator and champion of healthcare information technology at the regional level for many years, she had put the LHSC much ahead of most comparable institutions in terms of the innovative use of technology to deliver better healthcare.¹⁰ Indeed, when I had interviewed her as part of my thesis work, she came across as being very competent and extremely knowledgeable.

After it was leaked to the media that she had not followed proper procedure by awarding several untendered contracts, Beattie decided to resign her position. She stated that she was not resigning in reaction to the scandal, as she had not personally benefited from any of the contracts and therefore believed that she had done nothing wrong¹¹. However, she felt that she had lost the confidence of the Board, which she knew would have made it very difficult for her to continue doing her job effectively.

Beattie released a statement to the media some weeks later critiquing the system she had struggled within for many years in order to bring about change¹². She stated that the public sector procurement process was in dire need of reform, especially in cases where there was a critical demand for scarce resources. In such cases, she felt that quick procurement decisions were a must in order to secure the experts with the required skills to manage complex, high-risk, high-cost implementations that were typical in the

¹⁰ <http://www.lfpress.com/news/london/2009/09/25/11111941-sun.html>

¹¹ <http://www.lfpress.com/comment/2009/10/27/11541906.html>

¹² Ibid

healthcare sector. In her opinion, the current system impeded such quick decisions from being taken, which is why she had admittedly not followed proper procedure in hiring some contractors in the first place.

Beattie also importantly pointed out that even though a lowest-cost bidding process worked for most general hospital operations like linen services, ‘we would not want our hospitals to hire the cheapest brain surgeons, but we demand it when it comes to complex technology’¹³. By alluding to this misalignment of expectations, she was implying that we really needed a change in approach and mindset when it came to technology-based reform in the healthcare sector. Our old, well-worn approaches (Zuboff 1995) seemed to be hindering progress, as often times ‘yesterday’s meaning becomes today’s dogma’ (Bohm 2004: x). She also acknowledged that making such change happen, by using technology as a trigger, was not easy as there were many challenges to getting people who were used to being more independent to collaborate. She remarked that ‘where deep traditions of independence and autonomy are threatened by change, it is not reasonable to expect everyone to support the path to a shared future...when you add a layer of technological change on top of that anxiety, one that will accelerate and deepen that integration process, you increase the risks any shared project faces’¹⁴. Interestingly, from Beattie’s point of view, technology was aggravating the integration process not causing it. In other words, technology appeared to be one of the factors that were triggering change in the healthcare system but indeed there were others.

‘eHealth operation bled \$1B’

The second headline involved a situation that, in terms of money, was many orders of magnitude more controversial. The headline referred to the Auditor General’s report that critiqued Ontario’s ongoing push to implement information technology in the healthcare system and particularly the ‘cash it threw at the problem’. The media’s choice of several words in the article, like ‘bled’ and ‘threw’, seemed to reflect the public sentiment that the government was spending large amounts of money on the eHealth initiative without

¹³ Ibid

¹⁴ Ibid

adequately understanding why what they were doing was not working very well. The Auditor General would be reporting findings that Ontario taxpayers paid over \$1 billion for a system with little to show for it.

A few months earlier, a scandal at eHealth Ontario had claimed the jobs of its chairman Alan Hudson and CEO Sarah Kramer. This scandal was in some ways like the one Beattie had been involved in at LHSC as it also involved allegations of improper contracting procedures. Hudson, the Ontario Premier's handpicked choice to technologize healthcare in the province, and Kramer were both very accomplished change-makers in the healthcare environment. Now, they were casualties of the scandals and hence no longer in a position to lend their expertise and experience to the eHealth initiative. Even the sitting Health Minister David Caplan would be forced to resign over the controversy. Also, in the auditor's report, many consultants came under scrutiny. Some were being paid upwards of \$2,700 per day while at the same time expensing a \$1.65 tea! (It is interesting how this logic implies that if they had not expensed the tea then everything would have been fine). The eHealth initiative was becoming increasingly messy and controversial. Fortunately, Actor-Network Theory, a socio-technical research approach that I had been involved with for many years, was especially well-suited to making sense of these types of messy situations (Law 2004). As a result of seriously attending to what was going on, and therefore trying to see through to what is, I started to feel like I was able to gain some clarity in my own thinking.

The first thing that became evident to me was that vast amounts of money were being spent in the government's efforts to transform healthcare. This was quite telling, especially in these recessionary times, as it indicated how interested the government was in making progress on this initiative. Smart Systems for Health Agency, the predecessor of eHealth Ontario, had already spent \$850 million towards the eHealth initiative. Also, the salaries of executives reflected the need to attract competent and qualified people. Dianne Beattie, ex-CIO of LHSC, had been making \$260,000 per year and Sarah Kramer, the ex-CEO of eHealth Ontario, had been making \$380,000 per year. Kramer also received an \$114,000 bonus just four months after she started. Dr. Alan Hudson had

agreed to work pro bono when he joined eHealth Ontario but promptly retired after the scandal broke to the media. Consultants were being paid thousands of dollars per day and outrageous stories kept surfacing that seemed to disgust the public. For instance, there was a story about a consultant who ‘consulted to herself and then followed up with questions for herself’¹⁵. There seemed to be a lack of qualified personnel to get the job done, which prompted the need to pay rates that would lure them away from other projects in the private sector. Overall, it was quite evident that large sums of money were being spent in an effort to technologize healthcare because it was an extremely important initiative to the future of this country.

I did not intend to pass judgment¹⁶ on whether consultants were being paid more than they should be or whether we, as taxpayers, were getting good value for our money. I believe that the answer to such questions would be determined afterwards by the way that the eHealth initiative unfolded and what came to be accomplished through this process. I was more concerned with trying to gain a sense of ‘what was’ going on and, in so doing, I hoped to draw attention to ‘what was not’ and then perhaps open the possibility to consider ‘what could be’.

As the spending of large amounts of taxpayer money came under public scrutiny, the public seemed to become progressively more discontent. This sentiment was even more intense as many public services were being cut back in other areas due to a lack of adequate funding. However, as I took into account my own reaction to the controversy, I wondered if the public was really dismayed over the large sums of money paid out or more so by the fact that this public money was being spent in what they sensed was a wasteful manner as very little seemed to be getting accomplished. Indeed, builders of large-scale technological systems have to ‘call upon a wide variety of skills to manipulate a broad range of technical, scientific, economic, political and social elements to ensure that the technology they promoted *would be seen to “work”*’ (Mort 2002: 31, emphasis

¹⁵ Tanya Talaga, Toronto Star, June 5 2009.

¹⁶ One of my supervisory committee members raised the point that by bringing up this issue, in the way I have, I was in fact passing judgment. I accept that critique. My intention was more to make the observation that vast amounts of money were being spent on healthcare reform and therefore it must be an important concern.

added). However, from my point of view, the cause of this angst was not as revealing as the angst itself. In spite of these controversies, and other previous controversies, the efforts to transform healthcare continued¹⁷ with a few individuals being blamed and more governance being put in place to ensure that it did not happen again. Despite their angst, the public was still in support and large sums of money were still being spent¹⁸. By carefully attending to this effect, I came to what I thought was another important insight.

The healthcare system was of great concern to the public *because it was a public space*. Such public spaces are physically found in neighborhoods in the form of a park or a market. Public spaces are open spaces that hold strong social value by contributing to people's attachment to their locality and providing opportunities for socialization. These spaces represented a place 'where a range of interests...are able to converge and evolve' (Dines and Cattell 2006:x). Overall interest in a pan-Canadian healthcare system involved more than just the interests of governments, healthcare workers or hospital administrators but also the interests of every citizen in Canada (which made it a unique space in its own right). One of the promises of the new technology-based healthcare system was that it would better cater to the public interest, as patients were supposed to gain greater opportunities to interact with the system in ways that were largely unimaginable before. For the first time, patients were supposed to be involved in really co-managing their own healthcare. The involvement of a wide range of interested parties became apparent to me while attending various eHealth conferences over the last few years as I realized that I was in the company of many types of stakeholders, beyond the usual assembly of 'techno-suspects'¹⁹. I also realized that I was not only an observer but also very much a

¹⁷ A recent headline of an article in Canadian Healthcare Technology Aug 2010 was 'Hospital IT budgets growing despite eHealth scandals' <http://www.canhealth.com/News1468.html>

¹⁸ For instance, the Government of Canada initially held back \$500 million in additional funding from Infoway when the eHealth Ontario scandal broke pending 'due diligence'. However, they have just released the funds in the March 4 budget. <http://www.canhealth.com/News1345.html>. The provincial governments are also spending large amounts of money on their eHealth initiatives.

¹⁹ The techno-suspects are those involved more in the technical side of the EHR system.

member of the concerned public, which helped me better to understand my sometimes-visceral connection with the topic of my study²⁰. I needed to take account of that.

Interestingly, even though the eHealth brand had become quite tarnished due to many recent controversies, and some even thought that we needed to think of another name for it²¹, the public seemed to believe that the healthcare reform agenda was too important to scrap and that we needed to find a way to press forward. Judging from the public's general reaction to the current set of controversies, information technology and EHRs in particular had already become a fundamental component of the healthcare renewal story. I became intrigued by the question of *how Information Technology had come to be understood as the magic bullet solution to the healthcare crisis*²². I felt that by carefully attending to this question, I could perhaps gain a better sense of what was going on and how we ended up where we are today.

The strong role of public influence is important to acknowledge in this story, as it appears to be one of the key factors that distinguishes public sector technology-based initiatives from private sector ones. Since politicians are influenced by the opinions of the general taxpaying public, they generally seem to focus more on issues that have caught the public interest. For instance, these days the Canadian public seemed to be more concerned with environmental issues over healthcare ones, which posed a serious problem for healthcare system innovators who were relying on the flow of tax dollars into the healthcare sector in order to stimulate change²³. Recently, Infoway had placed a six-page insert in a National newspaper to try to communicate directly to the public about the need for an EHR system and hence draw their attention to what was lacking in this industry compared to many others like the pizza retailer²⁴. Infoway was planning to do similar types of promotion in the coming years. More recently they had launched a campaign

²⁰ I would venture to say that I would probably not be feeling the same way if I studied a topic like inter-organizational information systems between joint venture partners in the auto industry. My apologies to any of my readers who happen to be studying that topic but my statement only refers to how I feel.

²¹ This was communicated to me by one of my key informants in a somewhat jokingly but also somewhat serious manner.

²² Indeed, this is the main research question that emerged from reflecting upon my empirical work.

²³ This was mentioned during one of my interviews.

²⁴ Globe and Mail Nov.30 2007.

called ‘Where is your healthcare information?’ Since the public was indirectly able to exert their influence through the government, any change initiative could come under public scrutiny at any time if brought to attention by the media. In this way, the media had gained considerable power to influence the reform agenda.

As indicated by the outcry over the way things were done, the media (claiming to represent public sentiment) seemed to be calling for a rethinking of the whole eHealth agenda; however, I did not think that they were necessarily disputing whether a change was needed. Interestingly, this type of questioning does play out in some controversies. For instance, many groups still dispute whether global warming is an issue that warrants an urgent change in the way we do things or, more accurately, a well-promoted hoax²⁵. *For such a major large-scale transformation, there appeared to be little discussion about whether change was needed.* In other words, nobody seemed to be asking the question ‘*why do we need change?*’ It seemed that almost everyone was convinced that change was needed. There did not seem to be many dissenting opinions. It was almost an undisputed fact. Most of the debate had then shifted to the question ‘*what change was needed?*’ However, this question seemed as if it had already been answered, as it was now well accepted that we needed to improve our use of healthcare information to solve a problem that was assumed to be mainly informational in nature. Consequently, the follow-up question that emerged was ‘*how do we best bring about that change?*’ The answer that logically followed was Information Technology, of course.

Unfortunately, as evidenced by many of the recent controversies in the eHealth agenda and the subsequent reactions that ensued, many were left wondering if those in charge really understood what they were doing. The release of the Auditor General’s Report, shortly after, seemed to confirm this line of thinking as a deeper understanding of why things were unfolding the way that they were in the midst of controversy still seemed to be eluding us.

²⁵ e.g. <http://www.globalwarminghoax.com/news.php>

Auditor General of Ontario's Report

On October 7th, 2009, the Auditor General of Ontario (AGO) released a highly critical report on the province's electronic health records initiative. This report underscored the influence of a number of social factors that seem to plague the development of many complex large-scale technology-based inter-organizational systems (Hughes 1983; Volkoff et al. 1999). For instance, it was found that there was a lack of governance, strategic planning and overall coordination. Also, there were improper procedures related to the procurement of consultants and management of expenditures. My sense was that the AGO's recommendations seemed to focus more on what they had identified as the main cause of the contractual abuse²⁶, with much less attention given to some of the underlying, elusive and somewhat paradoxical conditions that seemed to have precipitated these effects in the first place. Perhaps, a more nuanced understanding was in order.

The evidence seemed to suggest that the previously mentioned healthcare administrators did not necessarily have bad intentions. More likely, they were looking for ways to accelerate the eHealth agenda by going around the encumbering rules that were previously put in place. Such reasoning was apparent in the accounts of both Dianne Beattie and Sarah Kramer. For instance, Sarah Kramer, the former CEO of eHealth Ontario, stated that in trying to turn around a badly drifting organization she had to 'shed an internal culture that prized process above results'²⁷. She further states that 'the Premier of Ontario and the Chairman of e-Health Ontario both conveyed to me, at the time of my appointment, a strong sense of urgency to rapidly turn around the government's failed e-Health efforts to date'²⁸. Consequently, that meant 'ruffling the feathers of an entrenched, and ineffective bureaucracy, and bringing on outside consultants'²⁹. When she ruffled feathers by using private sector approaches to quickly push forward the agenda, she states that 'our efforts were met with strong, intractable resistance and outright hostility in some

²⁶ My guess is that accountants would be inclined to identify 'the lack of control' as the main issue

²⁷ <http://www.newswire.ca/en/releases/archive/August2009/13/c4908.html>

²⁸ Ibid

²⁹ Ibid

quarters, including within the Ministry of Health and among a few other vested interests in the healthcare sector'³⁰. Shortly after, she was fired in the midst of a scandal involving unorthodox consultant hiring procedures that she claimed had been approved by the Board, but which they emphatically denied.

As it was found that proper procedure was not followed in the hiring of some consultants, the AGO identified a lack of managerial oversight as the main issue. Consequently, as a solution, the AGO called for better control in the form of more robust accountability mechanisms and planning to improve the overall coordination of activities between different institutions working on the eHealth initiative. However, it seemed plausible that more structure and procedure might only exacerbate, not alleviate, the very conditions that led to this behavior in the first place. Following this logic, it seemed likely that there would be a higher chance of triggering similar types of behavior in the future. After all, it was the excessive structure that precipitated much of the abuse in the first place as people tried to find ways to accelerate progress on the eHealth agenda in response to external pressures. This kind of behavior, falling on old heuristics to solve new problems, was characteristic of less mindful approaches to innovating with IT (Swanson and Ramiller 2004). Overall, it seemed that many agreed that the healthcare system needed to be changed, however, every time that change was attempted, the system was intent on 'striking back' by resisting the impending change (Latour 2000).

As a way to address the inadequacies of the Smart Systems for Health Agency (SSHA), the Ministry had combined the SSHA with their own eHealth Program Branch to form eHealth Ontario. These two entities had previously been responsible for delivering different parts of the EHR solution with the SSHA focusing on the underlying infrastructure and the Ministry's e-Health Program Branch focusing on the overall EHR strategy and the related applications. The AGO noted that 'the success of this plan depended on both parties having a cohesive and co-operative working relationship. This was never the case. There was little co-ordination or co-operation' (Auditor General of Ontario 2009: 9). At that time, the creation of one agency, e-Health Ontario, was seen as

³⁰ Ibid

the best solution as it was thought that more coordinating mechanisms and structure could be created thereby resulting in greater overall progress on the e-Health agenda. For the most part, this has not happened as EHR projects have not met expectations and progress has still been very slow. Again, the attempt to address a lack of co-operation with more structure did not seem to work. Instead, certain work practices appeared to be ported over to the new organization as the actors involved were the same. The Auditor General stated that ‘we found that procurement problems were not exclusive to eHealth Ontario; the Ministry’s eHealth Program Branch and SSHA also engaged in certain questionable procurement practices’ (Auditor General of Ontario 2009: 11). Consequently, as history repeats, there have been four major overhauls of leadership between eHealth Ontario and its predecessor SSHA.

Another startling finding in the AGO’s report, and the one that got most of the media attention, was that the SSHA spent about \$800 million to build a private IT network connecting the members of the medical community that was not being utilized, partly because of operational issues but mainly because there was insufficient health-related information to put on it to ‘make it useful’. The Auditor General noted that ‘we suspect that users would have been much more willing to put up with network operational issues if the network was providing them with more useful clinical information’ (Auditor General of Ontario 2009: 10). This suggested that perhaps users may not have been given a sufficient voice in the development of the system or that, if they were, their needs changed at some point later³¹. The AGO pointed out that ‘The most important standard for judging the ultimate success of any IT project is not whether it was delivered on time or on budget, or what technology was used, but rather whether the system meets the needs of its users’ (Auditor General of Ontario 2009: 8).

³¹ In my experiences, this was a common problem when systems were developed using a structured approach (known as the waterfall method). In my company, I was responsible to bring in Extreme Programming methodology to address this very issue. As a product manager, I played the role of the customer in order to make sure user’s needs were continuously met, even if they changed during the development process (as they invariably did). We found that users do not often know what their needs are at the start of a project, as their needs were highly emergent. We had two-week development cycles to ensure that the product we iteratively developed became the one that the users eventually needed.

Overall, my sense was that it may not have been just an issue of utility but there was also a lack of stakeholder ‘connection’ with the system as it was being developed that may also have been missing. The AGO seemed to be somewhat in accord, as he noted that ‘it is essential that the key stakeholders and users of the end product be actively involved up front. All too often, those proposing a new system, whether they be senior management or individuals from the technology side of the business, drive the investment agenda without adequate input from those who will actually be affected by, or use, the new system. Only once these needs are well understood should work proceed’ (Auditor General of Ontario 2009: 16).

My personal sense was that the full range of these needs could *never really be fully understood before a project begins*. As the system emerges, the needs of the users also tend to emerge. In other words, as the system develops, users come to better understand and are better able to imagine what new possibilities the system can afford and what it constrains them from doing. Importantly, they also gain a greater understanding of how their agency will be affected by the new system. This is important as ‘successful practice depends on accommodating ourselves to such affordances and resistances’ (Archer 2007: 9). What seemed to be missing was ‘a more coordinated delivery of the network and the applications and data content so that stakeholders would see the network’s value and want to be on it’ (Auditor General of Ontario 2009: 18). Perhaps the users of the system did not know what they wanted until they were able to experience the system in relation to their unique working contexts³².

Machiavelli (2004: 19) notes that ‘men are generally incredulous, never really trusting new things unless they have tested them by experience’. This could be especially true in the case of the EHR system, where ‘the size, complexity, and diversity of the stakeholder and user community made it essential to carefully consider in detail the full range of their needs’ (Auditor General of Ontario 2009: 17). Despite having the wisdom and experience

³² My sense is that experiential knowledge of the innovation does not only come from physical experience with it (as in a prototype) but can also be gained through reflection on what it could mean to us within our particular social context (the interactive vision). This idea is related to what Harvard psychologist Daniel Gilbert refers to as the synthetic happiness that we are able to gain from the unique human ability to envision the future Gilbert, D. 2007. *Stumbling on Happiness*. Toronto: Knopf Canada.

of failure in similar projects, the same kinds of mistake appear to be repeated. For example, the set-up cost of the gun registry ballooned to around \$2 billion, about one thousand times the initial cost estimate of \$2 million³³. Contrast this with the initial set-up cost estimate for a pan-Canadian EHR system of \$22 billion. What might the final cost be?

Evidence would suggest that the overall development of the EHR system by the SSHA and the Ministry seemed to have been done in a fragmented way with relatively little co-operation between the two organizations. As a result, ‘there were few clinical applications available to enable the sharing of EHR data and few databases available to feed these applications’ (ibid: 18). Further indicative of fragmented approaches was that when things went wrong, no one was willing to take responsibility. In fact, ‘it was not a true partnership and was marred by a lack of collegiality and confusion over each party’s respective roles and responsibilities.... The Ministry and SSHA blamed each other for many of the failures and delays in system implementation’ (ibid: 22). Meanwhile, it seemed like even the interests of the public were not adequately taken into account as ‘work on the EHR initiative proceeded without adequate planning for a means for all Ontario citizens to access the network’ (ibid: 19). This would suggest that even though the healthcare system was truly a ‘public’ system, perhaps it was not being understood in that way by many of those trying to put it into play.

Also indicative of the fact that current approaches needed to be reflected upon in a more nuanced way was that those trying to make changes were mistrusted and seen as outsiders. As a result, ‘many physicians were unwilling to adopt EMRs because they did not think the network that SSHA built was reliable’ (ibid: 32). These events ‘have damaged the reputation of the eHealth Ontario agency...the agency is now faced with regaining the support and trust of clients and other stakeholder’ (ibid: 46). When an innovator gains such a negative reputation it can be even more difficult to bring about IT-based innovation.

³³ <http://www2.macleans.ca/2010/09/10/the-registrars-value/>

Overall, the Auditor General's report triggered what I realized was another key insight. It seemed to me that the government was not being very reflexive in its general approach to technologizing healthcare. Instead of looking to new approaches when old ones failed to work, the government seemed to be largely clinging on to the old bureaucratic ways of thinking and then trying to impose those on others. As Bohm (2004: x) notes, 'we do not know how to live together in a changing world. We only know how to live based on truths from the past, which today inevitably results in one group attempting to impose their truths on another'. The government seemed to be imposing their understanding of what needed to be done on others without adequately taking into account the full range of stakeholder concerns. This monologic approach to innovating seemed to be generating much controversy, as information technology had come to play the role of the definitive 'magic bullet' solution for some of the major problems plaguing healthcare (Markus 1997).

The Auditor General sums up his findings succinctly by stating 'Ontario's EHR projects are behind schedule and struggling to deliver on their mandates...as well, integrating them so that they work together to collectively deliver an EHR to the medical community and all Ontarians *remains a challenge*' (Auditor General of Ontario 2009: 35, emphasis added). Since the challenge seems to remain, I believe one key question should also still remain...*is there a better way to push forward healthcare reform?*

Chapter Two: The Setting

We're not in the health care business; we're in the information management business. We should start thinking as information managers dealing with health care information, and think about the tools we need to do it properly. (Health Region CEO, Globe&Mail Nov. 30 2007)

In this thesis, I will suggest that by trying to see through to what is, by carefully reflecting on the current state of the system, we can then perhaps better know how to bring about its transformation³⁴. As J. Krishnamurti says, 'if we can really understand the problem, the answer will come out of it, because the answer is not separate from the problem'³⁵. So, in my mind, the purpose of this thesis is not to provide a solution to our healthcare problems but to create a space where stakeholders can more openly think about the possibilities. I will try to accomplish this by unsettling some preconceived notions and also proposing some new ways of framing our understanding of the innovation process. Through the words of this thesis, I too am trying to occasion a dialogic space of innovation.

If we accept that the healthcare system is currently in the midst of an inevitable and fundamental transformation, 'we're not in the healthcare business, we're in the information management business' (as stated above), then we should also be willing to attend to how healthcare and information technology will come to be inextricably entangled in the years to come. The terms by which this relationship comes to be developed is something that perhaps should still be up for debate, a debate that for some reason does not seem to be happening. This thesis is really about trying to locate a space (or many spaces) where such a debate could possibly occur... a dialogic space from where innovative and collaborative solutions may emerge.

³⁴ Interestingly, this is a sign of 'intelligent' systems i.e. they reflect upon their situation and then take actions to maximize their chances of success Russell, S., and Norvig, P. 2003. *Artificial Intelligence a Modern Approach*, (2 ed.). Upper Saddle River, NJ: Prentice Hall.

³⁵ <http://www.famousquotesabout.com/quote/If-we-can-really/284585>

The healthcare sector seems to be in the midst of a fundamental shift in thinking. *Better patient care seems to be coming to be understood in informational terms.* As a result, it has become widely accepted that many of the stresses being manifested in the healthcare system today can be effectively addressed by better integrating healthcare information, thereby enabling the development of more collaborative forms of patient care. Hence, Information Technology (IT) is being heralded by many as a ‘magic bullet’ solution (Markus 1997) and seems to have become the major focus of many healthcare renewal initiatives (Cheah and Abidi 2001). Consequently, governments at all levels have been concentrating efforts on trying to accelerate the implementation of IT-based innovation in order to expedite healthcare renewal. There also seems to be growing recognition that if this renewal is to be successful, then it should better meet the needs of a wide array of stakeholders, hence calling for unprecedented levels of consultation.

However, recent controversies would suggest that many such efforts to accelerate the change agenda have resulted in varying degrees of disarray and discontent.³⁶ As a result, healthcare stakeholders seem to have become even more fragmented than ever, thereby making the possibility of collaborative change even more difficult. In a recently released report on the state of eHealth initiatives across the country, the Auditor General of Canada concluded that ‘the federal and provincial governments have an opportunity to take stock and re-affirm or re-establish priorities, objectives, budgets, and timelines’ (Auditor General of Canada 2010: 12). Perhaps now is an opportune time to take a more nuanced look at how things are unfolding and to consider what possibilities may exist to keep things moving forward?

In the balance of this introductory chapter, I will provide the reader with an overview of the setting for this thesis. I will begin by describing the Canadian Healthcare System and then provide some background information on the two principle actors with whom I am particularly concerned (the pan-Canadian EHR and Infoway). After that, in the balance of the thesis, I will try to find a way to describe what these actors are doing to one another and how they are doing it. Accordingly, by the time we arrive at the end, my hope

³⁶ I described some examples of controversy in the prelude; however, there are many more.

is that I will have provided a somewhat coherent narrative of how the pan-Canadian EHR is unfolding and the role that Infoway seems to be playing in that unfolding.

2.1 The Canadian Healthcare System

Canada Health Act

The principles of the Canada Health Act began as simple conditions attached to federal funding for Medicare. Over time, they became much more than that. Today, they represent both the values underlying the health care system and the conditions that governments attach to funding a national system of public health care. The principles have stood the test of time and continue to reflect the values of Canadians...the reality is that Canadians embrace Medicare as a public good, as a national symbol and a defining aspect of their citizenship. (Romanow, 2002: xviii)

In everyday parlance, Medicare is talked about as if it was truly a pan-Canadian universal healthcare system and as a result has come to be a definitive symbol of Canadian society. But is it truly universal? More accurately, it might be considered as an interlocking set of ten provincial and three territorial health insurance plans linked by a shared adherence to the five core principles embodied in the Canada Health Act - Public Administration, Comprehensiveness, Universality, Portability and Accessibility (see Table 2 for a brief description of each). Together, these principles ensure that there are some key commonalities among the various jurisdictional plans being enacted across Canada in each of the provinces and territories.

Principle	Definition
<i>Public Administration</i>	Provincial and territorial health care insurance plans are administered and operated on a non-profit basis by a public authority, which is accountable to the provincial or territorial government for decision making on benefit levels and services, and whose records and accounts are publicly audited.
<i>Comprehensiveness</i>	The health care insurance plan of a province or territory must cover all insured health services provided by hospitals, physicians or dentists (i.e., surgical-dental services which require a hospital setting) and, where the law of the province so permits, similar or additional services rendered by other health care practitioners.

<i>Universality</i>	All insured residents of a province or territory must be entitled to the insured health services provided by the provincial or territorial health care insurance plan on uniform terms and conditions.
<i>Portability</i>	Residents moving from one province or territory to another must continue to be covered for insured health services by the "home" jurisdiction during any waiting period imposed by the new province or territory of residence.
<i>Accessibility</i>	Insured persons in a province or territory have reasonable access to insured hospital, medical and surgical-dental services on uniform terms and conditions, unprecluded or unimpeded, either directly or indirectly, by charges (user charges or extra-billing) or other means (e.g., discrimination on the basis of age, health status or financial circumstances).

Source: <http://www.hc-sc.gc.ca/hcs-sss/medi-assur/cha-lcs/overview-apercu-eng.php>

Table 2: Canada Health Act

Through national legislation passed in 1984, the Canada Health Act came to define the core principles that provinces and territories must follow in order to receive health care funding in the form of transfer payments from the federal government. The Act set out the primary objective of Canadian health care policy, which was *to protect, promote and restore the physical and mental well-being of residents of Canada and to facilitate reasonable access to health services without financial or other barriers*. At every point in the Canadian health care system, citizens³⁷ were supposed to be ensured free access to universal and comprehensive coverage for medically necessary hospital, inpatient and outpatient physician services. In a country as large as Canada where the population is quite geographically dispersed, ensuring accessibility of services to all residents has become a major focus of concern and consequently one of the main drivers behind ongoing eHealth reform initiatives such as Telehealth. The administration, delivery, evaluation and funding of such services is legally the responsibility of each of the provincial/territorial governments³⁸.

³⁷ When I use the term citizens, I am referring to all those residents of Canada who have full rights to the use the healthcare system. Even though this may include more than just citizens but also others such as landed immigrants and political refugees, this is not an important distinction to make for the purposes of this thesis.

³⁸ Health Canada (Federal Government) has a mandate to help Canadians maintain and improve their health. Responsibilities also include setting and administering national principles for the healthcare system through the Canada Health Act and delivering healthcare to designated groups (e.g. First Nations, Inuit and military).

Constitutionally, provincial and territorial governments are solely responsible for administering healthcare and extended healthcare services in their jurisdictions. This division of responsibility has its roots in the founding of Canada and the Constitution Act of 1867. Under the Constitution Act, the provinces were responsible for establishing, maintaining and administering hospitals, asylums and charitable institutions in their jurisdictions. The federal government took responsibility for marine hospitals and acts of quarantine that were of national importance. Notably, the development of a pan-Canadian EHR system, being of considerable national interest and therefore more of national concern, has become the exclusive charge of the federal health ministry.

As the federal government has no legal ability to direct the provinces or territories on how they should be administering healthcare in their jurisdictions, the Canada Health Act and the funding that became linked to it, was a way for the federal government to ensure all the provinces adhered to common universal principles. For instance, jurisdictional governments are required to report annually to the federal government as to how they meet the conditions set out by the Canada Health Act. However, notably, this method of influence has been progressively dwindling as the size of transfer payments has been diminishing relative to the escalating costs of healthcare in most of the jurisdictions. Consequently, as it pertains to promoting pan-Canadian collaborative healthcare practices against long-standing fragmented ones, money has become a less effective way to boost federal interests over provincial/territorial concerns.

As one of its 47 recommendations, the Romanow Report (1992: xix) argued that accountability, something the healthcare system was noticeably lacking, should be officially added as another principle to the Canada Health Act. Importantly, the escalating awareness that the healthcare system was in need of greater accountability has been another major impetus behind the drive to accelerate the implementation of electronic health record systems and other technology-based innovations in the healthcare sector. For instance, the recent initiative to post hospital procedure wait times to a website (www.ontariowaittimes.com) was conceivably in response to pressures from the Ontarian

public to hold the Ontario government and hospitals more accountable for particular inefficiencies in the way that healthcare was being delivered.

Due to growing fiscal pressures, yet another driving force behind technology-based renewal has been the general sense that the healthcare system needs to be more sustainable than it is now. In a recently released report called *Charting a Path to Sustainable Health Care in Ontario*, TD Economics drew attention to some of the more serious fiscal challenges that threaten the healthcare system in Ontario by stating that ‘if current trends prevail, health care expenditures would make up 80 per cent of total program spending by 2030, up from 46 per cent today. All other programs, such as education, would be funded out of the remaining 20 per cent’ (Drummond and Burleton 2010: 1). Similar situations exist in other provinces. The following excerpt from a recent report on achieving value for money in the healthcare system nicely sums up the significance of the sustainability issue to healthcare reform: ‘We know for certain that this conversation should involve everyone, whether they need health care today or not. Providers of health care, administrators, and policymakers; patients, clients, their families, and the general public – we all care deeply about the system’s sustainability and we all want it to be well stewarded into the future (Health Council of Canada 2009: 45).

Recently, the provincial government of British Columbia proposed to add sustainability as the sixth principle of the Canada Health Act with the argument that it would lend a ‘more focused and measured approach by requiring that decisions on health services balance the other principles with the question of whether that service would contribute to a sustained public health care system’³⁹. However, many argued against this proposal by suggesting that this balancing would ‘undermine the other principles and may in fact undermine the meaning and intent of the legislation as a whole and therefore destabilize the public health care system.’⁴⁰ Such conflicting perspectives between variously interested stakeholders reflect some of the underlying tensions that exist in the healthcare

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http://www.bcconversationonhealth.ca/EN/envisioning_a_strong_and_sustainable_system_of_care/canada_health_act_and_its_principles/

⁴⁰ Ibid

system. These tensions tend to make the task of bringing about collaborative reform even more challenging, as stakeholders would need to work together despite their differing views.

Major Stakeholders

Historically, the collective interests of three major groups of stakeholders have tended to influence the overall development of the healthcare system (see Table 3). Notably, over the years, this influence has not been equal, as stakeholders have often jockeyed for control in different periods of the history of healthcare in Canada⁴¹. Health service payers administer the system and are generally interested in seeing the system run more efficiently in order to reduce overall costs and increase long-term sustainability. Health service providers harbor an interest in better quality care and achieving higher levels of patient satisfaction. Health service consumers expect timely access to care and an overall adherence to the core values that have historically underpinned the system. These values seem to not only influence the ongoing development of the Canadian healthcare system but also seem to be very fundamental to Canadian society itself⁴². In Canada, it seems that citizens have historically placed their trust in their doctors to look after their best interests. It is only now, with ongoing reforms, that citizens have been promised to be able to gain greater involvement in the healthcare system and hence may be better able to represent their own interests. For instance, the recent emergence of LHINs (Local Health Integration Networks) is an attempt by the Ontario government to push much of the decision making in healthcare to the local level and ultimately into the hands of elected citizens and local caregivers. This three-way interaction, instead of the traditional two-way one that exists in most other sectors, seems to have added to the healthcare sector's inherent complexity⁴³. Therefore, any process of innovating will likely need to take the nuances of such complexity into account. At the very least, the increase in the number

⁴¹ Interestingly, the jockeying has been mainly between the payors and the providers. Only now does it seem like the public is starting to garner more influence.

⁴² This feeling is reflected in many reports of Canadian's opinions about healthcare e.g. in the Rock report.

⁴³ This was pointed out to me during an interview with one of my private sector association informants. Interestingly, he further commented that he wondered how many of our traditional business models would hold up in the health care context.

and type of stakeholder interactions makes the system innovator's task even more challenging. The sheer diversity of stakeholder groups is yet another complicating factor. For instance, as one of my informants interestingly pointed out when describing the challenges of innovating in the hospital environment, 'there's probably no other business where the primary attractor of business and driver of cost is not an employee but is an independent contractor of the organization...that's what hospitals are...because docs are not employees' (21-5).

Major Stakeholders	Some Primary Concerns
Health Service Providers	<ul style="list-style-type: none"> • Better quality care • Higher levels of patient satisfaction
Health Service Payers	<ul style="list-style-type: none"> • Increased efficiency • Long-term sustainability • Adherence to Canada Health Act
Patients	<ul style="list-style-type: none"> • Timely access to care • Better healthcare services • Better healthcare outcomes

Table 3: Stakeholder Concerns

2.2 The pan-Canadian EHR

We still have the diffusionist's bad habit of considering that one particular segment of a program of action is the essence of an innovation, and that the others are merely context, packaging, history, or development. But the only essence of a project or of a knowledge's claim is its total *existence*.

(Latour 1991: 115)

A pan-Canadian EHR can be defined as an 'electronic secure and private lifetime record of an individual's key health history and care' (Booz-Allen-Hamilton 2005: 2) *available on a pan-Canadian basis*. Whereas the EMR (electronic medical record) is a local record containing health information that is already being used in many doctors' offices and almost all major hospitals across Canada, the pan-Canadian EHR will only contain a key

subset of that information that is pertinent to a care encounter. Most likely, this will include information pertaining to medications, X-rays and lab results⁴⁴.

Based on estimated dollars to be invested, the pan-Canadian EHR system represents the largest IT-based initiative in this country's history. Once completed, it will also most likely be one of the most complex, as it is intended to link an extremely diverse array of healthcare institutions in various healthcare settings across the country. The possible benefits are purported to include, among other things, improved quality of healthcare, greater access to healthcare services, increased information availability for public health initiatives and improved cost control (Infoway 2005). However, due to the increasingly collaborative nature of patient care today, there is a growing realization that many of these benefits can only be attained if health care professionals work together, integrate electronic records into their everyday work practices and learn to share more information. In other words, engaging in a culture of collaboration seems to be a critical component of any move towards a pan-Canadian healthcare system.

Ironically, the EMR has become one of the key impediments to implementing a pan-Canadian EHR system. Current adoption rates of the EMR have been reported as low as 37% among physicians⁴⁵. This is a significant issue that is drawing more attention as encouraging users to modify their existing work practices in order to use new technologies can be quite challenging and often prevents many organizations from gaining the expected advantages from the innovation (Hirschheim 2007). In this case, if patient data is not available in electronic format to 'feed' the EHR then it limits the usefulness of any pan-Canadian EHR system. Eventually, we could end up with a similar situation as at eHealth Ontario, but many magnitudes worse, where over \$1 billion was spent on a system that nobody used. In recognition of this potential problem, Infoway recently announced the allocation of \$380 million to speed up the implementation of electronic medical record systems in doctor's offices as 'EMR systems are the gateway

⁴⁴ The actual information that will be available has yet to be fully determined and is therefore currently open to discussion. The question is: what is the absolute key information that is needed by a healthcare professional during a care encounter?

⁴⁵ <http://www.infoway-inforoute.ca/lang-en/about-infoway/news/news-releases/637>

that will enable physicians and nurse practitioners to securely access vital patient information including diagnostic images, blood test results, drug histories and clinical reports',⁴⁶.

At this point, instead of offering a detailed chronology of the history of health recording in this country, I intend to describe two major translations⁴⁷ that I hope will give the reader a more holistic understanding of the pan-Canadian EHR innovation that is currently at the centre of this thesis. In other words, 'instead of explaining the movements of the actors by times and dates, we would explain at last the construction of time itself on the basis of the agents own translations' (Latour 1988: 51). As each translation gets closer to completion, it becomes increasingly difficult to go back to the former state. In this way, time moves forward and we 'progress'.

Starting in this section, and continuing in the balance of this thesis, I will try to take into account the pan-Canadian EHR along with all of its socio-technical nuances. As Bohm (2004: xii) aptly notes:

Reductionist science has great power in understanding isolated things, and in applying this knowledge to create new things like new technologies. But its efficacy hinges on its being able to fragment or isolate its subject matter. It fails and may become actively dysfunctional when confronted by wholes, by the need to understand and take effective action in a highly interdependent context. This is why the modern world is full of increasingly stunning technological advances and an increasing inability to live together...the whole is too much.

So, instead of trying to explain the pan-Canadian EHR in terms of either its technical components or its social effects, I will try to consider it fully in its whole as a socio-technical phenomenon with all its associated complexities.

⁴⁶ <http://www.infoway-inforoute.ca/lang-en/about-infoway/news/news-releases/637>

⁴⁷ The idea of translation describes the diffusion or movement of a token (in this case a record of health) 'Instead of the transmission of the same token - simply deflected or slowed down by friction - you get...the continuous transformation of the token' (Latour 1986: 286). Notably, 'successful translation depends upon the capacity of the actor-world to define and enroll entities which might challenge these definitions and enrollments' (Callon, 1986a: 26). So work is involved every time translation is involved, as a new set of actors are brought into play along with some of the older ones. Nonetheless, the interactions and re-combinations are usually quite novel.

Analytically, it seems to make good sense to distinguish between the two translations I am about to identify, as each translation brings into play new configurations of human and non-human actors which all need to be ‘convinced’ that the innovation is worth building together in the new way. In this way, the innovation becomes occasioned ‘from chains of weaker to stronger associations of human and non-human alliances’ (McMaster et al. 1997: 4) in which each actor ‘translates and contributes its own resources to the shape and ultimate form of the emerging black box’ (ibid). Notably, each time translation occurs, work is required to re-align the necessary human and non-human actors, thereby stabilizing the innovation. This work involves various kinds of arguments and negotiations that I suggest are part of the dialogic process of innovating, which I will discuss later in this thesis. In other words, each time there is an intended movement from one material configuration to another, meanings also need to be re-aligned in order that the shift itself becomes meaningful. Otherwise, there is little incentive for practitioners to change the way they do things⁴⁸.

The first translation involves a movement from paper health records to electronic ones. Is the electronic version merely a digitized mirror image of the paper version? Or does the EMR carry particular affordances that the paper equivalent does not? The second translation involves a movement from the more local EMR to the more pan-Canadian EHR. Is the difference simply a matter of magnitude, scale and name-change? Or, are there other important factors to consider? Overall, we may end up gaining a sense of the kinds of effects these ‘digital objects’ (Kallinikos et al. 2010) are having on the institutional fabric of the healthcare system.

First Translation: From Paper to Digital

The Canadian healthcare system has been supported by information technology in various ways over the last 30 years. During the 1980s, information technology was

⁴⁸ We see this playing out in the present initiative. There appears to not be enough incentive for many doctors to make the shift to EMRs from paper-based records i.e. since the EMR, and the EHR that depends on it, is not seen to be meaningful then the shift itself is not meaningful. The government is considering initiatives like providing subsidies (recent allocation of \$380 million) and changing the way doctors get paid as possible triggers for change.

primarily focused on delivering administrative efficiency. As a result, human-resource management, billing and claims-support systems were deployed in health care institutions around the country. During the 1990s, clinical systems were more focused on the needs of specialized departments like Laboratory, Radiology and Surgery. Many of these systems emerged as best-of-breed customized solutions, most of which did not communicate or exchange information with one another. More recently, the desire to shift the focus of the healthcare system towards being more patient-centric⁴⁹, evidence-based⁵⁰ and collaborative⁵¹ has precipitated a need for systems that can integrate both clinical and administrative information across a wide continuum of health care settings. E-Health applications, and in particular electronic health record systems, are seen as key enablers of this shift.

The highest policy priorities for Canadians have been timely access to care and quality of care (Soroka 2007). According to a 2007 independent public opinion survey, 88 per cent of Canadians believe that electronic health records will improve overall delivery of healthcare in Canada (Infoway 2008). The digitization of health records, and the implementation of information systems that manage them, are seen as a central remedy to many of the problems inherent in the Canadian medical system. Paper-based record systems have well-documented problems such as illegible handwriting, missing information, missing files and inaccurate photocopying (Safran and Goldberg 2000). In fact, the failings of the paper-based medical record system are arguably one of the main driving factors behind the push to digitize health records. More recently, some of the innovations in care practice that are a part of the ongoing renewal of the healthcare system seem also to be driving the demand for acquiring healthcare information in digitized format. For example, pay for performance systems seem to be having the effect of encouraging doctors to think more about digitizing their health records.

Electronic health records are a fundamental building block of many e-Health applications including electronic patient administration systems in hospital settings, tele-consults in

⁴⁹ Clinicians account for the patient's desire to share in the co-management of their own health condition.

⁵⁰ Care pathways are based on scientific evidence to ensure better and more predictable outcomes.

⁵¹ Providers from complementary disciplines work together to improve the overall quality of patient care.

homecare settings and patient record systems in primary care settings. They are also important to healthcare renewal as they support newer innovations in telemedicine, patient self-care and primary care reform. Even though the Government of Canada has been making investments in this area since the 1997 Federal Budget, it is not until more recently that electronic health record systems have really emerged as a key factor in the enablement of modernized health care in Canada or put differently, as an enabling infrastructure (Weill and Broadbent 2000) in the healthcare reform initiative.

Once fully implemented, electronic health record systems should allow information to be more easily available to authorized individuals across a variety of care settings and jurisdictions. These systems promise to deliver timely and accurate information to health care professionals so that they will be able to engage in better and more efficient health care practices. Even though many advocates argue that they will result in reduced errors and reduced costs (Thomas 2007), others have argued that empirical evidence suggests that such systems often lead to higher billings and a decline in provider productivity (Sidorov 2006).

Based on a magic bullet understanding of innovation, many change agents tend to perceive information technology as an innocuous storage device and therefore perceive implementation as more of a technical challenge (Markus 1997). Accordingly, they become focused on trying to figure out ways to encourage adoption and implementation (Ramiller and Swanson 2003). Others may see that information and communication technologies do more than just facilitate or impede activities as they have an independent consequence in the form of 'new language formations that alter significantly the network of social relations, that restructure those relations and the subjects they constitute' (Poster 1990: 8). Understood in this way, in order to be successful, the electronic health record must come to be fundamentally 'interwoven with the structure of medical work' (Berg and Bowker 1997: 532). This would suggest that social factors are important to consider in the innovation process.

The digitization of health records makes them more amenable to being managed. In this way, organizational processes are not only automated but also informed (Zuboff 1988). Through the informing process, documenting organizational events in informational format, an increased level of visibility is afforded to those who have access to that information. However, when ‘information becomes the basis for organizational structure and function, politics will increasingly come into play’ (Davenport et al. 1992: 54). In order to manage such information politics effectively, a shift in organizational culture is needed, as ‘new technology and even new executives alone are not enough to make this happen’ (Davenport et al. 1992: 64).

The affordance of added visibility is well acknowledged and is, in fact, another important impetus behind the argument for implementing electronic records. In everyday discourse, added visibility is talked about in terms of making the healthcare system more accountable. Many argue that the increased information availability will be better for decision-making, as well as for the overall management of care and care practitioners:

Mounting evidence suggests that information technologies are unique because they help providers manage the explosion in information that other medical technologies and scientific advances create. It is through this knowledge management function that information technologies have the potential to improve safety and quality while reducing costs. (Booz-Allen-Hamilton 2005: 8).

However, empirical evidence suggests that the over-abundance of clinical information may not only enhance the clinical decision making process but it may also confuse it (Tierney 2001).

Health records also trigger organizational routines and mediate what and how tasks are distributed and collected. Consequently, the record’s sequential structure enters into the temporal organization of hospital work (Gasser 1986), thereby ‘transforming the very work of those who bring it alive’ (Berg 1996: 515). For instance, electronic health records enable the practice of evidence-based medicine (EBM), an approach to patient

care which ensures potential advances in healthcare are tested and proven to be effective before being fully incorporated into medical practice (Goncalves et al. 1999).

From a hospital administrator's perspective, there is a constant tension between allocating funds for the implementation of new information-related technologies and spending the money on more traditional forms of hospital care⁵². As a hospital CIO remarked, 'bedpans trump everything because if you don't have enough bedpans, it doesn't matter how much innovation you got, you can't run your hospital effectively, so bedpans win hands-down every time' (21-4). This conflict is as real today as it was 100 years ago (Arndt 2007).

Adding to the complexity of the matter is that hospital administrators continue to be urged to adopt management practices from the private sector⁵³ (Arndt and Bigelow 2000), as there has been a gradual shift from having 'a social service mindset to a corporate business mindset' (20-9). For example, as part of a supposedly more patient-centered focus, patients are being called clients or customers. This represents a shift in the healthcare system away from the more traditional institution-centered focus that seems to have largely dominated its history and seems to provide a new opening for the patient's voice to be better heard. Even though electronic health records are starting to enable such shifts, one of the main problems seems to be that hospital administrators control neither the institution's medical work nor the clinical credentialing of practitioners (Arndt 2007). Therefore, they have to rely on indirect means to elicit clinicians' cooperation, which may or may not be granted, to influence them to adopt particular innovations in practice.

Strains between administrators and physicians began appearing in the early twentieth century and the relationship seems to have largely remained that way even today (Boshier and Hinton 2006; Rundall et al. 2004). For instance, in the words of one hospital

⁵² These are such things as more hospital beds, more doctors and more nurses. When surveyed about where the government should be spending their healthcare dollars, these things have tended to be rated higher by Canadians as compared to information technology.

⁵³ Evidence of this is the prominence of Chief Executive type positions in hospital management and the hiring of individuals from the private sector to fill those roles. Also, every major hospital now has a 'glossy' annual report in which they are expected to be transparent and accountable to their 'customers'.

administrator, 'it may have taken us seven years to recruit a certain specialist...now, if they get ticked off and threaten to leave, are you going to call their bluff? You know you can't replace them for another seven years' (21-11). Much of the problem stems from trying to figure out how to deal with the tension of balancing clinical and financial issues (Veatch 2006). Interestingly, today's clinical information systems seem to attempt to tackle both issues simultaneously by providing better decision support to physicians, reducing medical errors and leading to considerable savings in the form of reductions in duplicate testing (Cotter 2007).

Overall, the first translation involves a movement from a paper-based form of recording to a digital one. The eventual proliferation of such digital objects throughout the healthcare system has poorly understood implications for the practice of healthcare. For instance, digital objects seem to make social practice increasingly unstable (Kallinikos et al. 2010). Furthermore, healthcare practitioners in various geographical regions or in different areas of the hospital can immediately start working on their own copy of a patient's digitized health record. A related development in the use of electronic picture archiving and communication systems (PACS) for medical imaging has resulted in some major effects on the healthcare system. For instance, one of my private sector informants remarked about the change in the locus of decision-making that occurred due to the move away from hard copy towards digitized film:

From a PACS point of view the decision was made on the hospital departmental basis and then it really went outside of the realm of radiologists to the IT, the CIOs and other decision makers...I mean the CIOs are concerned about different issues and I wouldn't say they would make decisions in opposition to the clinical users, certainly not, but they are interested in the kind of risks more and the connectability issues, how difficult is it to deploy this technology, how reliable is it, how many people does it keep, you know, the resources required to keep it running, life cycles, those sorts of things like that so more, you know, different things whereas the radiologists are really looking at clinical functionality and response times and things where image is to be displayed, and so on.

(14-4/5)

A digital object is much more effective and efficient than a paper-based record at accomplishing particular objectives as its increased mobility through electronic networks affords a greater action at a distance (Latour 1987). Poster described this movement nicely when he stated that ‘we are being changed from “arborial” beings, rooted in time and space, to “rhizomic” nomads who daily wander at will (whose will remains a question) across the globe, and even beyond it through communication satellites, without necessarily moving our bodies at all’ (Poster 1990: 15).

Second Translation: From Local to pan-Canadian

The second translation that I would like to take into account involves the movement from a local version of the electronic health record (EMR) to a pan-Canadian one (EHR). Infoway has defined the pan-Canadian EHR as ‘a secure and comprehensive electronic record of a person’s critical health history that can be accessed and shared by authorized health care providers – doctors, nurses, lab technicians, and so on – in your community, your province or territory, and eventually across the country’,⁵⁴ and is therefore of pivotal importance to an integrated health care delivery system. The interoperable pan-Canadian EHR system has a projected implementation cost of over \$22.7 billion⁵⁵. There are many local versions of the health record⁵⁶ that exist in hospitals and doctor’s offices around the country. However, the pan-Canadian EHR is both qualitatively and quantitatively different in that it will involve an information system that spans organizational boundaries and a large number of geographically dispersed stakeholders with varied interests thereby fitting the classic definition of an inter-organizational system (Kurnia and Johnston 2000).

Even though there are various points of contact that a citizen may have with the healthcare system, ‘ironically, when it comes to the interconnectedness of Canada’s more than 40,000 different kinds of points of care, our health system is remarkably

⁵⁴ <https://www.infoway-inforoute.ca/lang-en/about-ehr/benefits>

⁵⁵ This is Infoway’s estimation.

⁵⁶ In Canada, most commonly referred to as an Electronic Medical Record (EMR) but also sometimes referred to as an Electronic Patient Record (EPR) or a Computerized Patient Record (CPR). A Personal Health Record (PHR) refers to a special type of health record that is available only through the web and is initiated and maintained by the patients themselves.

disconnected'⁵⁷. This interconnectivity will allow patients to travel across Canada and have their health record follow them⁵⁸. It will also assure that important incidents of medical care are documented, regardless of where in the healthcare system that care was administered.

Overall, the pan-Canadian EHR is a way to transform a patient's personal problem into a manageable organizational problem 'by functioning as a structured distributor and collector of work activities, the record is actively involved in shaping the very events it 'represents'' (Berg 1996: 517). Although financial benefits will likely accrue with time, 'the primary driver for these initiatives is the ethical requirement to maximize the quality and safety of care for all citizens' (Booz-Allen-Hamilton 2005: 29). For example, companies like Microsoft are banking on this drive towards interoperable electronic health records by providing a search engine-supported service to help patients coordinate disparate pieces of healthcare information, from lab results and prescription records to X-rays and daily blood pressure and allergy readings (Greene 2007).

Technical projects encounter not only human actors who are differently interested and aligned, but assemblages of things that may or may not be compatible with one another (Latour 1996a). For instance, some of the health reform issues that need to be addressed include how to link multiple computer systems across different provinces that do not yet talk to each other and who should own the data in a pan-Canadian system (Pooley 2006). The challenge therefore becomes not only to align human and non-human elements but also to keep them aligned. In other words, 'interesting' and 'aligning' becomes a key part of the work of an innovator.

Overall, the second translation involves a movement from a local version of the electronic health record to a pan-Canadian one. This movement and the corresponding assembly of information that ensues will allow for a form of pan-Canadian governance

⁵⁷ Globe&Mail. Nov. 30 2007. "It Is a Matter of Life and Death," in: *Globe and Mail*. Toronto.

⁵⁸ This seems to be one of the most common arguments used for why we need a pan-Canadian system. However, some have begun to question how often this kind of event actually occurs i.e. how often would someone from Ontario be skiing in B.C. and hurt themselves thereby being rushed to a local hospital? Is it worth the extra investment, just in case?

that has never existed before or what Foucault (1991) calls governmentality. A link between the 'public objectives for the good health and good order of the social body with the desire of individuals for health and well-being' (Rose 1999: 74) will be made possible. A national system also affords greater visibility across the population⁵⁹, as 'modern medicine is a manifestation of an administered society in which the centralization of information about citizens is essential for social planning' (White 2002: 118-19). This suggests that there may be an inherent mismatch between the major costs (financial and non-financial) of digitizing health records to the caregiver and the primary benefits that seem to accrue more at the government level:

'So the doctors who have to pay to put these systems in their practices are not the major benefactors of the system... it's the government, it's the insurance companies, it's the pharmaceutical companies who have access to that information' (20-12).

Much Information Technology research seems to draw on 'commonplace and received notions of technology, resulting in conceptualizations of IT artifacts as stable, discrete, independent, and fixed.... [consequently] IT artifacts tend to be taken-for-granted or are assumed to be unproblematic' (Orlikowski and Iacono 2001: 121). This type of simplified conceptualization could be especially problematic when studying an inter-organizational innovation like the pan-Canadian EHR that by definition necessarily involves complex collaborative change. My hope is that a consideration of these two translations will help us move forward with a more nuanced and holistic understanding of the highly emergent, evolving, complex and often recalcitrant innovation that forms the central concern of this thesis. This way, we may gain a better sense of what it is that we are trying to achieve.

In reaction to the seemingly disparate development of interoperable EHR systems across the country, the strategic importance of using IT to address largely unsustainable practices in the healthcare system, the apparent need for a shared vision among various key stakeholders and the ongoing need for an agreement between the federal and

⁵⁹ An example of this is the Public Health Surveillance System that is currently being built by IBM to track immunizations and other information related specifically to public health. This system is thought to be critical in combating future pandemics and avoiding incidents like the recent SARS fiasco.

provincial/territorial governments to share accountability for e-health, Canada's federal and jurisdictional governments decided to create Canada Health Infoway.

2.3 Canada Health Infoway

In September 2000, in an unprecedented move, the First Ministers of the federal, provincial and territorial governments agreed on the vision, principles and action plan for health system renewal in Canada. This involved a funding agreement and a shared governance model to provide each jurisdiction an equal voice regardless of their relative size, assets or readiness. Importantly, this represented an important shift in the way that allocations had been administered in the past i.e. based on population counts. In support of this Health Accord, the Government of Canada committed \$500 million to start an independent corporation that would be focused on finding ways to accelerate the adoption of information technology in healthcare with an initial focus on electronic health records. It was from this commitment that Canada Health Infoway (Infoway) materialized with the specific mandate to 'lead the investment in collaborative e-health technologies *taking a pan-Canadian approach*'. Such a mandate meant that Infoway would be focused on establishing, promoting and maintaining a common national direction⁶⁰:

There is a continued need for national leadership and coordination, and this is the role that Canada Health Infoway has played up until now, certainly up until this point, and will play for some sort of the foreseeable future. This idea of national coordination is critical...[...]...we have a small marketplace. We can't afford for it to be fractured into fourteen separate little marketplaces. There is a need to coordinate investment strategies, to coordinate standards and inter-operability, of work, that national coordination is key. (15-2)

Governance Structure

As a result of the decision to funnel e-health expenditures through Infoway, the Federal government committed to having their spending in this area become more accountable,

⁶⁰ Notably there are about 11 other countries that have a pan-national EHR initiative similar to Canada (Australia and UK being the ones that are most similar), with 16-17 emerging and 35 dabbling in e-health but not necessarily interoperable pan-national solutions (source: interview with Group Director, Infoway).

transparent and strategic than it had been before. For instance, as a strategic decision, the provinces and territories were explicitly included in Infoway's governance structure in order that Infoway would be able to operate effectively across Canada, especially in those areas in which they held very little legal jurisdiction. Therefore, the organization was set up to operate independently (i.e. arms-length from any federal, provincial or territorial government), as well as be non-profit. The fourteen Deputy Health Ministers of the federal, provincial and territorial governments were designated as the official Members of the corporation. These Members represented their jurisdictions and most importantly were expected to report directly to their Ministers about Infoway's activities and progress. This meant that, by design, all governments across Canada were informed at the highest levels of Infoway's activities. On an annual basis, as part of institutional procedure, the Members would endorse the Corporate Business Plan after the Board of Directors had approved it.

Infoway's Board of Directors was appointed by Infoway's Members and operated independently of them. Directors included seven public-sector representatives made up of two from the federal level and one from each of the five regions of Canada. There were also private sector representatives made up of four to six independent directors with finance, information technology and clinical backgrounds. The Board met quarterly to discuss strategic issues.

Notably, at times, Infoway's governance structure had put the organization in a somewhat precarious position. Although Infoway's mandate involved accelerating the uptake of EHRs across Canada, they really had no legal authority to 'make it happen' as it was the jurisdictions that were ultimately responsible for the success or failure of the implementations. Furthermore, many of Infoway's activities resulted in pressure being put on its own Members. For instance, Infoway was engaged in encouraging the public to demand EHRs from their healthcare providers, an act which would eventually result in increased pressure being brought on jurisdictional governments to make further investments in eHealth.

Business Strategy

In accordance with their pan-Canadian approach, Infoway's goal was that all parts of the country would benefit from eHealth initiatives: 50 per cent of Canadians would have an EHR in place by 2010⁶¹ and by 2016 all Canadians would have their EHR available for access to those authorized professionals who provided their health care services. *In pursuit of these goals, Infoway established* five core ways to assist Canada's provinces and territories in accelerating the transformation of their health care systems. First, they participated in health care renewal efforts by supporting ongoing national, jurisdictional and local initiatives to reform health care. In the marketplace, they occupied a unique position, as they were not restricted to operate within any particular jurisdiction or to operate for the interests of any particular jurisdiction. Second, they collaborated with both public and private sector partners to ensure progress and alignment with pan-Canadian interests. Again, this meant that they were able to operate across sectors, trying to maintain an impartial position with regard to vendors⁶². Third, they targeted their investments at those projects that specifically support pan-Canadian interests, as well as fostered the transfer of such e-innovations to other jurisdictions. Fourth, they supported partner implementation efforts by providing expertise and learning, often transferred from one jurisdiction to another. In other words, they looked for ways to leverage their position to help accelerate the agenda through the free distribution of knowledge. For instance, they have made the pan-Canadian EHR blueprint freely available. Finally, they promoted adoption and benefits realization by facilitating clinical leadership, advancing best practices in the clinician adoption of solutions, as well as supporting the measurement of benefits.

In terms of Infoway's overall goal, considerable work remained to be done particularly in the largest provinces of Ontario and Quebec. Here the associated complexities and the breadth of the undertaking had resulted in longer completion timelines than expected, further exacerbated by the presentation of some unique challenges. We will now consider

⁶¹ Apparently, Infoway has fallen short of this goal. My sources there suggest that it is because of the slow uptake of EHRs in Ontario and Quebec.

the various roles that Infoway is playing in order to achieve their mandate (see Table 4 for a summary).

Strategic investor role

As a strategic investor, Infoway worked in regular collaboration with health ministries at both the federal and provincial/territorial levels to more closely align federal investments with jurisdictional plans. Other key strategic partners included regional authorities, various types of health care organizations, industry associations, information system vendors as well as physician and nursing associations. Once investment decisions were made, Infoway typically financed an average of 75 per cent of eligible planning and implementation costs for approved projects. Public-sector partners usually led the ongoing development, implementation and use of EHR solutions. For its part, Infoway remained focused on providing e-health leadership and coordinating the overarching strategic direction for e-health initiatives across Canada.

Projects in which Infoway invested were required to follow specific mandatory eligibility requirements that were related to promoting pan-Canadian interests. Projects needed to comply with *Infoway's pan-Canadian* standards as well as meet investment criteria for their relevant investment program. It was also assumed that project outcomes could be replicated and deployed in other jurisdictions. All contracts had pre-established milestones and deliverables, including clinical adoption targets tied to the disbursement of funds, a practice that was not typical in the industry⁶³. As each milestone was achieved, the next level of funding was allocated. This was a highly effective risk-mitigation tool for Infoway, ensuring strong accountability for investments made by both *Infoway* and the jurisdictions.

The strategic investor role had been highly beneficial to Infoway's branding in the marketplace. Initial seed capital from the federal government amounted to \$500M, with

⁶³ Typically 20% on contract signing, 30% on reaching implementation targets and 50% on reaching adoption targets (thereby introducing a new level of accountability for healthcare IT projects)

top-up funds totaling \$2.1 billion coming from subsequent federal budget allocations⁶⁴ (the most recent being \$500 million in the 2009 Federal Budget⁶⁵). As part of the agreement, the provinces and territories had allocated matching funds, thereby bringing the total to date spend on e-health in Canada to over \$3 billion⁶⁶.

Historically, government money invested in health care technology had been geographically allocated, based on population counts and spent mainly within local institutions. Infoway's mandate involved information systems that cut across institutions and demanded new approaches based on innovative thinking from both public and private sector partners. Infoway was trying to encourage and sustain such thinking by allocating funds based on strategic value, as opposed to geographic need. These efforts resulted in the development of entirely new segments in the marketplace, such as the ongoing work on the pan-Canadian EHR Solution Blueprint, a technology framework that had helped to guide the development of interoperable EHR systems supported by the pan-Canadian 'infostructure'.

The infostructure involved common service orientated architecture, with accompanying messaging and terminology standards, that ensured interoperability of the approximately 27 individual EHR solutions anticipated to be deployed across the country. As part of the initiative to develop the infostructure, the EHRS Blueprint had not only been a vehicle for knowledge sharing but also represented a collective direction to which the jurisdictions agreed.

Importantly, the vendor community was also actively engaged in the development of the EHRS Blueprint. Such instances of shared governance and collaboration, between the public and private sector, had been rare in the traditional market segments that existed before the advent of Infoway⁶⁷. Infoway's efforts to build out the infostructure through an

⁶⁴ \$500M (2001) for EHR, \$600M (2003) for EHR and Telehealth, \$100M (2004) for Health Surveillance Systems and \$400M (2007) for EHR and Wait Time Systems. Now, \$500M (2009) for Infostructure.

⁶⁵ Initially, this amount was being held back by the federal government in reaction to the eHealth Ontario scandal. However, at the time of writing this thesis, the funds have since been released.

⁶⁶ Notably, this entire amount has not been fully spent as much of this has only been allocated to projects

⁶⁷ Ibid

unprecedented level of health IT funding had started to re-focus the Canadian Health IT market. As a result, spending in traditional hospital segments was being curtailed in favor of infrastructure projects that had attracted the attention and subsequent entry of many new non-traditional players such as Sun, Oracle, IBM and Microsoft.

As part of ongoing efforts to achieve their goal of accelerating the uptake of pan-Canadian EHR systems across Canada, Infoway was also engaged in several other activities that reflected their pan-Canadian commitments. For instance, *Infoway placed an emphasis on interoperability through the use of vendor-neutral architecture/standards, among all healthcare stakeholders, thereby encouraging the use of COTS (Commercial Off the Shelf Software)*. Infoway also encouraged the jurisdictions to use a coordinated procurement process in which solutions and knowledge could be leveraged from one jurisdiction to another. Such activities had the potential to be highly beneficial to both public and private sector partners as overall adoption costs and time required to implementation could be greatly reduced.

Infoway had also been focused on building solutions and adoption strategies that encouraged acceptance and adoption of EHR solutions by various types of clinicians such as physicians, nurses and pharmacists. Their efforts included an end-user acceptance strategy and investment in projects that actively engaged clinical leaders to collaborate with and support their peers in implementing EHR solutions. Infoway invested in projects that supported models of care that integrated EHRs into clinical workflow and strove to clearly demonstrate the benefits of EHRs to end-users, patients and other health system stakeholders. They also realized that low physician adoption rates would be a major barrier to establishing a pan-Canadian EHR.

In 2007, Infoway underwent a major restructuring, adopting a regionally oriented model to solidify a more jurisdictional focus. This orientation further fostered the collaborative approaches that had been fundamental to the success of Infoway in the past, as it enabled Infoway to foster a more intimate working relationship with its jurisdictional partners.

By the end of the 2009 fiscal year, Infoway had approved \$1.576 billion in 283 ongoing projects across the country. Such projects accounted for over 95 per cent of Infoway's total capitalization from the federal government (not including the recent \$500 million allocation). Of these 283 projects, 145 were still active and 138 were completed. One hundred and eighty-two were jointly developed with the provincial and territorial sponsors whereas the other 101 were pan-Canadian projects directly spearheaded by Infoway. All projects fell into one of nine core program areas: Diagnostic Imaging Systems, Drug Information Systems, Infostructure, Innovation and Adoption, Interoperable EHR, Laboratory Information Systems, Public Health Surveillance, Registries and Telehealth. In the fall of 2007, the Infoway Board of Directors approved the investment strategy for a tenth program, Patient Access to Quality Care, to focus on wait-time management and overall accessibility involving consumer stakeholders.

Other roles

Infoway not only co-invested with its provincial and territorial partners but also was involved in various aspects of project planning and monitoring. Infoway monitored the ongoing progress of projects and the quality of the ensuing deliverables. Even though Infoway did work collaboratively with jurisdictional partners to further its goals, in accordance with its mandate as a strategic investor, Infoway refrained from getting overly involved in many of the tactical aspects of the projects they funded. Once investment decisions were made, public-sector partners led the development, implementation and adoption of EHR solutions. Overall, the focus of Infoway's efforts were on facilitating and leading pan-Canadian collaboration to ensure that public and private sector stakeholders planned jointly, shared best practices and continually improved the process of deploying the pan-Canadian health infostructure.

Infoway was also focused on supporting and fostering the ongoing efforts of its public and private sector partners to implement the EHRS Blueprint. To that end, knowledge transfer processes were explicitly embedded in all Infoway-supported projects to identify, capture and disseminate information, best practices and new knowledge. Infoway also

had a good understanding of implementation risks through their involvement in many types of projects, which enabled them to informally advise the jurisdictions accordingly. Adding to these activities, Infoway was also actively involved in shaping related reference solutions to guide development work in such areas as privacy and security. They also supported procurement processes, provided ongoing technical expertise to jurisdictional projects and collaborated with researchers and jurisdictions to develop methods and tools to measure the benefits accrued from the use of EHRs. In particular, Infoway had developed notable in-house expertise in EHRS architecture and its accompanying messaging and terminology standards, which had allowed them to provide critical assistance to ongoing projects.

In their role as e-health advocates, Infoway led and coordinated a range of national projects including the development of pan-Canadian standards, preferred/national pricing agreements for jurisdictions, end-user adoption strategies and benefits evaluation methodologies. Much like its EHRS Blueprint efforts, most of Infoway's work to this effect was not-for-profit in that it did not result in the generation of any sort of revenue⁶⁸. In the area of standards advocacy, Infoway had supported and promoted the operation of HL7 Canada and served as Canada's representative to the global SNOMED CT[®] standards development organization. HL7 was a standard used for the electronic interchange of clinical, financial, and administrative information among health care oriented computer systems, with version 3 being the latest version. Many vendors were still on version 2 which seemed to pose a problem for the development of compatible products. Infoway's view was that the more challenging approach to the EHR would better set them up for the future. SNOMED CT was a clinical terminology that facilitated the interoperability of electronic health records. More recently, Infoway sponsored a six-page special supplement in the *Globe & Mail* to make the case for EHRs and to encourage the public to demand their healthcare providers use EHRs in their practices.

⁶⁸ For instance, Infoway gave away its EHRS Architecture for free not only to provincial/territorial governments but also foreign governments. Private sector organizations also had free access.

Table 4: Infoway's Various Roles

Infoway's Multiple Roles		Description and Examples of Role
INVESTOR ROLE	Strategic Investor	<ul style="list-style-type: none"> • Jointly investing with provinces/territories • Investing only in those projects that promoted particular pan-Canadian strategic interests • Infoway provides 75% of eligible planning and implementation costs • Involves the establishment of milestones and deliverables (adoption targets) that are related to the disbursement of funds. This was not a common practice in the market. • Overall, funds allocated based on strategic value as opposed to population counts, which represented an innovation in usual practice.
SUPPORT ROLE	Support and Foster the Ongoing Implementation of the EHR Solution Blueprint	<ul style="list-style-type: none"> • Represents Canada's vision for an interoperable pan-Canadian EHR • Useful to information technology professionals in all areas of the marketplace • Enabled technology vendors to align their products to the emerging vision
	Support and Sustain Technology and Communication Standards	<ul style="list-style-type: none"> • Enabled health information systems to share information effectively, efficiently and securely • Involved supporting the Standards Collaborative and the MARC HI project • Infoway has large group of in-house subject matter experts for support of provincial/territorial initiatives
	Foster and Support Clinical Adoption of EHRs	<ul style="list-style-type: none"> • Increased the diffusion of EMRs and the integration of clinical solutions across the spectrum of care • Focused mainly on primary and ambulatory care settings • Involved the development of clinical IT support networks, demonstration sites and case studies, knowledge-sharing tool kits and a benefit framework for evaluating implementations
CERTIFICATION ROLE	Provide Certification Services for Technology Vendors	<ul style="list-style-type: none"> • Newest role (more about this later in the thesis) • Certified that EHR-related product met pan-Canadian Standards and best practices regarding privacy, security and interoperability • Helped public sector buyers with their purchasing decisions and increased diffusion of pan-Canadian standards in the marketplace
ADVOCACY ROLE	eHealth Advocates	<ul style="list-style-type: none"> • Led and coordinated a range of national projects including the development of pan-Canadian standards, preferred/national pricing agreements for jurisdictions, end-user adoption strategies, benefits evaluation methodologies • Supported and promoted the operation of HL7

		<p>Canada and served as Canada's representative to the global SNOMED CT[®] standards development organization.</p> <ul style="list-style-type: none"> • Sponsored a six-page special supplement in the Globe & Mail to make the case for EHRs and to encourage the public to demand their healthcare providers use EHRs in their practices • Recent campaign 'Knowing is better than not Knowing'
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Vision 2015

The Board of Infoway, having recognized that funding for e-health reform would be more limited in the future, had requested the organization to develop a comprehensive health IT strategy to guide their investment activities over the next ten years. Infoway commissioned McKinsey & Company to analyze the current state of health care renewal in Canada and identify key strategic areas that were in need of a more sustained focus. McKinsey interviewed over 100 key stakeholders from across Canada in all areas of the healthcare sector. From that study, five overarching priorities emerged to guide Infoway's investment activities⁶⁹ (see Table 5).

Five Key Priorities (source: Vision 2015)
1. Ensure the baseline EHR and public health infrastructure are in place across the country
2. Unlock additional quality and safety benefits by enabling decision support and communication across the care continuum
3. Enable public visibility into wait times
4. Facilitate improvements in patient self-care
5. Trial and perfect more advances functionalities to meet high-priority system needs

Table 5: Five Key Priorities

First, it was suggested to finish what had already been started in electronic health records and public health surveillance. Second, more focus was needed on the implementation of

⁶⁹ Infoway's 2007-08 Annual Report

EMRs in physician offices and physician-order-entry systems in hospitals⁷⁰. Third, wait-time management solutions needed to be deployed. Fourth, there was a need to implement consumer-health-solutions to support self-care. Finally, chronic-disease-management solutions should be integrated with other systems, diabetes being the area in most need. A vision document was produced that summarized the key findings and conclusions from the strategic planning effort. In the document, the current state of healthcare was assessed but also importantly an integrated vision of how to achieve ‘Canada’s next generation of healthcare’ was presented and promoted as such. Not surprisingly, pan-Canadian EHRs were central to that vision.

⁷⁰ In the 2010 budget, \$380 million was earmarked by Infoway to address the low rate of adoption of EMRs among physicians.

Chapter Three: Mapping Controversy

*Why map controversy? Mapping controversy is a method that helps the analyst to reveal things about the worlds being studied like how such worlds are being constructed, what arguments are being made, by whom, which groups are included and which groups are being left out. The challenge of mapping controversy involves trying to 'grasp and understand all the conflicting issues and themes behind controversial and highly technical subjects.'*⁷¹ *Taking the position that 'reality does not precede the mundane practices in which we interact with it, but is rather shaped within these practices' (Mol 1999:75), I am also cognizant of the need to let this understanding emerge on its own terms by avoiding the imposition of my own preconceived frameworks and meanings. After all, research itself can be quite performative (Law 2004). I am interested in understanding what realities my informants are seeing and what practices they are involved in that are helping to shape those realities in which they believe. By following in a careful and nuanced way the current controversies or debates that surround this yet to be determined innovation, I want to be able to track its intra-active becoming (Barad 2007). My sense is that such becoming is highly politicized by nature, as it will probably involve significant contestation, negotiation and resistance. Invariably, artifacts will have politics (Winner 1986). Hence, controversy and struggle are not only inevitable during technology-based innovation, but as I will come to argue later, somewhat necessary.*

In this chapter, I will begin by describing my general research approach and methods. I will also provide a brief overview of Actor-Network Theory, along with some of its ontological and methodological considerations that have proven to be useful in trying to map controversy. Next, I will specify the three research questions that I took into the field and the one research question that emerged unexpectedly during my field investigation. I will end the chapter with a comment about the scope and scale of this research, as well as providing an itemization of the data sources used.

⁷¹ <http://www.demoscience.org/controversies/description.php>

General Research Approach

In his seminal work *Understanding Media*, Marshall McLuhan argues that ‘the “message” of any medium or technology is the change of scale or pattern that it introduces into human affairs’ (McLuhan 1964: 8). McLuhan points out that the railway did not just introduce the possibility of transportation into society (largely an instrumental view), as many historians would conclude, but the railway also more importantly ‘accelerated and enlarged the scale of previous human functions, creating totally new kinds of cities and new kinds of work and leisure’ (McLuhan 1964: 8). As a result, new meanings appeared in society independent of the material functioning of the railway, as it did not really matter whether the railway transported bananas or passengers, in the city or in the country. The medium itself, and not its functioning, was the message as it shaped and scaled human association and action. Indeed, this would concur with Heidegger’s claim that the essence of technology is by no means technological (Heidegger 1993: 311). Importantly, McLuhan argues that it is the undue attention to content that ‘blinds us to the character of the medium’ (McLuhan 1964: 9). In other words, we tend to get beguiled by the materiality of technology and consequently accord less consideration to its meaning.

So what is the character of the pan-Canadian EHR? In order to investigate a possible answer to such a question, while not getting overly distracted by the more instrumental uses of the technology itself, I chose to adopt a largely phenomenological approach to my research. I was not concerned with any particular pan-Canadian EHR that may or may not exist in any particular healthcare institution or in any particular geographical region⁷². Nor did I want to describe any particular empirical situation in which healthcare personnel or others engage with electronic health records in their work. I was more interested in understanding how the pan-Canadian EHR system was coming to be i.e. what meanings were being made, by whom and in what way?

⁷² This actually works out well because there is no pan-Canadian EHR in use right now, except for prototypes in test environments e.g. MARC HI project at Mohawk College. EMRs exist all over the healthcare system and thus most healthcare technology research today is focused on their adoption and implementation.

In my view, this focus on meaning is somewhat analogous to Introna and Ilharco's approach to studying the screen-ness of screens as they considered 'not the *content* on the television, cinema, PC or palmtop screen, but rather the screen as itself, in its meaning' (Introna and Ilharco 2006: 62). They asked the question 'what does it mean when we engage with a surface "as a screen" rather than as something else? The result of their analysis showed that screens, in screening, hold our attention as they present us with information that has a particular relevance in a particular ongoing way of doing. In this way, the screen 'fits in' as it becomes part of a 'fundamental, and often hidden, process of ordering that renders it relevant and meaningful' (Introna and Ilharco 2006: 67). For instance, the monitors at an airport constantly flash flight arrival and departure information and thus become an integral part of the ordering of human and non-human actors. *By being an integral part of an ongoing network, the screen became meaningful.* (Note: this is the same way that I will be suggesting that the pan-Canadian EHR has become meaningful in healthcare reform, by being understood as an indispensable enabler of it). Problematically, through the process of becoming meaningful, technologies simultaneously and immediately 'exclude other ways of living and doing...where this ordering holds sway, it drives out every other possibility of revealing' (Heidegger 1993: 332). For instance, nobody goes to an airport anymore and looks for a printed listing of all the arrivals and departures of all the flights that day, as the screen is it. In many ways, I hoped to reveal that which comes prior to the empirical experience of the technology⁷³ and therefore investigate something that is probably not to be found in either its relevance or its functionality. As Winner insightfully notes 'we usually do not stop to inquire whether a given device might have been designed and built in such a way that it produces a set of consequences logically and temporally *prior to any of its professed uses*' (Winner 1986: 25 emphasis in original).

Overall, my concern was to 'trace the interconnections built up by technologists as they propose projects and then seek the resources required to bring these projects to fruition' (Law and Callon 1988: 285). More specifically, in what ways was Infoway trying to

⁷³This is why the EHR seems like such a good case study for the purposes of this thesis. Currently there is no pan-Canadian EHR in existence. It is still just an idea trying to materialize. As such there are no 'users', in the traditional sense.

materialize the pan-Canadian vision of healthcare? I wanted to take into account how Infoway was trying to enlist other actors into their world and how they were bestowing their desires, visions and motivations on them (Latour 2004a). I also wanted to understand how Infoway was making the argument that they were the key innovator who could deliver the pan-Canadian vision of healthcare. I knew I needed an approach that would allow me to account simultaneously for all the ‘messy’ social and technological influences that were relevant to this story. Actor-Network theory seemed like the most logical choice.

Actor-Network Theory

Boeing 747s do not fly, airlines fly. (Latour 1999b:193)

Actor-Network Theory (ANT) (Callon 1986a; Latour 1999b; Latour 2005b; Law 2007) forces us to shift our frame of reference in order that we may better understand the networks of relations that constitute the things we encounter in our world. For instance, it is not the Boeing 747 that flies us from one point to another, as it commonly appears. The plane is but one among many actors, of both human and non-human variety, that collaboratively accomplishes ‘transporting’. It is the airline that takes the credit, as it rightfully should, although the technology appears to be doing all the work. Thus, purposeful action is not the property of objects or humans but of institutions (Latour 1999b). Accordingly, the social and the technical are established simultaneously, mutually constituting each other (Bijker and Law 1992).

Methodologically, ANT enables the analyst to consider heterogeneous components of a network within one theoretical lens. An ANT approach begins with the understanding that the world is full of hybrid entities containing both human and non-human elements (Latour 1993). For instance, it is difficult to attempt to differentiate a computer program’s technical aspects from the influence exerted by the socio-cultural background of the software development team (Cusumano and Selby 1997). ANT has the ability to analyze such situations where there is no clear separation between the social and the technical. Actors are entities that do things and can therefore take the form of organizations,

associations between humans or associations between non-humans (Latour, 1992 p. 88). Accordingly, actors have variable content and variable geometry (Callon, 1992).

A key methodological constraint is that actors, human or non-human, must be treated in a symmetrical fashion irrespective of their ontology (Latour 2005b). Each actor is influenced by and influences other actors and the network as a whole (Latour 1992). In this way, the researcher is freed from the burden of having to distinguish a priori the social from the technical. Consequently, academic research is more focused on trying to record the text of what the various actants in the setting are doing to one another (Akrich and Latour 1992). Therefore, the relationships between actants becomes even more interesting than the distinctions between them (Latour 1992).

Instead of starting with an entity that is already a component of the world, an ANT researcher tries to understand what it takes for that entity to come into existence. In the terms of this particular thesis, I would ask what does it take for the pan-Canadian EHR to emerge? I would focus on that which defines the EHR, thereby examining the relations it has with other human and non-human actors. I would look to see how these relations are built and maintained.

Networks are created by the simultaneous influence of subject and object (Latour 1992). An ANT researcher is focused on analyzing their emergence, their construction, their maintenance, how they compete with other networks and how they are made more durable over time (Latour 1996a). As we consider the association of humans and non-humans, we begin to talk in terms of collectives. The collective is unlike the idea of society, which is more an artifact of humanity imposed by modernism (Latour 1999b). Thinking in terms of the collective allows us to adjust our framework of analysis. We begin to consider the exchange of properties between humans and non-humans. We also consider the process of enrollment, where a nonhuman is seduced, manipulated or induced into the collective. We start to become aware of the mobilization of nonhumans inside collectives, adding fresh unexpected resources and then resulting in strange, new hybrids. We begin to think in terms of displacement, the direction the collective takes once its shape, extent and composition have been altered by the enrollment and

mobilization of new actants. We start to become aware of the process of translation, the means by which a set of goals is altered in the process of enrolling new actors in a network. An actor is defined by what it does, by its performances under ‘laboratory-like’ trials (Latour 1987). Its competencies are deduced and it is enticed to be part of an institutional arrangement.

Some Nuances of Actor-Networks

Before going any further, I would like to alert the reader to some misunderstandings that may arise about the concept of actor-network (Latour 1998). First, the word ‘network’ does not signify the common technical meaning that we tend to associate with it. A technical network is only one of the many final and stabilized states of an actor-network. ANT is curious to understand how one particular configuration of the network comes to be preferred and stable, for a time as no network is ever final and given. Second, ANT has very little to do with the idea of social networks. Social networks are more concerned with social relations of individual actors. As noted before, ANT has a symmetrical approach in which humans and non-humans are included in the collective. Social networks will be implied in the description but they will have no privilege or prominence. Third, the term actor-network is misleading as it implies (actually the ‘hyphen’ between the two words is the culprit) that actors and networks can exist separately and are actually somehow linked. In ANT, actants and networks are conceptualized as two faces of the same phenomenon, like wave-particle duality in the nature of light (Latour 1999a). For analytical purposes, we may deal with them in a somewhat essentialist fashion. However, in thinking about networks, we continually acknowledge and are aware that actors and networks mutually constitute each other and therefore can never be considered apart.

Overall, a network is always unreliable and unstable as it relies on the maintenance of its simplifications for its continued existence. Those actors that make up networks are always shifting their alliances as they themselves are made up of other actor-networks. Behind each actor there hide other actors that it has drawn together (Callon 1986b). Therefore, any changes to the network of interactions and associations will affect not only the focal actor but also all the actors behind it. Consequently, the durability of an

actor-network will partly depend on the durability of the bonds that hold it together, but also on the durability of the networks that form it as it is also composed of a number of durable and simplified networks. Each point is at the intersection of two networks ‘one that it simplifies and another that simplifies it’ (Callon 1986b: 97).

Decentering the Object

According to Gareth Morgan, ‘scientists engage a subject of study by interacting with it through means of a particular frame of reference, and what is observed and discovered in the object (i.e. its objectivity) is as much a product of this interaction and the protocol and technique through which it is operationalized as it is of the object itself’ (Morgan 1983: 13). Such a view emphasizes the importance of understanding the influence of not only the paradigms through which researchers engage their object of investigation (Kuhn 1970) but also the various research methods that are used to investigate the object of interest (Law 2004). As a result of conducting research within various theoretical frames and using various methods, multiple views of the object will most likely emerge, if allowed to do so. We assume that there simply are multiple perspectives and in the centre, ‘the object of many gazes and glances remains singular, intangible, untouched’ (Mol 1999: 76).

As opposed to a perspectivist lens, ANT takes more of a performative approach to understand how objects actually gain their object-hood (Akrich 1992). Instead of starting with an object that is already a component of the world, the analyst tries to understand what it takes for that object to come into existence (Latour 1992). How is it that one particular trajectory comes to be preferred over an indefinite number of possibilities? How does order come to be built? ANT focuses on that which defines the object by examining the relations it has with other subjects and objects, as articulated in practice. The world is abound with quasi-objects⁷⁴ that have both human and non-human elements

⁷⁴ Quasi-objects bring together heterogeneous (material/semiotic and human/non-human) elements. For instance, a hole in the ozone layer is a quasi-object that links ‘the most esoteric sciences and the most sordid politics, the most distant sky and some factory in the Lyon suburbs, dangers on a global scale and the impending local elections or the next board meeting’ Latour, B. 1993. *We Have Never Been Modern*. Harvester Wheatsheaf.

(Latour 1993). Through the process of gaining object-hood, subjects and objects are brought into a relational co-existence in which they become an effect of stable networks of relations (Law 2002b). Such networks tend to hold together so long as those relations that constitute them also hold together. Interestingly, those quasi objects that are somewhat fluid, or not too rigorously bounded, seem to be much more durable than those that are rigid (de Laet and Mol 2000).

A characterization of practices as acts oriented to achieving specific purposes is the key to understanding the importance of considering objects as entities that come into being rather than being simply out there. This is an important sensitivity that needs to be maintained when studying any innovation with an ANT lens. In this view, the pan-Canadian EHR is currently in the process of trying to gain its object-hood through the various practices of many concerned actors. Therefore, what that innovation ends up becoming like nobody really knows, although many will claim that they do and then use various means to persuade others that *their truth is the only truth*.

Networks of practices give rise to particular realities that are both coherent and obvious to those who share such practices and interests and only partially understood by other groups. Different enactments do not simply alter the way we look at objects, as if we were merely emphasizing different aspects of the same essential entity. Rather, different practices tend to give rise to different realities and consequently reality multiplies (Mol 2002). The initial idea of multiple perspectives gives way to the new possibility of multiple objects and the ontological politics that will inevitably result (Mol 1999). In this way, 'reality does not precede the mundane practices in which we interact with it, but is rather shaped by these practices' (Mol 1999: 75). If such practices are fore-grounded, the idea of a single passive object is displaced by a conceptualization of the object that comes into being and disappears with the practices in which it is manipulated. Problematically, for a researcher interested in understanding the innovation process, once the innovation gains object-hood then the practices that gave rise to it seem invariably to disappear from view (Mol 2002).

For the aforementioned reasons, the researcher should decenter the object of interest before any study proceeds. In this way, ‘we start to wash away the *assumption* of singularity, the *pre-supposition* that, whatever we might study and whatever we might interact with is indeed a single, coherent, and centered object that is out there... a single object that we may come to know in this way or in that... a single object over which we may have different perspectives... but, nonetheless, a(?) single object’ (Law 2002a-33 emphasis in original). Once we approach things in this way, any singular object becomes an effect, a more or less precarious effect that is held in place through various means ... to look as if it was singular ...but only for a time⁷⁵.

Drawing with a Pencil⁷⁶

The ontological and epistemological commitments of ANT are extremely important to consider, as they very much constrain its methodological approach. For instance, since reality is understood to be constructed by the interplay of more than one actant and this reality emerges outside the mind of any one individual, it is quite unlike most interpretive approaches (Cordella and Shaikh 2006). When using ANT to study organizations, researchers should be clear about the ontological, epistemological and political commitments it brings with it (Whittle and Spicer 2008). Understanding such positions will allow the ANT scholar to take full advantage of the many tools it provides. Bruno Latour cautions in a fictitious conversation with a student ‘drawing *with* a pencil is not the same thing as drawing the *shape* of a pencil...ANT is a method, and mostly a negative one at that; it says nothing about the *shape* of what is being described with it.’(Latour 2005b: 142 emphasis in original).

In many ways, ANT is ‘empirically realist in that it leaves the task of challenging its empirical base to the research and user communities it addresses, and ontologically relativist in that it typically embarks on research without a clear picture of what sort of entities it will discover through interaction. This serves to distinguish ANT from both

⁷⁵ This time may be anywhere from one to infinity depending on how well the elements are able to maintain their relations with each other and fend off any outside influences that are interested in tearing them apart.

⁷⁶ I guess drawing with a pencil has a certain kind of tentativeness associated with it, as well as an aesthetic quality that a pen is not quite able to imitate.

‘modern’ and ‘postmodern’ research strategies’ (Lee and Hassard 1999: 393-394). Because of such commitments, ANT has a strong emphasis on empirical enquiry and the careful tracing of networks (Doolin and Lowe 2002). As Latour advises, ‘if I were you, I would abstain from frameworks altogether. Just describe the state of affairs at hand’ (Latour 2005b: 144). Such rich, but purposive, description is the focus of any ANT study.

As a ‘material-semiotic’ method, ANT maps relations that are simultaneously material (between things) and semiotic (between concepts). From this perspective, the EHR system does not exist independent of the human and non-human actants that put it into play. In other words, the collective results from the interaction between both material and conceptual components that together form a network. ANT is concerned with how these material-semiotic networks come together, sometimes acting as a whole. As part of the analysis, the ANT researcher looks for explicit strategies that are used by actants to relate different elements together into a coherent network. Such relations need to be repeatedly ‘performed’ or the network will dissolve. Such relations are also inherently conflicted and as a result are always open to negotiation. ANT does not usually explain why a network takes the form that it does. It is much more interested in exploring how actor-networks get formed, hold themselves together, or fall apart.

ANT is a method that enables the researcher to describe the deployment of associations (like semiotics is a method to describe the generative path of any narration). It does not say anything about the shape of entities and actions, but just what the recording device should be that would allow the entities to be described in all their details. The burden of theory is on the manner of recording not on the specific shape that is recorded. The researcher should not presuppose an epistemological primacy for any one viewpoint i.e. the viewpoint of the amateurs is not inherently better or worse than that of the professionals, or the researchers for that matter. This approach would suggest that individual’s visions are not so important, as the more important questions concern the flow of objects and concepts through the network of participating allies and social worlds. Therefore, visions have no epistemological primacy as they are understood to be

but one of the many methods a researcher can use to help him/her trace the various networks of associations.

The ANT method does not require the researcher to decide in advance on a list of actors and possible actions. Through empirical work, the researcher discovers who the main actors are, what happens to them and what trials they undergo. I will rely on stories of actors themselves and records of what each actor says of the others. In this way, I will be able to follow the transformations, drifts and diversions as they are made. The investigation of the documentary materials will not follow a historical path but rather the network of associations that make up the collective⁷⁷. Through this process, I will also uncover many different human and non-human actants. For instance in the study of Pasteur, Latour identified hygienists, biologists, surgeons, sanitary engineers, veterinary surgeons, physiologists, medical doctors, military doctors, as well as tuberculosis, cholera, diphtheria, tetanus, yellow fever, rabies and the plague (Latour 1988). I wish to be able to follow both the chain of speakers and their statements (syntagms, in the parlance of semiotics) and the transformation of speakers and their statements (paradigms). Whenever I discover a 'stable' social relation, I will look to see if it is the introduction of some non-human element (actant) that accounts for this relative durability. From an ANT perspective, technology is seen as the moment when social assemblages gain stability by aligning actors and observers. In this way, society and technology are not two ontologically distinct entities but more like phases of the same essential action (Latour 1991).

Overall, an ANT scholar would explore the ways that network of relations are composed, how they emerge and come into being, how they are constructed and maintained, how they compete with other networks, and how they are made more durable over time. We would also examine how actors enlist other actors into their world and how they bestow their visions on these actors.

⁷⁷ Whenever I think about this, I am reminded of the television show CSI in which the investigation traces out the elaborate networks of associations that have led to a murder being committed. In the process, many other actor-networks are also uncovered.

Describing the Collective

Efficiency, truth, profitability, and interests are simply properties of networks, not of statements. Domination is an effect, not a cause. In order to make a diagnosis or a decision about the absurdity, the danger, the amorality, or the unrealism of an innovation, one must first describe the network (Latour 1991: 130)

According to the ANT view, the collective is an interwoven socio-technical seamless web, consisting of heterogeneous, changing networks of actants, inscriptions, work practices and institutional and organizational arrangements (Hanseth and Monteiro 1997). Within the collective, the dominance of one network over another depends on the way in which a network of actants is able to mobilize its resources and translate its ideas into convincing representations, and thus impose their desired structures and meanings upon other actor-networks (Raisanen and Linde 2004). Many (probably all) objects putatively located in physical space can be detected only in a network of relations that make them visible. For instance, alcohol liver disease is an object that does not look like an object because our methods are not geared up to detect or know it (Law and Singleton 2005). In her fascinating study of the day-to-day diagnosis and treatment of atherosclerosis in different areas of a hospital, a multiplicity of ‘objects’ was found (Mol 2002). Mol posited that there were different sets of relations and practices existing in various areas of the hospital that ended up producing multiple objects, all called atherosclerosis. These objects were made to cohere through a range of tactics ‘like transporting forms and files, making images, holding case conferences and conducting doctor-patient conversations’. Likewise, in the case of the EHR, the patient is now represented and constituted in electronic form. Consequently, ‘in electronically mediated communications, subjects now float, suspended between points of objectivity, being constituted and reconstituted in different configurations in relation to the discursive arrangement of the occasion’ (Poster 1990: 11). Systems have multiple types of actants existing in multiple dimensions, all enrolled in a dynamic and fluid network that cannot be captured by simply studying the system at a given point in time, in a given place.

The case study method has been used in the IS field both in a positivist way (Dube and Pare 2003), as well as an interpretive way (Walsham 1995b). It remains the most widely adopted qualitative approach in IS research (Orlikowski and Baroudi 1991). As a research strategy it focuses on ‘understanding the dynamics present within single settings’ (Eisenhardt 1989: 534) and combines various methods, including interviews, observation and documentation analysis (Yin 1984). There have even been attempts to develop a scientific methodology for case study research (Lee 1989) and more recently the approach has received considerable attention in the IS field (Chen and Hirschheim 2004). Some have argued that one deep case study with good story telling might generate better theory than a number of surface case studies (Dyer and Wilkins 1991).

From an ANT perspective, the problem with the case study method as it is commonly used is that it tends to set boundaries for the case even before the study has started. An ANT analysis only establishes boundaries as the investigation of the negotiations involved unfolds (Tatnall and Gilding 1999), in order that explanation are allowed to emerge and are not imposed. In this way, ‘ANT races against itself, against any tendency it might have to produce boundaries and thereby rule out possible future relationships’ (Lee and Hassard 1999: 392). ANT case studies are highly descriptive and invariably rely on judgment calls from the researcher as to which actors are important within a network, and which are not. Since ANT is ontologically relativist, it must allow for the world to be organized in many different ways. Overall, ‘the empirical would not be a passive collection of ‘raw’ materials silently awaiting the researcher’s gift of intelligibility, form and voice. Rather, it would be ‘the site of *active processing* – organizational participants, working and reworking not just their various descriptions of organizational form, but organizational form itself’ (Lee and Hassard 1999: 399). Interestingly, this approach is very much in line with current thinking in the management field that brings into question the traditional economic type conceptualizations of organizations and instead replaces it with the idea of a boundary-less organization (Arkensas et al. 1995). I will now describe my research questions.

Research Questions

RQ1: How has the process of deploying the EHR unfolded thus far?

My first research question was chosen to be necessarily broad in order to allow for a more uninhibited investigation of the phenomenon of interest. Having this space is important if we consider the pan-Canadian EHR as an effect. In other words, I do not assume that it exists but instead try to understand how it comes into existence. Therefore, my first research question amounts to the more colloquial ‘what’s really going on here?’

ANT, as an investigative lens, provides a means by which I may simultaneously account for both the discursive and material means by which innovations are constructed and contested, as they are put into play (Law 2007). ANT is ‘more concerned with changing recursive *processes*...it tends to tell *stories*, stories that have to do with the processes of ordering that generate effects such as technologies, stories about how actor-networks elaborate themselves’ (Law 1994: 18 emphasis in original). In using an ANT approach, the researcher relates a narrative in which a wide range of heterogeneous factors can simultaneously be taken into account when studying how information systems and other types of technological innovations become implemented (Tatnall and Gilding 1999). This is particularly important as a new technology is ‘profoundly shaped by the political, economic and social context in which it is mobilized’ (Spicer 2005: 886). Accordingly, instead of the observer’s eyes, the innovator’s hands will become the focal point of my investigation (Mol 2002). Thus, much of this thesis will be focused on trying to understand what Infoway is doing and how their ‘net-work’ is helping to materialize a pan-Canadian vision of healthcare.

As one of the champions of technological innovation (Howell and Higgins 1990), Infoway has used various means to try to materialize this new way of working, many of which will become important to the development of this manuscript. For instance, as mentioned before, a special supplement in the Globe and Mail was run with the headline ‘IT is a matter of life and death’. Infoway reasoned that in order to encourage healthcare professionals to adopt EHRs, the Canadian public needed to demand that their caregivers

use them. This illustrates the increasingly market-based orientation of the healthcare sector, where clients are expected to have a more powerful say in how their care is being delivered. However, the reality is that for the time being the power still very much seems to reside with the physicians (the keepers of the healthcare information) who have historically enjoyed a privileged position in the healthcare system (Arndt 2007). Innovation seems to have happened relatively slowly in this sector. Despite the promised benefits of the EHR, only about 37% of community-based physicians have adopted EMR systems into their practices⁷⁸. It seems to be imperative, according to Infoway, that such records be adopted and used by healthcare professionals in order to accrue the expected benefits of a technology-based healthcare system.

Stakeholders in the healthcare system seem to hold a somewhat diverse understanding of how the EHR could be useful in their own work, probably owing to the fact that their work itself is quite varied. Getting these various players to ‘share’ a vision of the EHR, and consequently align with each other and the technology, has become one of the key challenges for those interested in accelerating its diffusion and acceptance⁷⁹. Institutional entrepreneurs⁸⁰ mobilize various resources in their desire to legitimize (Munir and Phillips 2005) or even delegitimize an innovation (King and Soule 2007). Visions also seem to play an important role in the innovation process. For example, in their efforts to launch professional services automation software, institutional entrepreneurs built a community in which they ‘tried to develop a consistent vision incorporating compelling success stories’ (Wang and Swanson 2007: 61). Hence, my second research question is to do with visions.

RQ2: How do multiple stakeholder visions of the EHR inform our understanding of this process?

⁷⁸ <http://www.infoway-inforoute.ca/lang-en/about-infoway/news/news-releases/637>

⁷⁹ This was pointed out to me during one of my interviews with a CIO of a local hospital.

⁸⁰ In ANT terms, these actors are called heterogeneous engineers as they are mainly concerned with aligning human and non-human elements to occasion technology. Law, J. 1987. "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in: *The Social Construction of Technological Systems*, W. Bijker, T. Hughes and T. Pinch (eds.). Cambridge: MIT Press, pp. 111-134.

Research that involves an investigation of visions requires a shift away from usual methodological approaches. Instead of studying the adoption practices of specific individuals, the concern is more with evolving text and institutional presence (Swanson and Ramiller 1997). Such an approach requires more process-oriented, historical methods (Swanson and Ramiller 1997). Consequently, researchers should ‘follow the developing text’ wherever it may be evolving, including pertinent documents, work practices and conferences. Indeed, ‘what counts as ‘the technology’ is just as much the outcome of interpretative accounts - some more persuasive than others – as is what counts as the technology’s ‘uses’ or ‘effects’” (Hutchby 2001b: 443). It is important to note that I am more concerned with understanding how visions of the EHR can *inform our understanding* of the unfolding of the EHR system. Therefore, I use these visions more as a methodological tool to learn more about the innovation process. Accordingly, I take a more performative view of discourse where ‘discourse is not what is said; it is what constrains and enables what can be said’ (Barad 2003: 824). This helps me to avoid assigning any kind of essential existence to visions, as in my view, visions are always emergent, evolving and multiple. For instance, the fact that Infoway has put out a particular vision in the Vision 2015 document does not necessarily mean that stakeholders hold the same vision or, for that matter, those in Infoway may hold different understandings of the vision. To me, the Vision 2015 document is simply a particular materialization of a vision of the EHR system at a particular point in time. The question then becomes how do some visions come to marginalize others? What makes this vision more meaningful than others? How does this vision constrain or enable what is sayable?

My third research question focused on drawing out what the larger theoretical implications of this research might be, as our extant models seemed unable to adequately capture the complexities of the innovation process in a multi-stakeholder environment like the healthcare sector. After completing my research, I hoped to be able to say something useful about what may be lacking in our approaches and where future research might be focused.

RQ3: How does this understanding augment what we already know from extant innovation diffusion theory?

Over the past twenty years, the IS field has accumulated an impressively large body of work on IT-based innovation at the individual and organizational levels with considerably less work done at the inter-organizational or institutional level. In the inter-organizational context, it seems that communication would be an even more critically important factor in influencing the overall success of an innovation. In his landmark book *The Diffusion of Innovations*, Everett Rogers argued that *communication about the innovation* was usually not given enough attention by innovators as:

‘Many technologists believe that the advantageous innovations will sell themselves, that the obvious benefits of a new idea will be widely realized by potential adopters, and that the innovation will diffuse rapidly. Seldom is this the case. Most innovations, in fact, diffuse at disappointingly slow rates, at least in the eyes of the inventors and technologists who create the innovations and promote them to others’ (Rogers 2003: 7).

The logic followed in such an argument is that by properly communicating the benefits of an innovation to potential adopters, and not leaving it for them to discover at their own pace (or derive their own meanings of the innovation, as I will come to argue), the diffusion of the innovation may be accordingly accelerated. From innovation diffusion research, we have understood that an IT innovation has a greater chance of being adopted if the focal user or organization possesses a greater quantity of adoption antecedents (Jeyaraj et al. 2006). However, there has been an underlying adopter bias in the work that has assumed that since all innovation is good, users will inevitably make a rational decision to adopt it once they are presented with an adequate amount of information reflecting its benefits (Jeyaraj et al. 2006; McMaster and Wastell 2005; Rogers 2003). This has clearly not been the case with electronic health records, as practitioners still hesitate to switch over from paper-based systems despite being presented with an array of possible benefits. Perhaps, the explanation as to why a new system struggles to get

established over a legacy one cannot be easily articulated using purely technical arguments.

In an example of a more socio-technical oriented explanation of the innovation process, Tatnall and Gilding (1999) described the failure of the Dvorak keyboard to replace the highly inefficient QWERTY keyboard. The QWERTY keyboard was intentionally designed to slow down typists who were jamming earlier versions of the mechanical typewriter by typing too fast. Despite the fact that key jamming is no longer a problem with modern keyboards, the QWERTY keyboard still dominates the market today, as 'there are just too many things attached to it' (Tatnall and Gilding 1999: 961). Since the QWERTY keyboard occupied a stable position in an extended socio-technical network of both human and non-human actors, the newer Dvorak keyboard could not disrupt this network very easily. Consequently, even today the Dvorak keyboard remains quite marginalized, and underused, even though it was technically far more efficient. Such socio-technical 'messy' phenomena do not seem to be so easily accounted for using traditional research approaches and methods (Law 2004).

Classic diffusion studies have tended to focus on the innovation itself, taking it as a given and stable object that diffuses through the institutional environment relatively separate from its context and the various users it comes in contact with (Tatnall 2009). However, empirical evidence would suggest that this is not the way that innovation is taken up in practice. Some have gone so far as to suggest that diffusionism is largely 'delusional' as it promotes a largely asymmetrical view in which innovation originates in progressive centers and spreads out to an essentially passive recipient community (McMaster and Wastell 2005).

Much of the work in this area seems to have inadequately taken into account the important role that social and technical factors together play in influencing the diffusion process. Rogers clearly agreed that meaning was important as the 'subjectively perceived information about a new idea is communicated from person to person...the meaning of an innovation is thus gradually worked out through a process of social construction' (Rogers 2003: xx). This would suggest that researchers should perhaps accord more

attention to the methods by which meanings are made, and by whom, during the innovation process (this will be the focus of the next chapter i.e. reviewing what we already know about how meaning is made during the innovation process).

An important way that innovators attempt to shape technology use is by manipulating the meanings given to technology (Bijker et al. 1987). Through dialogue about the innovation, multiple meanings are assigned to technology, thus shaping how potential users understand it and its possible uses (Munir and Jones 2004). Arguments are constructed and organized with the aim of spreading the innovation among workers whose buy-in is essential to the project's success (Harrison and Laberge 2002). Innovation narratives sustain the innovation process across different areas of the organization (Bartel and Garud 2009). In this way, the innovation becomes established through the construction of consent among multiple stakeholders rather than coercion (Tuckman 1995). The overall instability of meaning would suggest that Roger's depiction of meaning being gradually worked out during the innovation process falls short of adequately capturing the richness of what is really going on in practice. I hope to be able to capture some of that complexity in my thesis and therefore tell a more nuanced story.

A New Research Question Emerges

At a very high level, my research approach involved collecting data, reflecting on that data, and then collecting more data. In this way, it was a very reflective, iterative and emergent process. During one of these iterations, a new research question emerged:

RQ4: How has the EHR come to be so meaningful in the healthcare reform agenda?

I did know that we (society) had the tendency to view information technologies as magic bullet solutions that will solve all our problems (Brooks 1987; Markus 1997). I also had a sense that the discourse of technology was particularly powerful in persuading people to embrace the 'new', as the new always seemed to be better than the old⁸¹. However, I was

⁸¹ I just have to think of how many cell phones I have gone through in the last several years. Was the new phone really a necessity? Or, is the whole industry actually predicated on the trope of the 'new'? Do we need all those functions that we are told we need?

specifically interested in knowing how information technology in the healthcare sector (EHRs in particular) had come to be understood in that way. How was the argument built such that EHRs had become virtually indispensable in the healthcare reform agenda? What methods were used? How did this reality come to occupy a privileged position over so many other possible realities? In ANT speak, I could say that the EHR had come to be an Obligatory Point of Passage (OPP) (Callon 1986b) in the healthcare reform agenda and I wanted to know why? An OPP is a point through which actors must pass in order to accomplish their goals (at least the innovator promotes it like this and tries to convince others of its truth). This is a way for the innovator to become indispensable. For instance, Infoway argues that pan-Canadian EHRs are an OPP to healthcare reform and, in so doing Infoway had also become indispensable to the healthcare reform agenda.

It seemed like nobody was really questioning the logic. Most everyone appeared to accept the idea that we first needed to put the EHR system in place and then we could worry more about all the other things that needed to be done. This knowledge seemed to have become a fact, a somewhat unquestionable fact. The belief was that everything would somehow fall in place if only we could get everyone to get on board and let technology work its magic. This seemed to be a potentially problematic stance, especially if one was to consider that innovation should be more associated with ‘opening up questions and possibilities’ (Barry 2001: 211) and not closing them down.

I felt that by first trying to answer this research question, before any other, I could possibly accomplish three things. First, I thought it would help me to be more mindful⁸² in my thesis work by not only grounding myself in the contextual specifics of the EHR, an area with which I was not familiar, but help me be more open to new information and perspectives. Second, it would help me gain a historical perspective explaining why the government is intent on focusing most of its efforts on trying to accelerate the implementation of the pan-Canadian EHR system. This would therefore help answer my first research question. Third, it would allow me to question the grounds on which the

⁸² Being mindful involves avoiding mindsets of categories and habits of thought born of repetition. It also involves stressing process over outcome, allowing free rein to intuition and creativity, and being open to new information and perspectives. Langer, E. 1990. *Mindfulness*. Reading, Mass: Da Capo Press.

connection between EHRs and healthcare reform has been made, thereby possibly helping to make a space for alternative insights to emerge. I sensed that these insights could help me answer my second research question about the role of visions. Overall, I wanted to be able to open up questions and possibilities.

I knew that in my investigation of this research question, my focus would have to be on *how* the connection between the EHR and the healthcare reform agenda had been made i.e. through what process? I was not so much concerned with why it was made, although the answer to this question should become apparent through this investigation. This suggested to me that my first concern should be with generating a rich description of how the EHR had come to be meaningful in relation to the healthcare reform agenda. In order to do this, I would need to understand more about how meaning is made in the innovation process. Somehow, I would need to locate meaning.

Data Collection

In a workshop called "Actor Network and After", Bruno Latour was noted to say that he had been helpfully reminded that the ANT acronym 'was perfectly fit for a blind, myopic, workaholic, trail-sniffing, and collective traveler' called the Ant.

An ANT scholar is concerned with carefully tracing the socio-technical networks that come to make up the phenomena of interest. Such socio-technical networks are considered to be 'ordering attempts in which entities seek to establish themselves as agents, building a network of alliances by constituting, mobilizing and juxtaposing a set of materially heterogeneous elements, obliging them to enact particular roles and fitting them together to form a working whole' (Doolin 1999: 97). As ordering attempts, nothing is ever a given. Everything is precarious as it involves work to keep it stable. Therefore, research that uses ANT aims to seek out controversies, instances where debate is still active. It is within such controversies that the various actants and their arguments become visible, for a time. Later on they may all disappear from view, as the network stabilizes. Consequently, 'following the actor' becomes the primary concern of an ANT researcher (Latour 2005b).

In the case of the pan-Canadian EHR actor-network, or an ‘institutionalised action-net...interconnecting acts of organizing’ (Czarniawska 1998: 26), I will need to identify important actors and actions as the investigation unfolds. The limits of the investigation cannot be known a priori, as ‘the scope of the network being studied is determined by the existence of actors that are able to make their presence individually felt on it’ (Law 1987). In this way, there are no obvious limits to the scope of my investigation in that I will go wherever the actors care to take me. Accordingly, I will try not to apply any pre-determined frameworks, theories or concepts. At the very least, I will be reflexive in my approach, always questioning and examining my assumptions.

My goal is to allow the actors to speak for themselves and find ways to help them to tell me their stories. No doubt, the actors I study will have many lessons to teach me, as they do not wait for me to define for them the world in which they live. They define it in their own way from their own perspectives. Furthermore, I will need to identify the numerous attempts at inter-definition, i.e., how actors define other actors. In order to do this, I will take lessons from Latour in his study of Pasteur, who used literature of the time to ‘find stories that define for us who are the main actors, what happens to them and what trials they undergo’ (Latour 1988: 9). These attempts at inter-definition are continually contested and resisted (Spicer 2005). It is in such ways that multiple actors order the world in which they live and it is these variations in order that become the relevant axes of difference to consider (Mol and Mesman 1996).

To identify the various actors and the ordering attempts in which they engage, the history of these various players will need to be examined. The history of particular actors will lead me to other actors, each with their own history and potential involvement in other networks. It is through this iterative ‘snowball’ approach that I have tried to uncover the web of inter-related networks. What the actors ‘say’ and ‘do’, and the way that they interact, became crucially important in helping me to understand what is going on.

Initially, my project started by following Canada Health Infoway and trying to understand how this organization has made its presence felt in the pan-Canadian EHR space. Through an investigation of many of their official communications, like annual

reports and business plans, I also gained a better understanding of some of the other actors that were important to acknowledge. In this process, I went back in history to the founding of Infoway in 2001, although I did not limit myself chronologically to this time period. There were events that happened before the founding of Infoway that were important for my story. My concern was to trace the various networks in order to try to understand how the EHR was becoming. Hence, my analysis tries to delineate the network of associations that make up the EHR.

From an ANT perspective, stories have great utility as evidenced by the following quotation:

'How laboratory members tell stories, how they formulate their past, is an important clue to a much more general issue: how it is(?) that they would like to order the organization in a much wider range of circumstances; and how it is the organization is being performed and embodied in a wide range of circumstances. For this is the point: stories are often more than stories; they are clues to patterns that may be imputed to the recursive sociotechnical networks' (Law 1994: 19 emphasis in original)

Visions can be considered to be but one form of storytelling. In my thesis research, I will be using visions a little differently than they may have been used in previous research. Visions have been usually understood to be perspectives. Accordingly, research was mainly focused on uncovering the structures and functions of organizations as presented by organization members through interviews or documents. In my work, these are representations and, as such, are not so much explanations for organizational action but are instead understood 'to serve as products of, and resources for, organization members' own ongoing (re) production and transformation of what it is that the organization comprises or could be' (Suchman 2000: 312). Therefore, I consider storytelling as one of the methods used by innovators to further their goal of aligning multiple stakeholders. They are *performative*. However, storytelling is also one of the methods used by an ANT researcher to help uncover and trace the various networks that allow the vision to be related in the way that it is. I ask the question: *What makes it sayable?* Indeed, 'as the

premises for decisions become inscribed in material artifacts, those artifacts assume the role of actors in the network' (Holmstrom and Robey 2005: 169). Ultimately, it is these underlying networks that I wish to trace and not necessarily the visions that lead me to them.

Following Latour (1988), the focus of my methodological approach has been to identify texts that will help me to understand at once both the *content* and the *context* of the pan-Canadian EHR. By content, I mean what are the transformations, drifts and diversions that constitute the work of making the EHR. By context, I mean to ask how the EHR is made to work through the invocation of other discourses. Accordingly, I will try to trace the network of associations that perform the EHR system, making it 'temporally emergent' (Pickering 1995). The semiotic method will help me to concentrate on the inter-definition of actors and the chains of translations as they appear.

The inter-definition of actors can be followed in the way that actors talk of other actors through reports, business plans, annual reports, and vision documents. In this way, actors are not only identified but also assigned some kind of a role. These chains of translations are the ways that the interests of one actor are projected onto another actor and thereby create a link between them that did not exist before. In this way, actors are enrolled and chains are formed. Innovation just does not diffuse through the power of its own inertia but must be taken up by people. Through this process of translation, the innovation becomes something...*but it involves work!*

The Scope and Scale of this Research

Social scientists tend to use scale to limit their study even before they enter the field. However, it is of little use to respect the actors' achievements if in the end we deny them one of their most important privileges, namely that they are the ones defining relative scale (Latour 2005b: 183-84). In my view, Latour's remarks about scale can be equally applied to scope. In an ANT influenced study, determining either scope or scale before the research begins is difficult and perhaps actually undesirable. When 'following the actor', an ANT researcher goes wherever the actor takes him/her, thus the choice is clear:

‘either we follow social theorists and begin our travel by setting up at the start which kind of group and level of analysis we will focus on, or we follow the actors' own ways and begin on travels by the traces left behind by their activity of forming and dismantling groups’ (Latour 2005b: 27). This uninhibited ability to trace the network wherever it may be is of critical importance, as the researcher is focused on trying to understand how those we study define their worlds. In this way, ‘actors are allowed to unfold their own differing cosmos, no matter how counterintuitive they appear’ (Latour 2005b: 23). They are the ones who determine scope and scale through their actions and inferences. We, as researchers, are mainly the means through which their actions become recorded. This is why, from an ANT perspective, either scope or scale cannot possibly be fully known ahead of time as both are an effect of the research process and hence defined through its activity.

In terms of both scope and scale, I can say that this research is mainly concerned with the specific activities of Canada Health Infoway as they relate to the pan-Canadian EHR initiative. These are the two primary actors in my narrative and their relation is the main focus of my concern. However, I had to begin by decentering the actors (Law 2002a), thereby enabling me to take a much wider approach to the topic of my research. Since ANT tells stories which ‘erode the analytical status of the distinction between the macro and micro-social’ (Law 1994: 18), both scope and scale become indeterminate as I began to understand what was important to my narrative. Once I felt that I had gathered enough knowledge about that which I was studying, I refocused on the actors with which I was specifically concerned. Analytically, ANT has a scalable notion of actor-networks in that ‘macro-actors are micro-actors sitting on top of many (leaky) black boxes’ (Callon and Latour 1981: 286). Overall, this methodological freedom proves to be quite beneficial, as ‘mixing levels of analysis may be useful in research and theory on information technology and organizational change’ (Markus and Robey 1988: 594).

Data Sources used for this Research

Controlling resources, controlling the environment, and controlling the world that is being built, all of these are aspects of the entrepreneurial activity of

scientists. In a sense then, they are not only practicing science - they are also practicing politics, economics, and sociology. Thus the analyst who follows scientists into their laboratories has no need to create his or her own categories and linkages. Since scientists are also practical politicians and sociologists, they are able to supply them in profusion themselves. *The job of the analyst is rather to study the creation of such categories and linkages, and examine the ways in which some are successfully imposed while others are not.* (Callon et al. 1986: 10, emphasis added)

From an ANT perspective, the work of a scientist or politician or entrepreneur is not unlike that of an innovator. The analyst is interested in understanding how innovators manage to build their worlds by imposing their meanings on other actors. This process of alignment results in their network being extended as more and more actors join their ranks and come to believe in what they believe⁸³. Non-conventional methods of data collection have to be used when studying meaning making in the innovation process. This is because meanings arise in places that are usually peripheral, and yet not insignificant, to the material creation of the innovation. Accordingly, I consulted a wide array of document sources, conducted interviews and attended a variety of conferences.

I will now provide a listing of the data sources that I used for my investigation, with a short description of each:

- Interviews with senior executives from industry, hospitals and trade associations (see Table 6 for a full listing). I interviewed these knowledgeable informants in an informal way, asking them questions about eHealth and healthcare renewal but letting them point to whatever they thought was important. I did not use any kind of specific structured question list although I had an idea of some of the things I wanted to talk about, especially as it pertained to the activities of Infoway. All the interviews were conducted between May and July 2008. I audio taped all the interviews and then had them transcribed afterwards. In total, I ended up with 112 pages of transcribed materials.

⁸³ I understand full well that using the term 'belief' in reference to non-human actors can be quite jarring to some. However, my point is that non-human actors are always represented, as they do not have their own voice, and it is, thus, these representatives that need to be recruited into the network.

Throughout this manuscript, I will make reference (as I already have) to excerpts from these interviews using a notation like (x:y). The *x* refers to the interview number and the *y* refers to the page number of the transcript from which that quote is taken.

Date	# of Pages of Transcription	Description
	14	Interview #14 President, healthcare technology company
	5	Interview #15 President, healthcare information association
	14	Interview #16 VP Healthcare, technology company
	17	Interview #17 Consultant
	20	Interview #18 Executive, healthcare information association (1)
	10	Interview #19 Executive, healthcare information association (2)
	26	Interview #20 Hospital President
	16	Interview #21 VP and CIO, Hospital
TOTAL	112 pages	

Table 6: Research Interviews

- Official Reports produced by government-sponsored commissions (e.g. Rock, Romanow and Mazankowski Reports), government bodies (e.g. Health Canada) and other groups (e.g. Canadian Medical Association or Canadian Institute for Health Information) about the state of healthcare in Canada (see Table 7 for a full listing). The government-sponsored reports were particularly useful for several reasons. Many of the reports were produced after extensive consultation with various kinds of stakeholders that made up the healthcare system and as such, were useful in trying to understand specifics of the purported collective vision for healthcare. In those vision documents, many of the supposed problems of the existing healthcare system were also revealed. Most importantly, I was trying to gain a sense of what kind of arguments were being made, by whom and how. I also wanted to gain a sense of how those arguments changed over time.

Along with this main set of reports, I also read carefully through many other supplementary reports. The main texts totaled approximately 944 pages. In particular, I was looking specifically for instances where key words such as ‘collaboration, integration, pan-Canadian, EHR, partnership, accountability, alignment, coordination, share’ were used.

Table 7: Supplementary Reports

Year	Name of Report	Published by	Pages
1997	Towards a Canadian Health I-Way: Vision, Opportunities and Future Steps	Canadian Network for the Advancement of Research	18
1997	Canada Health Action: Building on the Legacy	National Forum on Health	56
1999	Canada Health Infoway: Paths to Better Health (Rock Report)	Advisory Council on Health Infostructure	67
2000	First Ministers’ Meeting Communique on Health	First Ministers	6
2000	Canada E-Health 2000: From Vision to Action	Health Canada	28
2001	A Framework for Reform (Mazankowski Report)	Premier’s Advisory Council on Health for Alberta	72
2002	Building on Values: The Future of Healthcare in Canada (Romanow Report)	Commission on the Future of Health Care in Canada	356
2002	Advancing Electronic Health Record in Canada	Canadian Medical Association	8
2002	Strengthening the Foundations: Modernizing the Canada Health Act	Commission on the Future of Health Care in Canada	37
2002	Reforming Health Protection and Promotion in Canada: <i>Time to Act</i> (Kirby Report)	Standing Senate Committee on Social Affairs and Technology	67
2003	2003 Accord on Healthcare Renewal	First Ministers	10
2004	2004 10-year plan to strengthen healthcare	First Ministers	10
2005	Canada’s Health Care System	Health Canada	26
2007	Health Care in Canada	Canadian Institute for Health Information	63
2007	Vision 2015: Advancing Canada’s next generation of Healthcare	McKinsey & Co. commissioned by	36

		Infoway	
2009	Value for Money: Making Canadian Health Care Stronger	Health Council of Canada	48
2010	Charting a path to Sustainable Health Care in Ontario	TD Economics	36
		TOTAL PAGES Examined	944

- Infoway Annual Reports (2003 to 2009) and Infoway Business Plans (2003-2009). These documents were used to gain an understanding of what Infoway's activities and concerns were. Also, I managed to get a sense of how the organization itself was changing over time. Both the Annual Reports and Business Plans were available openly through Infoway's website. Again, I was looking specifically for instances where key words like 'collaboration, integration, pan-Canadian, EHR, partnership, accountability, alignment, coordination, share' were used. In total, these reports amounted to about 500 pages of content.

- EHR News @ Infoway: Newsletter published by Infoway (2003-2009) (13 issues). This was also a way for me to learn more about Infoway's relationship to healthcare stakeholders and the kind of arguments Infoway was using to further their agenda. These amounted to about 40 pages of content, as the newsletters were short (typically 3-5 pages).

- Vision 2015: This was a nicely packaged, professionally printed, vision document commissioned by Infoway and produced by McKinsey & Company after extensive consultation with various stakeholders across Canada. It was useful in helping me to trace the arguments that were being made and, importantly, the kinds of networks that needed to be in place in order to support those arguments. I asked myself how was this sayable? This document helped me get a better sense of Infoway's intended activities and main arguments in relation to their agenda. Overall, the Vision 2015 document rendered a comprehensive overview of the pan-Canadian collaborative vision of healthcare.

- **Healthcare Conferences:** I had the opportunity to attend several healthcare conferences over the course of my thesis work including a national e-Health conference, a pan-Canadian standards collaborative conference as well as some smaller information sessions and partnership conferences run by Infoway. It was at these conferences that I gained a greater appreciation of the sheer diversity of the healthcare stakeholders involved, as well as those noticeably missing, and the immensity of the challenge in trying to connect their various perspectives. I also gained a better sense of the passion and concern that these stakeholders had in trying to bring about the needed change. I engaged in some informal note taking and at one conference taped some of the presentations. I also took the opportunity to converse with various stakeholders and share some of my ideas. My intention was to see what they thought of some of my insights. I used the information that I gathered to provide further context.

- **Canadian Healthcare Technology:** This is a twice-monthly compendium of key I.T.-related news from Canadian Healthcare Technology sent to me through email. I skimmed the articles looking for things related to my thesis work. Whenever Infoway was mentioned, I made sure I read the entire article. For instance, in the Oct. 7, 2010 issue, one of the headlines read ‘Infoway to invest \$380 million in physician systems’. I also learned a little about efforts to technologize healthcare in other provinces, as this publication had a pan-Canadian focus. Notably, it also had a pan-sector focus in that it talked about issues in both the public and private sectors. I had been subscribing to this publication for over a year.

A Note On My Research Method

In investigating the answers to my research questions, I have tried to be as methodical as I possibly can. However, I am also cognizant of trying to reduce the influence of my research method on my findings. I want the phenomenon I study to appear to me in as pure a form as possible (seeing through to what is, as Nietzsche would say). I understand that this is a serious challenge and I accept the fact that some influence is always present. Despite this, I have tried to use whatever lens or whatever approach to collecting data that will help me answer my research questions without being stuck with one particular method and all the excess baggage that comes with it⁸⁴. This is why I chose to decenter ANT a little and also chose to employ dialogic approaches.

My overall approach has been largely hermeneutic by nature. I have tried to oscillate between the parts and the whole to get a better sense of what is happening as health care is being reformed. My first inclination was to zoom out and investigate the way that the government was trying to bring about change in the healthcare system. Mapping controversy seemed like a good place to start, as it was here that I thought I could gain a better sense of what was happening, as things were being unraveled. Specifically, I wanted to understand the government's reasoning for focusing on accelerating the implementation of a pan-Canadian electronic health record system. Was this a good approach to bring about healthcare reform? Would it achieve a pan-Canadian vision of healthcare? Then, I zoomed back in by trying to understand what Infoway's role was in this process. This approach allowed me to 'unpack complexity by zooming in – or collapse complexity by zooming out' (Monteiro 2000: 244). In retrospect, I zoomed in and out continuously throughout my thesis work. By zooming in and zooming out, again and again, I hoped that I would learn something useful about the innovator's role in relation to technology-based innovation and more specifically how the pan-Canadian vision of healthcare was desperately struggling to become occasioned. This also helped me to better record the intra-active becoming of the pan-Canadian EHR system.

⁸⁴ In my efforts to publish some of my other work, I am constantly reminded as to how much 'baggage' Actor-Network Theory has.

At a more methodical level, I used the framework of sociologies introduced by Latour (1987) to study ‘the unpredictable and heterogeneous networks of links and associations that constitute the construction, accumulation, and mobilization of knowledge in the face of controversy’ (Fountain 1998: 119). I thought that this would be a useful way to frame my investigation, as I was interested in understanding how the pan-Canadian EHR had come to be so meaningful in the healthcare reform agenda and in the process how certain other knowledges and voices had come to be marginalized. Accordingly, I informally reflected on the five groups of questions that Latour provides as part of his approach (adapted from (Petrina 2007: 142)):

1. Mapping: What points of view are linked to which other points of view? Who is saying what about what?
2. Credibility: How credible are the points of view? What are the strengths of the links between points of view?
3. Legitimacy: Who and what have a voice and role in the controversy? Who is excluded and why?
4. Movement and change: How are the design and technologies modified in the arguments? How are the arguments modified in the controversy?
5. Resolution: How will the controversy be settled or resolved? What are the options?

Working through these questions (See Appendix 3 for a more complete listing of questions related to sociologies) helps me to understand the logical and political ways in which controversies are formed, addressed and resolved (Fountain 2001; Fountain 1998). Even though these questions resonated with me during my thesis investigation, I chose not to use them formally to frame my results as I thought that it would force me to be bound to a more formulaic approach. Again, I wanted to keep things as free flowing as possible⁸⁵.

⁸⁵ I believe that by keeping things free flowing, RQ4 was allowed to emerge.

As I zoomed in and out, there were also several non-human actors that were integral to my method. I carried a notebook around with me wherever I went. I would find myself jotting down thoughts at conferences or even at the mechanic's shop while I was waiting for my car to be fixed. I found that flashes of insight can happen anywhere, as it seems that the subconscious mind is always working on whatever you plant in it. Many of these insights only served as foundation for further insights. In this way, I went from insight to insight being cognizant of trying to refrain from drawing conclusions that may inhibit this process. By the time I finished writing this thesis, my notebook was full i.e notebook saturation⁸⁶. I also had a whiteboard, at home, on which I jotted down the big picture and erased the big picture when it did not seem quite right. Much of my learning came when I tried to figure out how I would narrate my story in this thesis. Indeed, the structure of this thesis is a reflection of how I see things unfolding. Again, the brilliant thing about the whiteboard was that it was easily erasable. This ability to start over was also integral to my general method. After many dialogic interactions at the Coffee Shop, between my supervisor and I, he instructed me to put my current document aside and start over. At first, this was frustrating. However, I soon came to realize that it was actually more liberating, as I could write fresh based on new insight.

Now that I have given the reader a better sense of the theoretical and methodological approaches that I have chosen to use in this thesis and an overview of some of my empirical sources, I will next turn to the literature to see what we know about how meaning is made in the innovation process. Until this point, I have argued that meaning is something that has been largely neglected in innovation research. Yet, there are particular research streams that can usefully contribute to this discussion.

Chapter Four: Locating Meaning in the Innovation Process

⁸⁶ This reminds me of a fictitious anecdote that Latour relates in which a student asks a professor about how you know that you are done your thesis if you are using the ANT method. His response is 'you stop when you have written your 50.000 words' (my thesis is close to 100,000) Source: <http://www.bruno-latour.fr/articles/article/090.html>.) This indicates the arbitrariness of the 'stop point' (could be when funding runs out or time runs out or whatever). In my case, it was always going to be 'notebook saturation'.

As I pondered my last research question ‘How has the EHR come to be so meaningful in the healthcare reform agenda?’ and what my possible responses to that question might be, I realized that I needed to understand more about what we already know about how meaning is made in the innovation process. This quest to locate meaning, through what has been said before, took me through several literatures and theoretical approaches. Each literature seems to portray a slightly different but useful sense of how meaning is made. Together, they laid the groundwork for what I consider to be a more nuanced understanding that will follow in successive chapters.

An innovation is ‘an idea, practice, or object that is *perceived as new* by an individual or another unit of adoption’ (Rogers 2003: xx). Due to its newness, an innovation inevitably results in some degree of uncertainty, as the potential adopter is often unsure about what it means in the context of their work. Being generally incredulous by nature, potential adopters question whether the innovation is actually any better than their previous ways of doing things (Machiavelli 2004). Thus, they become motivated to seek information from others in order to cope with the uncertainty that is created and, in this way, the meaning of the innovation becomes gradually worked out (Rogers 2003). This logic suggests that meanings are quite critical in influencing whether the innovation will eventually be taken up, as these meanings are very much a part of the interpretative struggle and everyday sense-making that occurs in organizations (Boje 1991).

There have been several literatures that have attempted to deal with meaning making in the innovation process. I do not claim that this is a comprehensive collection, by any means. There may be other literatures that I have not considered. These are simply those literatures that were consequential in influencing the way that I began to think about meaning making and hence were important to the development of this thesis. I will now give a brief overview of each to lay the groundwork for what is to follow.

4.1 Diffusion of Innovation

Early work on the diffusion of innovation was focused on the fields of agriculture and health, especially in developing economies. Puzzled to know why farmers did not adopt new ideas that could have been profitable to them, Everett Rogers came to posit that ‘factors other than just economic explanations must have been at work’ (Rogers 2003: xv). As he furthered his own investigative work and reflected on the work of others who had come before him, he proposed the idea that innovation diffusion may in fact be a ‘universal process of social change’ (Rogers 2003: xv), not bound by the type of innovation studied, who the adopters were, or by place or culture⁸⁷. Accordingly, he

⁸⁷ The reader may feel that this section carries an inordinate amount of citations from Roger’s landmark book *Diffusion of Innovations*. This is done on purpose to give the reader a better sense of the general spirit of Rogers work since it is so foundational in the study of innovation. I hope to also bring to light some of his ideas that seem to have been largely neglected by many IS researchers in this area.

suggested that research in this area should be highly cross disciplinary⁸⁸ but with a firm grounding in communication theory. From his understanding, the diffusion of innovation was ‘essentially a social process in which subjectively perceived information about a new idea is communicated from person to person. The meaning of an innovation is thus gradually worked out through a process of social construction’ (Rogers 2003: xx). This view suggests that communication and meaning making are important factors to consider in the innovation process.

Rogers specifically suggests that the innovation-decision process consists of ‘a series of choices and actions over time through which an individual or a system evaluates a new idea and decides whether or not to incorporate the innovation into ongoing practice’ (Rogers 2003: 168). This further highlights the complex and influential nature of an individual’s perceptions of an innovation on the adoption process. Perhaps understanding such perceptions can prove useful to technological experts, as taking into account the potential user’s (or manager’s for that matter) perceptions of an innovation rather than the technologist’s is essential in overcoming the pro-innovation bias i.e. that all innovation is good and therefore resistance to adoption should be overcome. This inordinate focus on the innovation itself, by many diffusion researchers, has inadvertently resulted in a lack of sensitivity to understanding the full range of its consequences (Rogers 2003).

Problematically, as Rogers contends, common cross-sectional methods are unable to answer many of the ‘why’ questions about diffusion. Innovation and the social change process can be studied more accurately ‘if the spread of a new idea is followed over time as it courses through the structure of a social system’ (Rogers 2003: 104). Hence, diffusion studies should rely more on ‘moving pictures’ of behavior rather than ‘snapshots’. This suggests that the scope of future diffusion research should be broadened to include studies of the entire process through which an innovation is generated and sustained. Rejection, discontinuance, and reinvention frequently occur during the diffusion of an innovation and such behavior may indeed prove to be rational and

⁸⁸ Innovation research today probably encompasses the widest most diverse body of literature of any one area in the social sciences.

appropriate from the individual's point of view (Rogers 2003). Unfortunately, many diffusion studies do not seem to have adequately taken into account the individual's perception of the innovation as it relates to the individual's situation.

New ideas tend to be perceived in relation to existing practices that are already familiar to the individual (Harrison and Laberge 2002). Similarly, new information systems are usually perceived in relation to the legacy systems that they are trying to replace. However, change agents who introduce an innovation often commit an empty vessels fallacy in which potential adopters are seen as blank slates that lack any relevant experience with which to associate the new idea. In the past decade, the empty vessels fallacy has been largely overcome in agriculture, health, and family planning by acknowledging and analyzing indigenous knowledge systems (Rogers 2003). For example, in a study of the interplay between telemedicine and local healthcare practices, it was found that 'the spread of scientific medicine is not just a matter of formal education or information transmission. It must deal with the contexts in which people live, and the social environments they constitute because it is there that scientific medicine is expected to be accepted and meaningful in shaping activity' (Miscione 2007: 414). Furthermore, in its daily use, 'the telemedicine system underwent adaptation due to the encounter with local contexts' (Miscione 2007: 415).

Effective change agents take account of indigenous knowledge systems, understanding that when individuals share common meanings, beliefs, and mutual understanding, communication between them is more likely to be effective (Rogers 2003). This implies that 'the general picture of an innovation champion emerges not as a particularly powerful individual in an organization, but rather as someone particularly adept at handling people, an individual skillful in persuasion and negotiation'⁸⁹ (Howell and Higgins 1990; Rogers 2003: 415). This view is supported by research suggesting that

⁸⁹ This conception of power matches quite well with the conception of power in ANT, where power is not something that someone has. It comes from the alignment of actants who are persuaded to do what you want them to do (the act of translating interests) and as a result you gain power. Accordingly, the innovation has no power of its own but is 'moved' by those who take it up. As Latour argues, power can't be something that is used to explain action, it needs to be explained. Latour, B. 1986. "The Powers of Association. Power, Action and Belief. A New Sociology of Knowledge?," in: *Sociological Review Monograph*, J. Law (ed.). pp. 264-280.

champions use transformational leader behaviors and influence tactics to promote technological innovations (Howell and Higgins 1990). Furthermore, promoting an innovation seems to involve a process of mutual adaptation in which the champion, the innovation and the organizational system change in important ways (Westley et al. 2007). Based on the understanding that the innovation is developed in context through various processes, then ‘cultivating these processes through tentative alignments can make development efforts more accountable to local contexts’ (Miscione 2007: 422).

As a consequence of accepting the possibility that reinvention could occur during the innovation process, a different view of adoption behavior emerges where ‘instead of simply accepting or rejecting an innovation, potential adopters are active participants in the adoption and diffusion process, struggling to give meaning to the new information as the innovation is applied to the local context’ (Rice and Rogers 1980: 512). Consequently, an innovation might be perceived somewhat differently by each adopter and accordingly modified to suit the individual's particular situation. In general, diffusion scholars and innovators should recognize that an innovation is never ‘perfect as is’ for all potential adopters in solving their problems and meeting their needs. In fact, a successful innovation is usually one which can be flexible enough to be used in heterogeneous ways, like a piece of highly customizable software (Quattrone and Hopper 2006). Thus, innovations are ‘not only constructed by their designers, they are also reconstructed by their users’ (Rogers 2003: 188).

A higher degree of re-invention of the innovation seems to lead to a faster rate of adoption and greater sustainability (Boczhowski 1999). In other words, if many of an organization's members participate in designing, discussing and implementing an innovation, its sustainability over time seems to be more likely (Rogers 2003). When organization's members modify an innovation, as they adopt it; they begin to regard it as their own and are more likely to continue its use over time. Organizations seem to ‘adopt not a specific blueprint for an innovative activity, but a general concept whose operational meaning gradually unfolds in the specification process of adopting and implementing the new idea’ (Rice and Rogers 1980: 503). For instance, an SAP system

was found to emerge from multiple and continuous translations which enabled it to travel across multiple sites in the organization, thereby enhancing intra-organizational diffusion (Quattrone and Hopper 2006). In this way, an innovation may be able to more appropriately match any preexisting problems and consequently be more responsive to new problems (Rice and Rogers 1980: 504). Consequently, reinvention may not necessarily be bad and may be ‘a natural part of the innovation process’ (Rice and Rogers 1980: 509). Overall, this literature suggests that an innovator should perhaps be more concerned with occasioning conditions that better foster reinvention and help encourage the creation of new meaning.

4.2 Technology Adoption

The Technology Acceptance Model (TAM) is perhaps the most widely used model in information systems (Lee et al. 2003), as well as the most well-recognized IS model outside of the field (Benbasat and Barki 2007). The Davis (1989) article, in which the constructs of perceived usefulness and perceived ease of use are presented as antecedents to the intent to use, is also one of the most frequently cited papers in the IS field (Venkatesh et al. 2007). Davis (1989) defined perceived usefulness as ‘the degree to which a person believes that using a particular system would enhance his or her job performance’ and perceived ease of use as ‘the degree to which a person believes that using a particular system would be free from effort’. The model has been extremely robust, being replicated several times (Adams et al. 1992), as well as shown to have good predictive validity (Szajna 1994) and high test-retest reliability (Hendrickson et al. 1993). More recently, TAM has been integrated with other competing models into a unified model of the user acceptance of IT (UTAUT - Unified Theory of Acceptance and Use of Technology), which has been shown to have high explanatory power (Venkatesh et al. 2003). Overall, this body of research has provided strong evidence that perceived usefulness and perceived ease of use are important factors in influencing the intent to adopt technology. More importantly, for the purposes of my arguments, this work has also shown that individual perception of an innovation is an important influence in the innovation process. In other words, the meanings that potential adopters derive when they

encounter an innovation are consequential factors that should be considered in the innovation process.

Even though TAM has greatly benefitted the IS field by helping researchers explain many types of adoption behaviors, the overly intense focus on TAM has also led to several dysfunctional effects (Benbasat and Barki 2007). For instance, there has been a limited investigation of the full range of consequences of IT adoption as a result of the one-dimensional measure of IT acceptance in terms of system use (Burton-Jones and Straub 2006; Doll and Torkzadeh 1998; Schwarz and Chin 2007), lack of attention to the IT artifact itself (Orlikowski and Iacono 2001) and an uncritically accepted assumption of a linkage between intention and behavior (Bagozzi 2007). Furthermore, the illusion of progress in knowledge accumulation along with the multiple efforts to extend TAM and keep the model relevant in the face of the evolving contexts of technology adoption may have led to a state of ‘theoretical confusion and chaos’ (Benbasat and Barki 2007: 212). Even though TAM seems to have been successfully extended in several ways (e.g. UTAUT (Venkatesh et al. 2003)), technology acceptance research has generally not been able to account adequately for group, cultural or social aspects of innovation adoption decision making (Bagozzi 2007). This also suggests that the role of shared meanings of innovation may not have been adequately considered. Some have even gone as far to suggest that TAM may even be a methodological artifact due to its unresolved issue of Common Methods Variance (Straub and Burton-Jones 2007). Importantly, an emergent view of IT adoption may be better able to recast the notion of IT acceptance to include a wider array of behavioral and psychological factors than has tended to be included in the past (Schwarz and Chin 2007).

TAM has been extremely valuable to the historical development of the Information Systems field (Goodhue 2007); however, it may now be the opportune time to make way for some new paradigms (Bagozzi 2007) and alternative theorizations (Venkatesh et al. 2007) to develop. Looking ahead, Lucas et al. remark that ‘we see the necessity for *more fully accounting for technological, institutional and historical contexts*, leading us to suggest that our research should be more oriented toward *telling rich and complete*

stories of innovation with information technology' (Lucas et al. 2007: 208, emphasis added). It seems that only when we fully account for contexts, are we able to see that innovations can carry multiple meanings for multiple actors and these meanings can become quite consequential in the innovation process.

4.3 Narratives of Organization

Corporate narratives concerning technological change are often constructed around a linear event sequence that sanitizes the change process and presents a story from which others can formulate neat linear prescriptions on how to implement the new technology (Dawson and Buchanan 2005). However, empirical evidence suggests that technological change is actually a complex political process imbued with multiple versions of events which compete with each other for dominance to see which might eventually become the definitive change account and therefore transcend the other narratives held by the various communities that compose an organization (Robichaud et al. 2004). A new idea does not seem to move of its own accord as it requires a force to fetch it, seize upon it for its own motives, move it and often transform it (Czarniaswka and Sevón 1996; Latour 1988). Through this process, an idea never travels directly from point to point, but always through a risky intermediary pathway (Latour 1999b). Put another way, an idea is never given in the order of things as fact or fiction; it is made so by others, later on (Latour 1987).

Organizational narratives co-orient organizational members by helping them relate to each other through some common object of concern (Bartel and Garud 2009). To that end, texts are constructed and these texts, in turn, become a context for future conversations (Taylor and Robichaud 2004). In this way, text and agency are inevitably intertwined, in that agency draws on the resources of language to effect co-orientation while the texts that people produce reflect their involvement in a mixed, or 'hybrid', material and social environment. Thus, the innovation becomes adopted as it evolves both socially and linguistically. To separate the two by analyzing language without reference to context, or context without reference to language, is to misunderstand both how language works and the social/linguistic basis of agency (Taylor and Robichaud 2004).

For efficient ‘organization’, members should collectively align their ways of dealing with the objective world, while simultaneously being situated within a particular social world and the demands that it creates. The leader is responsible for building and promoting this shared vision (Lewis 1997). If organizational members are simply engaged in action but are not co-oriented, perhaps they are not what we would call organized. Navigating the tension between trying to establish co-orientation and responding to a heterogeneous material and social world could be considered to be the essence of organizational work (Star and Greisemer 1989). However, it is often the case that organizational members do not become so easily aligned. For instance, it was found that the rhetoric of IS adoption from the government was quite different from the reality of IS adoption (Wainwright and Waring 2007). It seems that it is through the ‘mangle of practice’ that meanings tend to emerge (Pickering 1995; Taylor and Robichaud 2004).

In their study, Prasad & Prasad (1994) found that the concept ‘professionalism’ held multiple meanings at the local levels of the organization. These meanings shaped the process of sense-making around work computerization and thereby influenced the adoption and implementation of computers in the organization (Prasad and Prasad 1994). Also, the way the ideology was understood had ramifications for what was determined to be professional versus unprofessional conduct (e.g. complaints). One of their most striking findings was that ‘computers were a *presence* long before their physical introduction into the organization...employees had already constructed realities around it in the course of their daily conversations, interactions and work practices’ (Prasad and Prasad 1994: 1441-1442). Indeed, certain aspects of innovation tend to be idealized or exaggerated at the expense of others, thereby leading to a narrow focus of issues during technological change (Feldman and March 1981).

In *The Rhetorical Construction of Chicago's Electric Future*, Throgmorton (1996) argues that planning involves more persuasive storytelling than technically oriented activities. Planners are focused on ‘trying to persuade specific audiences in specific contexts to accept proposed explanations, embrace inspiring visions, undertake recommended actions, and so on. But it would also acknowledge that such persuasive efforts take place

in the context of a flow of utterances, replies, and counter replies' (Throgmorton 1996: 39). Importantly, planning is not just a form of persuasive storytelling but also more importantly it is dialogic and constitutive storytelling that occurs within a web of relationships and partial truths. In this view, planners can be regarded as:

Authors who write future-oriented texts (plans, analyses, articles) that reflect awareness of differing or opposing views and that can be read (constructed and interpreted) in diverse and often conflicting ways. But planners do not simply write texts; they are also characters whose forecasts, surveys, models and other tools act as tropes (persuasive figures of speech and argument) in the planning stories that others tell. (Throgmorton 1996: xiv).

Consequently, 'good' authors do several things (Throgmorton 1996). They build conflict, crisis and resolution into their narratives, such that key protagonists are somehow changed or moved significantly. They also build characters into their narratives, characters who are interesting and believable, and whom readers (many of whom are also characters in the stories) care about. Furthermore, they place the action in its rightful context, which means acknowledging the settings in which those characters come into conflict. Finally, they adopt an appropriate point of view and use the imagery and rhythm of the language to express a preferred attitude towards the situation and its characters.

The study of storytelling in organizational work acknowledges the powerful role of discourse to not only describe the worlds we live in but also to constitute them. Indeed, 'when words and images remake our past, present and future, they also remake the personae of those of us who accept the new realities' (Booth 2004: 17). Perhaps even more fundamentally 'storytelling is the preferred sense-making currency of human relationships among internal and external stakeholders' (Boje 1991: 106). Therefore, this literature suggests that stories and the meanings we derive from them seem to be highly consequential to the innovation process.

4.4 Boundary Objects

Louis Pasteur needed to convince the minister, the veterinary surgeons, the peasants and his fellow microbiologists that the rod bacterium was indeed the cause of anthrax (Latour 1988). Indeed, scientific-related work is inherently heterogeneous as it invariably exists at the intersection of various participating social worlds and therefore necessarily involves cooperation among many different kinds of actors with many different viewpoints (Star and Greisemer 1989). Through such cooperation, the construction of innovation seems to be more of a *collective* process (Latour 1987: 29) where the creation and management of boundary objects seems to be a 'key process in developing and maintaining coherence across intersecting social worlds' (Star and Greisemer 1989: 393).

In natural history work, boundary objects are produced when sponsors, theorists and amateurs collaborate to produce representations of nature (Star and Greisemer 1989). Specimens, field notes, museums and maps of particular territories seem to hold a boundary nature in that they are simultaneously concrete and abstract, specific and general, conventionalized and customized i.e. they are often internally heterogeneous. In order to meet the scientific goals of the museum, innovators had to develop, teach and enforce a clear set of methods to 'discipline' the information obtained by collectors, trappers and other non-scientists. In addition, they needed to generate a set of boundary objects that would maximize both the autonomy and communication between different social worlds. Boundary objects 'both inhabit several intersecting social worlds and satisfy the informational requirements of each of them' (Star and Greisemer 1989: 393). In this way, they are both flexible enough to adapt to local needs and the constraints of several parties employing them, yet robust enough to maintain a common identity across sites. Accordingly, 'they have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation' (Star and Greisemer 1989: 393).

In their study, Star and Greisemer found that conventional forms of control were not sufficient enough to accomplish the goals of the museum but that other means were also

necessary to ensure cooperation across divergent social worlds. These means were not engineered as such by any one individual or group, but rather emerged through the work process. Consequently, a dialogic process was activated where 'consensus is not necessary for cooperation nor for the successful conduct of work...because these new objects and methods mean different things in different worlds, actors are faced with the task of reconciling these meanings if they wish to cooperate...actors translate, negotiate, debate, triangulate and simplify in order to work together' (Star and Greisemer 1989: 388). As groups from divergent social worlds started working together, they unwittingly created various sorts of boundary objects. Overall, the intersectional nature of the museum's shared work⁹⁰ created objects which inhabited multiple worlds simultaneously, and which needed to meet the demands of each one.

Boundary objects are able to carry multiple meanings for various stakeholders and therefore become a key way of developing and maintaining coherence in the innovation process (Carlile 2004). In such contexts, like new product development (Carlile 2002), it was important that knowledge flow across boundaries, between different communities of practice involved in the innovation process. The boundary object was 'a means of representing, learning about, and transforming knowledge to resolve the consequences that exist at a given boundary' (Carlile 2002: 442). In Bechky's (2003) very interesting study, she suggests that knowledge is shared in organizations through the transformation of occupational communities' situated understandings of their work. She shows how technicians, through the use of boundary objects such as drawings and stories, mediated the misunderstandings between engineers and assemblers that were rooted in their differences in language, locus of practice, and conceptualization of the product. In particular, she found that when communication problems arose they were overcome by 'cocreating common ground that transforms their understanding of the product and the production process' (Bechky 2003: 312). Through such interaction in common space, a richer understanding of the problems they faced was generated. In my view, this was an inherently dialogic process as 'collective coherent ways of thinking and acting only

⁹⁰ Perhaps museum work and medical work are not that much different, in that they both involve the collaborative effort of a variety of workers in order to accomplish particular goals.

emerge when there is truly a flow of meaning, which starts out with allowing many views, an approach that defensiveness precludes' (Bohm 2004: xi). Finding material ways to help often disparate meanings to dialogically interact becomes a key challenge for any innovator as usually one meaning has the tendency to marginalize countless others. In fact, in many cases, it is the innovator that seems to promote particular meanings of the innovation, at the expense of others, because he/she believes that their way is the better way to promote the innovation. Later in this thesis, I hope to suggest a different approach that an innovator may take.

4.5 Visions of Innovation

The work done on organizing visions of innovation (Ramiller and Swanson 2003; Swanson and Ramiller 1997) is also quite useful to consider in relation to meaning making in the innovation process. When faced with novel technologies, managers must develop a conceptual understanding of how that innovation might benefit their organization. This conceptual framework, or organizing vision, plays an instrumental role in the way innovations are applied and diffused as the vision influences how managers approach and deal with the innovation. However, building a credible and useful vision is usually quite problematic as the innovation itself is often immature, ill defined and poorly understood.

Adding to the confusion is that multiple visions of the innovation seem to originate from a variety of stakeholders in the inter-organizational community often with conflicting interests. These visions seem to continually drift as various stakeholders, including adopting organizations, struggle to make sense of their ongoing experiences with the emerging and evolving innovation. For instance, it was found that the organizing vision of the EMR was 'not yet sufficiently motivating to these physicians to overcome their hesitance to adopt in the face of very practical barriers like upfront investment costs' (Reardon and Davidson 2007). Furthermore, adding to the complexity is that such visions of technology need to be relatively ambiguous in order to be able to diffuse throughout the organization. For instance, 'if SAP were a product of *de-finition* (i.e. has clear features, parts, and function to unambiguously meet user information needs) it would not

travel well for it would lose the malleability necessary for mediating, forging alliances, engaging diversity, and satisfying users' divergent and emergent information needs' (Quattrone and Hopper 2006: 237 emphasis in original). In this way, 'conceptualizing SAP as a working technology with precise definitions (i.e. a well *de-fined* black box) neglects how each definition is ambiguous and incomplete, and how this enables SAP to translate, get translated, and engage a conglomerate of humans (users) and non-humans (e.g., accounting excel spreadsheets)...it is the tensions in 'de-finitions' that enable SAP to become a working IT system' (Quattrone and Hopper 2006: 237 emphasis in original). This body of work suggests that organizing visions, taken as meanings or perceptions ascribed to innovations, are influential in the innovation process. However, importantly, they seem to be continually evolving in response to the dialogical interaction between the innovation and its context⁹¹.

4.6 Affordances

Each thing says what it is....a fruit says "Eat me"; water says "Drink me"; thunder says "fear me"... (Koffka 1935) as quoted in (Gibson 1986).

The assertions of the Gestalt psychologists that the meanings of things are perceived just as immediately as their other more physical properties like color greatly influenced the thinking of James Gibson as he proposed his theory of Affordances in his seminal book *The Ecological Approach to Visual Perception* (Gibson 1986). Affordances of objects, according to the original definition forwarded by Gibson, are 'what it offers the animal, what it provides or furnishes, either for good or ill' (Gibson 1986: 127). Gibson was interested in understanding how perception informed animals about the meaning of the objects that it encountered in its immediate environment. The more dominant cognitive approaches had argued that a person only has direct access to sensations of objects, which are consequently integrated into its memory in order to build up symbolic representations of the environment and its potential for goal-oriented action (Gaver 1991). Such

⁹¹ After his conference presentation, Neil Ramiller was sure to point out to me that I should be careful to never assume that the organizing vision of an innovation is static. On the contrary, he said, it is always evolving. I would also add that it seems to never be one vision but multiple. If these multiple visions are loosely aligned then I would perhaps consider that to be a 'shared' state.

approaches had been greatly criticized for their over-simplified decontextualization of the object (for example see Suchman 1987; Winograd and Flores 1987). Gibson refused to accept the fundamental claims of these approaches, as he believed that perception was naturally economical and, as a result, animals perceived objects in the environment directly in terms of their potentials for action, without significant intermediate stages involving memory or inferences. In other words, direct perception meant that there was no mediation or cognitive processing by the actor.

In his 1954 article on visual perception, Gibson remarked that ‘just as a motion for a physicist can be specified only in relation to a chosen coordinate system, so is a phenomenal motion relative to a phenomenal framework’ (Gibson 1954: 310). This idea of a phenomenal framework, as opposed to a physical one, would later serve as the foundation for his ecological approach to visual perception and eventually spawn the field of ecological psychology.

Ecological psychology challenges the claims of orthodox psychology that ‘we perceive objects insofar, as we discriminate their properties and qualities’ and instead claims that when we look at objects we perceive ‘their affordances, not their qualities’ (Gibson 1986: 134). One of the profound implications of Gibson’s theory was that you ‘do not have to classify and label things in order to perceive what they can afford’ (Gibson 1986: 134). This approach is inherently relational by nature as it takes into consideration the relation between the actor, the environment and the object. Importantly, it seems to nicely account for contextual factors that are critical in understanding the relationship between information systems and organizational change (Avgerou 2001).

As an approach to the study of innovation, the theory of affordances is useful as it acknowledges that an individual’s behavior in a particular setting is shaped, but never fully determined, by the physical and social characteristics of that environment (Fayard and Weeks 2007). Accordingly, ‘an affordance cuts across the dichotomy of subject-object and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer’ (Gibson 1954: 129). This theory has

also been usefully extended to describe social behaviors in organizations (Fayard and Weeks 2007; Gaver 1996; Hutchby 2001b).

More recently, in a special issue of *Organization Science* dedicated to the changing fabric of organization, the theory of affordances was called upon as a bridging concept that emerged from the intersection of IT systems and organization systems (Zammuto et al. 2007). The authors argued that one could not talk about a complex technology without reference to its social setting, just as it would make limited sense to talk about a door handle without discussing the people opening the doors. The authors put forward a challenge to the field: ‘We need to study how information is socially, and organizationally, made sense of because organizing takes place around those understandings and subsequent actions, not only around information acquisition and transmission’ (Zammuto et al. 2007: 758). This suggests that meaning making in the innovation process is just as consequential as the instrumental dimensions of the innovation itself.

In order to fully understand innovation and socio-technical change, we may need to recognize that ‘new technologies seldom simply support old working practices with additional efficiency or flexibility. Instead, they tend to undermine existing practices and to demand new ones. In this disruption, subtleties of existing social behaviors and the affordances upon which they rely become apparent, as do the new affordances and social behaviors offered by the technology’ (Gaver 1996: 1). An affordance perspective may be better able to attune us to the important conditions that influence the potential use of technology. Whereas, ‘ignoring the different affordances which constrain both the possible meanings and the possible uses of technologies denies us the opportunity of empirically analyzing precisely what the ‘effects’ and ‘constraints’ associated with technological forms are’ (Hutchby 2001b: 447). Perhaps most importantly, an affordance perspective allows us to focus not on technology or users alone but on the fundamental interactions between the two (Gaver 1991).

An affordance can be understood as an ‘action possibility’ (McGrenere and Ho 2000), with three fundamental properties. First, an affordance exists relative to the action

capabilities of a particular actor. For example, ‘if a terrestrial surface is nearly horizontal (instead of slanted), nearly flat (instead of convex or concave), and sufficiently extended (relative to the size of the animal) and if its substance is rigid (relative to the weight of the animal), then the surface affords support’ (Gibson 1986: 127). Furthermore, ‘the affordances of an artifact are not things which impose themselves upon humans’ actions with, around or via the artifact. But they do set limits on what is possible to do with, around or via the artifact’ (Hutchby 2001a: 33). Second, the existence of an affordance is independent of the actor’s ability to perceive it. Interestingly, affordances are objective as their existence does not depend on meaning or interpretation and they are also subjective in that an actor is needed to establish a frame of reference (McGrenere and Ho 2000). They therefore avoid the subject/object dichotomy by being both, as ‘affordances are primarily about action and interaction, not perception’ (Gaver 1996: 3). Affordances are invariant (Gibson 1986). They exist naturally and they do not have to be visible or known (Norman 1999). Third, an affordance does not change as the needs of the actor change. An actor may change their needs but the affordance still remains until it becomes brought into visibility through practice (Norman 1988).

Perceptual cues of affordances can be learned as social convention. Research has shown that affordances are linked to a web of cultural knowledge and conventions regarding use (Hutchby 2001b). As such, some researchers have proposed the idea of ‘social affordances’ in which cultural differences become important, as members of different cultures may perceive affordances of an environment differently. For example, broken windows and graffiti may not be perceived in many European countries as the strong signals of disorder affording criminality as they typically are in the U.S. (Fayard and Weeks 2007).

Overall, thinking in terms of affordances involves a shift in orientation away from focusing on either the subject or the object, towards studying the interactions between the two in the context that they are a part of. It is within these interactions that meanings emerge.

4.7 Locating Meaning Elsewhere?

Organizational researchers have most usually approached the study of organizations with either a monologic or dialogic understanding (Eisenberg and Goodall 1993). In a monologic approach, the goal is to construct a single narrative of the organization, which usually ends up being from the perspective of the most powerful group while others are inevitably marginalized (Boje 1995). In other words, the ‘monologue pretends to be the ultimate word’ (Bakhtin 1984: 293). In contrast, a dialogic approach recognizes that there are always multiple voices engaged in an ongoing negotiation of the story, with never any finality to the meaning making process (Bakhtin 1986). Meaning may be held in place for a time but it is always open to the possibility of being modified. *Thus, it is more the meaning making process than meaning itself that is important to take into account.* For example, it is possible for meaning systems and institutional logics of a dominant system of authority to be reconfigured by social movements using protests and ensuing media attention (King and Soule 2007). Understood in this way, ‘an organizational culture is necessarily a conflicted environment, a site of multiple meanings engaged in a constant struggle for interpretive control’ (Eisenberg and Goodall 1993: 137). The question of which narratives dominate and which are marginalized, in the midst of technological change, largely becomes a political consideration (Dawson and Buchanan 2005).

Both mechanistic and organic conceptualizations of organization have generally had limited success in capturing the discursive dimensions of organizational life, as they have failed adequately to recognize human beings as thinking and discoursing beings (Pondy and Mitroff 1979). Postmodern perspectives, on the other hand, do not rely on grand narratives to explain technological change and are therefore perhaps better able to focus on the communicational aspects of social systems (Lyotard 1984). Importantly though, with postmodern approaches, some believe that ‘language has been granted too much power’ (Barad 2003: 801). A more performative understanding of discourse, which I will come to take in this thesis, tends to challenge the view that words simply represent preexisting things. In this understanding, discursive practices determine what is to be considered as meaningful. Accordingly, I will argue that discourse is one of the main

methods by which the pan-Canadian EHR has come to be meaningful in the health reform agenda and, as such, this truth has become given and hence very difficult to question. Since it is difficult to question, we are left no other possibility but to accept that the better use of healthcare information, brought about by the implementation of a pan-Canadian EHR, will lead to a renewal of the healthcare system and consequently address most of its current problems.

Perhaps we need a better way to think about innovation that takes into account the mangle of everyday practice, in which meaning is extremely important but so is materiality.

Chapter Five: The Mattering of Innovation

Mattering is simultaneously a matter of substance and significance, most evidently perhaps when it is the nature of matter that is in question, when the smallest parts of matter are found to be capable of exploding deeply entrenched ideas and large cities. (Barad 2007: 3)

In this chapter, I will introduce a somewhat different way of thinking about innovation. In this view, innovation emerges as matter and meaning come to be entangled through practice. In my account, aligning both material and discursive relations appears to be critical, as both should be aligned for innovation to be properly⁹² occasioned.

⁹² I use the term 'proper' here not to denote some essential truth i.e. the right way, but rather to imply that in my view an innovation that better meets the needs of its stakeholders is more proper as an innovation.

We shall be questioning concerning technology, and in so doing we should like to prepare a free relationship to it. (Heidegger 1993).

To begin his monumental 1953 lecture *The Question Concerning Technology*, Heidegger lays out the approach that he feels needs to be taken in order to reveal the essence of technology. Provocatively, he argues that the essence is nothing technological and, therefore, purely technical modes of thinking will not help us accomplish this task. By casting off both our ‘instrumental and anthropological’ understandings of technology, we will only then be able to prepare a free relationship to it (Heidegger 1993). However, such an action is not easily undertaken, as we have become so thoroughly conditioned to think about technology in certain ways. Consequently, only a fundamental revolution of the mind in which we become free of its conditioning can lead to real insight (Krishnamurti 2007).

The limits of either an instrumental or anthropological understanding of technology can be nicely illustrated with Dreyfus’ (1995) study of a Styrofoam cup. We understand this technology as something that can be used for a specific purpose like drinking liquids of either the hot or cold variety and then discarded when no longer needed. We can contrast this way of knowing this particular technology with the Japanese everyday understanding of a similar technology, a delicate teacup. For most intents and purposes, the teacup and the Styrofoam cup seem to be close functional equivalents. However, when examined a little closer, the teacup is actually functionally inferior as it does not seem to preserve temperature as well as its Styrofoam replacement, and it has to be washed and dealt with very delicately. However, its use has been ‘preserved from generation to generation for its beauty and its social meaning’ (Dreyfus 1995: 99). This would suggest that artifacts have aesthetic and symbolic dimensions that need to also be taken into account (Rafaeli and Vilnai-Yavetz 2004). Even though the teacup is functionally lacking compared to the Styrofoam cup and actually involves more human effort to maintain, it has remained anchored within a whole array of social practices as ‘it is hard to picture a tea ceremony around a Styrofoam cup’ (Dreyfus 1995: 99). The tea ceremony, and the teacup which is at the centre of it, have become an integral part of Japanese culture and will most likely

remain so for many more centuries to come. With a strongly instrumental understanding of technology, we would struggle to understand why this is so when seemingly better functional alternatives are easily available. With a strongly anthropological understanding of technology, we would perhaps not be able adequately to account for why anyone would choose to use the less ceremonially compatible Styrofoam cup because it is made of a cheap material that is easily disposed.

Heidegger argues that the instrumental view will eventually be turned back on us, as we fully embrace a technological understanding of being. This can already be seen in the field of human resources, where employees are treated as a resource whose utilization needs to be maximized in the name of efficiency (Barratt 2002; Thompson 2002; Townley 1993; Townley 1998; Wicks 2002). Heidegger posits that the essence of modern technology is to seek more flexibility and more efficiency, simply for its own sake. In this way, everything (including us) is ordered to stand by as standing reserve, to be immediately available for a further ordering. Most importantly, he notes, we are no longer the subjects standing over nature and turning it into an object of exploitation: 'The subject-object relation thus reaches, for the first time, its pure "relational" i.e. ordering character in which both the subject and the object are sucked up as standing-reserves' (Heidegger 1993: 48). For instance, the drive in the paper industry for efficient production results in the forests, the lumberjacks and the machinery being brought into relation and becoming standing reserve to be used when needed. According to Heidegger, the greatest danger of all is that this technological understanding of being, this calculative thinking, would someday come to be the only way of thinking as it problematically comes to marginalize all other ways of knowing the world and ourselves. This seems to have already somewhat played out in the way that most management scholars have come to understand technology.

In a recent review of the dominant ways that management scholars have conceptualized technology over the last five decades, Orlikowski identified three main approaches (Orlikowski 2010). The first is an *absent presence* in which technology remained unacknowledged and unaccounted for. In fact, in a previous study, it was found that over

95% of the papers published in four leading management journals did not take the role of technology in organizational life into serious consideration (Orlikowski and Scott 2008). The second and most common approach was a deterministic account in which technology was understood as an *exogenous force* that impacted the organization in a particular way and consequently generated particular effects. Since this account reifies technology by considering it as a discrete entity (Orlikowski and Scott 2008), it does not seem to be able adequately to register the role of human agency in the innovation process (Avgerou 2007). Others have argued that it also tends to downplay the important influence of historical, social and political contexts (e.g. Avgerou et al. 2004; Ciborra 2002; Orlikowski and Baroudi 1991).

In a third account, which has recently gained considerable popularity in the information systems field, technology is understood to be the effect of an *emergent process* that involves ongoing historically and contextually contingent human interpretations and interactions. Some examples of approaches that fall into this category include STS (Science and Technology Studies), SCOT (Social Construction of Technology) and structuration theory (Bijker et al. 1987; Bijker and Law 1992; Orlikowski 2000b). About 331 articles over a twenty year period have used structuration approaches and yet, according to some, there is still considerable opportunity to yield ‘significant, further insights...through the careful but critical, exploration of Giddens’s ideas’ (Jones and Karsten 2008: 152).

Such social constructivist approaches generally involve ‘a dialectical process in which the meanings given by individuals to their world become institutionalized or turned into social structures, and the structures then become part of the meaning systems which limit individual actions’ (Ashmore et al. 1994: 734). Even though this perspective tries desperately to avoid reifying technology, the material properties and possible agency of technology tends to become marginalized in efforts to accord a stronger role to human agency in the innovation process. It is clear that in this view, ‘technology does nothing, except as implicated in the actions of human beings’ (Giddens and Pierson 1998: 22). Consequently, structuration theory seems to unduly privilege human agency, causing

‘technology to vanish from their accounts, appearing only as an occasion for structuring, without any activity or specificity of its own’ (Berg 1998: 465). Furthermore, in the emergent view, there is an underlying assumption that the technology will eventually emerge, as the meaning of an innovation is gradually worked out (Rogers 2003). However, this view tends to fall short of adequately acknowledging the ongoing, open-ended process of reinterpretation and reworking of technology that invariably occurs in practice (Orlikowski 2010). Overall, the ‘IT artifact itself tends to disappear from view, be taken for granted, or is presumed to be unproblematic once it is built and installed’ (Orlikowski and Iacono 2001: 121). The emergent view has also been criticized for being unable to deal adequately with the wider political and societal consequences of technology (Orlikowski 2010). Despite these critiques, the emergent view has contributed significantly to our understanding of the relationship between the technical and the social in organizations, not as discrete entities but as mutually dependent ensembles (Orlikowski and Scott 2008).

Even though the exogenous force view and the emergent process view seem very different, they are both nonetheless predicated on an *ontology of separateness* between humans and non-humans (Orlikowski 2010) or alternatively put ‘an ontology of separate things that need to be joined together’ (Suchman 2007: 257). This kind of ontology is highly conducive to causal arguments that suggest that either technology affects the social or that the social structures technology. Even though empirical evidence poorly supports the kind of logic implicit in such arguments, much of contemporary thought still tends to consider information technology as a determinant or enabler of radical organizational change (Robey and Boudreau 1999). Consequently, these logics continue to restrain the ways that we are able to imagine the world by marginalizing other possibilities that may have even more explanatory power (Heidegger 1977). Using an allegory of ‘dropping our tools’, Weick explains why organizational academics are unable to unlearn as ‘dualities within organizational studies (e.g. macro/micro) harden into positions with which people identify and that in turn identify them, the tools associated with these positions taken on excess weight, which ironically makes it harder for them to be dropped’ (Weick 1996: 312).

As a way forward, Orlikowski (2010) suggests what she considers a more promising approach towards thinking about the relationship between the social and technical aspects of organization. This view, which she terms *entanglement in practice*, has been starting to gain some prominence outside the management field (Barad 2003; Latour 2005b; Suchman 2007). Based on a *relational ontology*, which 'undercuts the dualism that has characterized but also limited much of the prior technology research in management studies' (Orlikowski 2010: 128), it rejects the notion that the world is made up of separate entities and instead suggests that entities are enacted into being based on the relations they hold with other entities. Furthermore, capacities for action become enacted by constitutive entanglements (e.g. configurations, networks, associations, mangles, assemblages etc.) of humans and technologies (Orlikowski 2010). In other words, it is the ongoing reconfiguring of human and non-human actors that generate agencies (Barad 2003) or what has also been termed as action-nets (Czarniawska 2008). Orlikowski argues that sociomaterial approaches, like ANT, shows great promise in being able to deal with the many new and complex contemporary work situations in which organizing is inextricably bound up with materiality, as these approaches give us the opportunity to 'radically reconceptualise our notions of technology and reconfigure our understandings of contemporary organisational life' (Orlikowski 2010: 128).

Thinking about technology-based innovation in terms of the entanglement of matter (technical aspects) and meaning (social aspects) can be a somewhat onerous task. I have personally spent countless months grappling with what the practical implications of this are for my thesis work. For this reason, I have decided to introduce this approach to the reader through a series of short narratives in order to allow the reader to come to his/her own interpretations and understandings of what all this means.

Narrative #1: A Coke bottle in the Kalahari

What could a mundane Coke bottle possibly teach us about the innovation process? By relating a story of this quasi-object, I hope to bring to attention some of the dialogic meaning-making activities that I suggest do not just surround innovation, on the periphery, but are actually more fundamental to the innovation process than is commonly

understood. Innovations don't just exist; they seem to get enacted through practice in a dialogic way between matter and meaning.

In the opening sequence of the film 'The Gods must be crazy' (Uys 1980), a bush pilot finishes drinking his Coca-Cola and then casually tosses the glass bottle out of his window. After falling thousands of feet, it lands close to where a Bushman is strolling in the Kalahari Desert. The Bushman walks over to where the bottle landed and begins to examine it with incredulity. As he had noticed its downward trajectory, he concludes that it most certainly must be a gift from the Gods 'like the rain or the sun or other things that have come from the sky' (Uys 1980). He promptly takes this precious gift back to his tribe. At first encounter, the Bushmen had no understanding of what this bottle was or what it was supposed to be used for. The only thing they knew was that it was something sacred that had come from the Gods and therefore must have some 'good' purpose.

The Kalahari is extremely dry and, as a result, liquid of any sort is a rare commodity (Nash 1996). Therefore, based on their everyday experiences in their lifeworld⁹³, the Bushmen appeared to have no way to know what this object should be used for, as it seemed to have no place in any of their existing work practices. The 'Coca-Cola' label on the side of the bottle had little significance. Even the glass material was something they had probably never seen before. However, using their imagination and an innate psychology of materials (Norman 1988), they quickly realized that there were probably certain ways in which the bottle could *become useful* in their practices: 'The bottle was harder, heavier and smoother than anything that they had ever known....the most useful thing the Gods had ever given them...a real labor saving device' (Uys 1980). In this way, over the next several days, matter would become more meaningful and new meaning would find a way to materialize.

Day by day members of the tribe discovered new ways in which the bottle could become more useful in their existing work practices. Notably, this kind of experiential knowledge

⁹³ The lifeworld is a grand theatre of objects arranged in space and time relative to perceiving subjects and is the ground for all shared human experience. Husserl, E. 1970. *The Crisis of the European Sciences and Transcendental Phenomenology*. Evanston, Illinois: Northwestern University Press.

could not have been had a priori. Through practice, they came to attribute certain meanings to the bottle, meanings that were perhaps not originally intended by the bottle's designers, but meanings that nonetheless emerged in this novel context amongst a novel array of work arrangements and associated objects. For instance, some women used it for preparing food, as its hardness made it ideal for smashing roots. Others used its bottleneck shape to make circular designs on headbands for decorative purposes. Also, many children discovered they could use it to make music by blowing into it, if the angle was just right. As the uses for the object started to get more numerous, the object *became* even more useful and the demand for the object became even greater: 'Suddenly everybody needed it...a thing that they had never needed before became a necessity' (Uys 1980). The once 'foreign' object, with very little meaning or use, became quite meaningful in the practice of everyday life. In other words, the matter started to matter.

As a result of this mattering process, in which matter and meaning became entangled, the innovation *became necessary* to complete everyday tasks. Since there was only one bottle to be shared for the whole tribe, unfamiliar emotions like anger, jealousy and hate started to surface as some members became selfish and tried to hoard its usage. Such emotions had never been experienced before, since for over five thousand years the Bushmen had been a highly communal society. Eventually, a fight broke out in which one of the children became aggressive and used the bottle to strike another. This was an unwanted innovation in social practice. That night, the elders came to realize that this bottle that seemed like a blessing from the Gods was actually an evil thing that must be returned. The bottle's old meaning was no longer able to continue being materialized and a new more sinister meaning was able to take its place. As the elders were well respected, everyone readily accepted their re-casting of meaning and consequently a re-casting of the object. The elders concluded that the Gods must have been crazy (hence the title of the film) when sending the object, as they had only sent the Bushmen good things before. The rest of the movie is about Xi, one of the Bushmen, and his journey to the edge of the Earth (which turns out to be the coast of Africa) to cast the evil thing back to the Gods.

This story could be explained using different lenses. For instance, using an economic lens, the introduction of a scarce resource into a traditionally communal society is bound to cause a recurring dispute over property rights⁹⁴ (Williamson 1981). However, for the purposes of this thesis, I would like to closely attend to how meaning was enacted *during* the innovation process and importantly how such enactment eventually led to the ‘rejection’ of the innovation. In this story, it is important to consider the meanings derived by all social actors, not just users of the innovation⁹⁵. For instance, the elders themselves did not actually use the bottle for anything, but the meaning they arrived to at the end became quite consequential to the overall sustainability of the innovation. The notion of affordances may help us to better understand how meaning emerged (Gibson 1986).

The affordances of an object are ‘action possibilities’ or what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill’ (Gibson 1986: 127). Conceptually, it brings the observer, the object and the environment into relation. Affordances are neither exclusively a subjective property (based on a social construction of the bottle in the mind of the observer) nor an objective one (based on the physical properties of the object), but the outcome of an interaction between both. Even though they are independent of the individual’s ability to recognize them, they are always in relation to the actor and therefore highly dependent on the actor’s capabilities.

In critique of the conventional beliefs held in cognitive psychology, Gibson made the radical argument that when we perceive an object we first get to know its affordances even before the qualities of that object. What the object affords us is most consequential to perception, as ‘the meaning is observed before the substance and surface, the color and form, are seen as such’ (Gibson 1986: 134). This implies that meaning is a critical factor when trying to understand people’s reactions to objects or even quasi-objects that they

⁹⁴ For instance, I believe such disputes over property were common just after communism fell in the U.S.S.R.

⁹⁵ I concur whole-heartedly with Lamb & King (2003:197) that ‘Despite pervasive ICT use, social actors are not primarily users of ICT. Most people who use ICT applications utilize multiple applications, in various roles, and as part of their efforts to produce goods and services while interacting with a variety of other people, and often in multiple social contexts’ Lamb, R., and Kling, R. 2003. "Reconceptualizing Users as Social Actors in Information Systems Research," *MIS Quarterly* (27:2), pp 197-235.

perceive. This further implies that we do not necessarily need to classify objects before we understand what they could afford us. For instance, it could be argued that the Bushmen did not need to know that the Coke bottle was made of something called glass in order to understand how it could become useful. They probably had no sense of exactly what the glass material was or what any of the printing on the label meant. Gibson also suggested that objects could carry both positive and negative affordances, like a knife-edge that afforded both cutting and being cut. Notably, depending on the context, being cut could be a positive affordance when you are undergoing surgery and a negative one when you are in a fight. Similarly, a surface of deep water affords drowning while a surface of shallow water affords bathing (Gibson 1982).

So, how does the notion of affordances help us to better understand how meanings became unfolded during the innovation process in the Bushmen story? The Coke bottle was originally designed for the functional purpose of holding a specific quantity of Coca-Cola, in a secure yet accessible way. Even though the bottle had many other possible affordances, most of them probably remained undiscovered in the context of the developed world. The affordance of ‘holding liquid’ was mostly attended to by Coke drinkers with some, perhaps, presenting a variation on the theme by using the empty glass bottle to hold other kind of liquids like water for a cut flower once the Coke was finished. When the bottle was cast into the almost ‘liquid-less’ world of the Kalahari Bushmen, it was an object that practically had no meaning in their world and hence was perceived as new (Rogers 2003). Through multiple trials with the object, many affordances or meanings were uncovered and hence brought into visibility for others to see. Interestingly, the Bushmen did not perceive the originally designed affordance, as they had no liquids to place in it⁹⁶. Consequently, this affordance remained latent within the life world⁹⁷ of the Kalahari Bushmen.

⁹⁶ Since ‘thought is emerging from the tacit ground’ (Bohm, 2004:ix), the tacit ground of the Bushmen did not enable the originally intended affordance to be perceived. Interestingly, it was the scarcity of liquid that had limited the Bushmen’s imagination of what possibilities could exist.

⁹⁷ According to Habermas, the lifeworld consists of socially and culturally sedimented linguistic meanings: “[L]ifeworld appears as a reservoir of taken-for-granted, of unshaken convictions that participants in communication draw upon in cooperative processes of interpretation” (p.124), Habermas, J. 1987. *The Theory of Communicative Action Vol. 2*. Boston: Beacon Press.

Affordances are highly dependent on both the observer and the environment, as the object is always situated somewhere. For example, Gibson (1986) notes that a regular size chair affords sitting for an adult but may not for a young child who is perhaps too small. He further suggests that an infant does not begin by first discriminating the qualities of objects and then learning the combinations of qualities that specify them. Instead, the infant begins by noticing and learning the affordances of an object, which are easier to perceive within context of use. Similarly, the Bushmen had no understanding of what the bottle was and therefore perceived it, as a child would, with incredulous curiosity. Through trial and error, certain members of the tribe learned to use the object in particular ways, bringing to visibility particular affordances for others to see and imitate. As a form of collective mindfulness, this process involved ‘inquiry and interpretation grounded in capabilities for action’ (Weick et al. 1999: 81). For instance, the bottle afforded ‘labor saving’ or ‘decorating’ or ‘playing music’. Such affordances, brought into awareness through trial use of the object in practice, were already action possibilities within the semiotic relation between technology, user and environment. In the developed world, most Coke drinkers probably did not think of using the Coke bottle in their cooking practices to smash roots or other edibles. We have other objects that afford us that ability, if we were to ever need it, and therefore the bottle is understood differently. Furthermore, the affordance of using the bottle to strike another person was not something readily perceived by citizens of the developed world, perhaps only within the context of something like an angry mob.

According to Gibson, ‘the perceiving of an affordance is not a process of perceiving a value-free physical object to which meaning is somehow added in a way that no one has been able to agree upon; it is a process of perceiving a *value-rich ecological object*. Any substance, any surface, any layout has some affordance for benefit or injury to someone. Physics may be value-free, but ecology is not’ (Gibson 1986: 140 emphasis added). The wise Bushmen elders understood that once the negative affordance of ‘striking’ was brought into awareness and hence became an imagined possibility, it could have grave negative long-term implications for the collective. As a result, the elders decided that the object (the ‘evil’ thing) needed to be returned to the Gods. By ousting the object, the

semiotic relation that resulted in the act of ‘striking’ would be broken. The logic followed was that the unwanted meaning ‘this bottle can be used for striking’ would no longer be allowed to materialize once the bottle was returned to the Gods. Unfortunately, the emotion that elicited the act of striking would remain and perhaps one day end up being materialized through another object.

Indeed, objects have no value on their own, they do so ‘only when integrated into practice and allied to requisite forms of competence and meaning’ (Shove and Pantzar 2005: 57). The Coke bottle was eventually rejected due to a negative meaning or affordance or action possibility that became enacted due to the semiotic alignment of one Coke bottle, two Bushmen - one striking and the other being struck - and one Kalahari Desert. Consequently, the object that had started out meaning-less and then became quite meaning-full during the innovation process ended up gaining one too many meanings.

Narrative #2: Bush pumps in Zimbabwe

This second account illustrates how ‘fluid’ technologies, ones that are not too rigorously bounded, can become meaningful in a wide variety of contexts. During the mattering process, innovations can become stabilized in socio-technical networks that sustain them across space and time. In this way, ‘we might call technology the moment when social assemblages gain stability by aligning actors and observers’ (Latour 1991: 129).

The Zimbabwean Bush Pump ‘B’ type is a water pumping device that is used in the rural villages of Zimbabwe (de Laet and Mol 2000). What is so remarkable about this little device is that it has been in use all over the country for more than half a century, not remaining the same, but being constantly modified and improved in ways that depend on the particular setting that it is a part of. In fact, there are Bush Pumps that were installed in the 1930’s that are still used in practice in rural Zimbabwe today (Morgan 1990). But what has resulted in the continued usefulness of this technology over such a long period of time and over such a wide diverse geographic area? Using non-monetary measures, we can say that the Zimbabwean bush pump has been an extremely successful innovation.

From a functional perspective, the pump is a simple mechanical object made up of parts that are easily and locally replaceable or substitutable when they break down. This was the implicit design of the inventor who was not concerned with making any kind of profits from his invention, and therefore took steps to make sure non-proprietary parts could be used for replacement. However, the pump also became meaningful for other reasons. The bush pump afforded strong communities due to its dependence on collaborating villagers to install and care for it⁹⁸. It also afforded good health due to the clean water that it provided villagers and, on a much larger scale, it afforded a strong nation due to the nation-wide water infrastructure that it provided to the country of Zimbabwe where water was usually in scarce supply. Notably, the one device simultaneously afforded benefits at many different levels (individual, group, community and nation) and therefore became meaningful within each of those contexts.

The critical point is that the bush pump became a meaningful innovation as it was an 'object that isn't too rigorously bounded, that doesn't try to impose itself but tries to serve, that is adaptable, flexible and responsive - in short a fluid object' (de Laet and Mol 2000: 225). As a result of such fluidity, the Bush Pump had the potential to become enacted in different ways in different villages depending on the local context. For instance, in some villages it is installed, cared for and maintained by the village community and therefore affords a strong community, upon which it in turn depends for its continued operation. In other villages, it is taken up by one individual and therefore affords a business income to an enterprising villager. By remaining as fluid matter, and not too structured, the Bush Pump more easily enables a wide variety of meanings that are held in a wide variety of contexts and therefore is better sustained over space and time. Importantly, 'in each of its identities, the Bush Pump contains a variant of its environment' (de Laet and Mol 2000: 252), thereby making each instance of mattering necessarily unique in its own right.

⁹⁸ This reminds me of the EHR which promises to bring more collaboration to the healthcare sector but which ironically also requires collaboration in order to be implemented. The Bush Pump requires community participation to install it and it also becomes a space of collaboration as villagers congregate and meet around it.

The story of the Zimbabwe Bush Pump illustrates that both the material configurations and meanings of the pump are continually evolving as it is brought into practice. This constant reconfiguring of the relations between human and non-human actors are what accounts for the durability of the pump (Law and Singleton 2005). Also, through a re-accentuation process (Bakhtin 1986), the innovation takes on new meaning as it is actively translated by social actors in ‘modifying it, or deflecting it, or betraying it, or adding to it, or appropriating it’ (Latour 1986: 267).

Narrative #3: Bridge Building

This third account illustrates how the work of the innovator tends to be more dialogical by nature than technical. Not only do many heterogeneous material elements need to be aligned, but also simultaneously the semiotic alignment of ever proliferating meanings has to be carefully attended to. In this way, building bridges also becomes about bridging materials and meanings.

The work of bridge-building seems to be largely a technical challenge that requires much analysis, calculation and planning (Suchman 2000). At first look, engineers working for the Department of Transportation do the technical work of designing the bridge. However, the reality is that such work is usually contracted out to a specialized firm with particular expertise in bridge design. The Department engineers are actually more engaged with bridge related ‘alignments’ (Suchman 2000). In order to get the bridge built, they need to align many heterogeneous elements. For instance, they need to decide which bridge to build (the final design), where the bridge will be located, what roadways will it connect to and perhaps, most importantly, how to deal with any resistance from community groups and others. Many human and non-human elements need to be aligned before the bridge can be built. Although these activities are often considered to be peripheral to the core technical work of a civil engineer, they seem to actually be quite consequential to the overall success of the project.

During the innovation process, the engineers usually get involved in various dialogic activities like participating in town hall meetings and publishing commissioned studies.

Engineers are at once ‘experts, politicians and advocates for a particular point of view’ (Throgmorton 1996: 40) and are therefore consequently involved in as much story-telling work as technical work. These stories are key to sustaining the innovation (Bartel and Garud 2009). Furthermore, such story-telling work seems to both rely upon and reflexively constitute those elements that it aligns (Suchman 2000). It is through such ‘heterogeneous engineering’ that human and non-human elements are aligned to produce what is seen as a stable artifact but what actually may just be a sustainable reproduction of an enduring socio-technical order (Law 1987). In this way, matter and meaning are brought into relation as the innovation is caught up in the process of becoming.

Aligning proliferating meanings during the innovation process is not easy, as even ‘people who live in the same city may, in fact, be inhabiting very different worlds, not only because cities contain a variety of physical and social settings within their boundaries but also because people perceive and interact within these settings in significantly different ways - they ‘inhabit’ different cities’ (Abu-Lughod 1991: 323). The bridge may mean different things to different people depending on who they are and what their particular interests in the innovation are. For instance, to a commuter the bridge affords easy crossing but to an area farmer the bridge affords polluting as cars are brought closer to his/her land. This crossing affordance may also lead to another less desirable affordance for reclusive area residents, but more desirable for profit-hungry realtors, in that surrounding land could then possibly be developed into a subdivision. Aligning meanings and other heterogeneous material elements thus presents a serious challenge to an innovator interested in bringing about any kind of technology-based innovation⁹⁹.

Robert Moses, the master builder of roads, parks, bridges and other public works for over fifty years in the city of New York, built bridges according to specifications that he felt would discourage the use of buses on his parkways (Winner 1986). He designed and built the bridges relatively low so that the city’s twelve-foot tall buses, mainly frequented by poor black people, could not negotiate them and therefore could not transport passengers

⁹⁹ I will be using a similar argument to suggest that innovators interested in bringing about the pan-Canadian EHR system will also be faced with the challenge of aligning materials and meanings.

from the suburbs to some of the nicer parks in the Long Island area. Through much political maneuvering, Moses was able to inscribe his social class bias and racial prejudice in the materials he used to build bridges. In this way, he used the bridges to promote his own sense of what it meant to enjoy the city's downtown parks. Interestingly, long after his political alliances had fallen apart and even after he was long gone, his bridge-building endeavors continued to shape the city of New York for many years to come. To see this matter purely in functional terms misses a decisive element in this story, as it was the meanings held by Moses that influenced the way he designed his bridges and what he was trying to achieve. These meanings became inscribed into the artifacts he designed. They spoke for him long after he was gone. From this perspective, innovators can be understood as heterogeneous engineers working to align a variety of heterogeneous materials and meanings in order to put the innovation into play (Law 2007).

Finally, we will turn to the last narrative in order to understand how, during the innovation process, the British freezer that began its life with questionable status, eventually came to not only represent but also to help enable much of modernity.

Narrative #4: British freezers

This last account suggests that remaining meaningful depends on the continued acceptance of the innovation in a changing web of material-semiotic relations. Also, allied technologies and practices seem to be important in grounding meanings that are perpetually subject to negotiation and redefinition. This implies that the meaning-making process is strongly grounded in, and stabilized by, material practice.

There are few households in most of the developed world¹⁰⁰ that do not have a freezer, whether stand alone or attached to a fridge. Apparently, this story of normalization has more to it than just 'the gradual acceptance of a relatively standardized object' (Shove and Southerton 2000). Over its history, the domestic freezer has conveyed an evolving set

¹⁰⁰ For instance, the U.S. has a 99.5% adoption rate (<http://www.ideafinder.com/history/inventions/refrigerator.htm>).

of benefits and functions. Shove and Southerton identify three phases in the British freezer's historical development during which the innovation remained meaningful but in very different ways. The initial phase was oriented around the utility of preserving home produce, the second involved the utilization of a frozen food infrastructure and the third a subtle but significant redefinition of the primary benefits of freezing in terms of convenience. In fact, they argue that 'the normalization of the chameleon-like freezer can only be understood in the context of similarly changing systems of food provisioning, patterns of domestic practice and allied technological devices' (Shove and Southerton 2000: 301).

During the introduction phase (1960-70), freezer manufacturers had to persuade potential consumers to adopt new methods of food preservation (i.e. freezing) in place of established techniques like salting, bottling, curing, drying and tinning. The freezer could then be understood as affording freezing and this technological object could thereby become well established as a bona fide member of an array of legitimate food preservation practices. Users also needed to be convinced that freezing, which modified the structure of the food itself, was in fact safe. Interestingly, it was during this phase that many manufacturers also promoted the new meaning of the freezer as a symbol of technological progress¹⁰¹. As can be imagined, persuasion and promotion were critical dialogical activities in the innovation process. The formerly unknown freezer got new meaning and new meaning found a way to materialize itself.

During the establishment phase (1970-1980), cost was reduced and the upright format (a new material configuration) was introduced into the market. Technical factors were important in encouraging its market acceptance, yet according to Shove and Southerton, the really critical development in this phase was the rapid expansion of superstores and with them an extensive and reliable commercial infrastructure for frozen food. The increased availability of all types of frozen foods helped the freezer to become even more meaningful, so much so that the freezer became understood as a necessary rather than optional appliance in the modern household. In fact, more mattering of the innovation

¹⁰¹ A similar claim has been made about the EHR.

made the innovation matter more. Most notably, the freezer itself became modern, not on its own, but with the help of a whole network of related material and semiotic elements. Consequently, the freezer became understood as a kitchen appliance and not a garage one (a promotion in status, one which the automobile was never able to accomplish, but that may be for other reasons!). Eventually, it was to become forever associated with another soon-to-be-invented modern appliance, the microwave oven. The freezer and the microwave worked hand in hand, like technological lovers, one affording rapid freezing and the other affording rapid thawing. This food storing and consuming circuit would soon be able to offer convenience in the form of time saving.

During the redefinition phase (1980s onwards), ‘the particular form of convenience which the freezer offers is one associated not with saving of time but with ordering, scheduling, co-ordination and timing’ (Shove and Southerton 2000: 313). The freezer that once only afforded freezing now enabled the new meaning of convenience itself. In other words, it helped the modern household to be modern *in practice*. Food could be conveniently made available when needed, at the right time, in the right quantity. As opposed to a long preparation time, which culminated in a traditional dinner where all members of the household would congregate around the table at mealtime, members of the family could now eat whenever it was convenient to them. This meant that for better or for worse dinner time no longer interfered with family members schedules, thereby affording them much more flexibility to engage in other activities. The matriarch of the household could now be afforded ‘employing’ and could get back just in time to rapidly heat dinner in the microwave. The freezer had a script of its own designed by technologists anticipating how the device might be used in practice (Akrich 1992). As the technological (matter) became mangled with the social (meaning) in practice, the innovation became. This suggests that ‘the business of becoming normal involves a two-way process in which freezers respond to their surroundings and at the same time impose something of their own script’ (Shove and Southerton 2000: 314-15).

Importantly, ‘to be entangled is not simply to be intertwined, as in the joining of separate entities, but to lack an independent self-contained existence’ (Barad 2007:ix). Through

these stories, I hope to have illustrated how matter and meaning come to be inextricably entangled through practice, such that 'no event, no matter how energetic, can tear them asunder' (Barad 2007: 3). With this lens, the mattering of innovation is revealed where mattering is simultaneously 'a matter of substance and significance' (Barad 2007: 3). Therefore, my hope is that I have found a way to track the intra-active becoming of innovation better. Now, all I have left to do is to use it.

Chapter Six: Settling the Matter - Making an Indisputable Case for EHRs

Facts and cases are not strong in and of themselves, but only relative to the strengths or weaknesses of competing accounts. A fact is established and a case is closed, not when truth and justice are finally out, but when one party has succeeded in making it very difficult and costly for the opposing party to disagree. When this happens it is no longer promising to offer alternative accounts; the matter is settled, and for the time being natural and social order emerge. (Fuchs and Ward 1994: 487, emphasis added).

In this chapter, I will present a series of three statements that I believe have been made into facts through discursive means: ‘The work of generating interest consists in constructing these long chains of reasons that are irresistible, even though their logical forms may be debatable’ (Latour 1996: 33). Importantly, facts are able to build upon and combine with each other. Once a new argument is promoted, the old one fades away, rarely to be opened for questioning again. For instance, nobody would dare ask the question ‘is healthcare information fragmented?’¹⁰², because we all know and accept that it is. It has become a fact. In this way, the matter gets nicely settled and the ground becomes properly set for ‘doing’ innovation (assuming that all the important stakeholders keep buying the arguments being sold and therefore allow themselves to become appropriately aligned for a time).

‘The cup is useful only when it is empty. You can fill it with what you like. But if your cup is already full... of what use is it?’ (Krishnamurti 1992:199). My overall goal in this chapter is to unsettle some of our taken-for-granted understandings of what may be the best way to deal with the healthcare crisis. By trying to empty the reader’s cup, I hope to prepare the ground differently than do the builders of fact, by providing more room, and

¹⁰² I am not necessarily suggesting that we should be asking this question, as I would hardly suggest that healthcare information is not fragmented. I am just trying to argue that any kind of meaningful debate, if one is to take place, has already been limited as we have moved on to build another argument based on the closure of this one. Perhaps we have unwittingly marginalized other factors that may have been important to consider in this narrative.

not less, for competing accounts to emerge. In some ways, I am trying to build in controversy by unsettling matter that has already been settled. By revealing how we got to where we are today, I try to show that things could have been otherwise. Indeed, there may be other important factors that matter.

Discourse is not a synonym for language. Discourse does not refer to linguistic or signifying systems, grammars, speech acts, or conversations. To think of discourse as mere spoken or written words forming descriptive statements is to enact the mistake of representationalist thinking. Discourse is not what is said; it is that which constrains and enables what can be said. *Discursive practices define what counts as meaningful statements.* Statements are not the mere utterances of the originating consciousness of a unified subject; rather, *statements and subjects emerge from a field of possibilities. This field of possibilities is not static or singular but rather is a dynamic and contingent multiplicity.* (Barad 2003: 819, emphasis added)

Fact 1: *Health care is fragmented, We must collaborate!*

Those charged with the governance of the health care system need to restore a level of mutual respect and trust that has been missing in recent years, especially in the relationship between the federal government and the provincial and territorial governments, and among the various actors in the health care system. (Romanow 2002)

The establishment of the National Forum on Health in 1994 resulted from a growing awareness that there was a need for ‘cooperation and partnership between governments and with organizations and individuals involved in health and health care’ (National Forum on Health, 1997: 2). The Rock report (1999) was the first to suggest that it was the federal government’s role to exercise leadership in healthcare renewal and, in particular, the federal minister of Health and Health Canada should be focused on building cooperation and collaboration among federal, provincial and territorial governments (Advisory Council on Health Infostructure, 1999: 16). Furthermore, the

report suggested that the federal government should also take responsibility to ‘foster mutual cooperation and collaboration among provincial and territorial governments, Aboriginal communities and all stakeholders in developing and implementing the Canada Health Infoway’ (5). Infoway, at that time, was understood to be a health information highway and not the organization we know today. Ten years on from Romanow’s landmark report and the Canadian healthcare system still seems to remain fragmented along both care and jurisdictional lines.

From Fragmented to Collaborative Health Care

We must transform our health care “system” from one in which a multitude of participants, working in silos, focus primarily on managing illness, to one in which they *work collaboratively* to deliver a seamless, integrated array of services to Canadians. (Romanow 2002: xvii, emphasis added)

In the medical model, the body itself tends to be viewed with a fragmented perspective as it ‘reduces all patients and all illnesses, regardless of the nature of the illnesses, to the diagnostic names and treatments of disordered parts’ (Barbour 1995: 1). Accordingly, the medical profession has become organized through specializations around this view. In *The Birth of the Clinic*, Foucault analyzes the types of discourses that were used to describe the medical experience, and how they became mutated during the period of the great scientific discoveries of the nineteenth century. He showed that the question of the eighteenth century ‘what is the matter with you?’ was gradually replaced with the more calculative and problem-oriented question ‘where does it hurt?’ (Foucault 1973: xviii). Foucault argues that this latter question recognizes and buys into the centrality of the clinical system and the principles of all its reductionist discourses. This pathological approach to the framing of healthcare problems is still the dominant mode of thinking in healthcare practice today.

Modern medical records also play a crucial role in maintaining the dominance of the medical model and the clinical discourse upon which it depends. They not only allow physicians access to disembodied information about a particular patient, but they have

also come to *re-present the patient* in such a way that ‘a compliant, recontextualized and retemporalized body emerged as the outcome of a process in which the physician’s recording activity figured centrally’ (Berg 1996: 508). Accordingly, the physician has not only become the recorder of the patient’s healthcare information but also its trusted custodian. In this way, science-based medical knowledge¹⁰³ has come to marginalize other more traditional and holistic ways of knowing the patient. This arrangement resulted, and still results today¹⁰⁴, in the expert physician having power over the patient’s information and consequently within the medical system.

Healthcare delivery had been historically focused on episodic acute care. However, factors like the growing focus on prevention and the need to better manage chronic conditions has precipitated a need for more collaborative forms of care (Adams et al. 2007). In particular, patients are to be significantly involved in having to ‘change counterproductive health behaviors and actively participate in their healthcare decisions’ (Adams et al. 2007: 3). In discussing interprofessional collaboration, the Romanow report remarks that ‘new work environments and new divisions of labour call for new approaches to collaboration among health care providers in order to maximize the use of the health workforce’. (Romanow 2002: 87). The report went as far to suggest that a Centre for Health Innovation should be created in order to develop and disseminate best practices in the area of interprofessional collaboration, in particular to support primary health care.

More recently, in Ontario, the manifestation of Family Health Teams has signaled the growing value of inter-professional collaboration in healthcare. Today, more than 720 physicians in 150 Family Health Teams serve over 1 million patients (Rosser et al. 2010). Remuneration for family practitioners has been re-aligned to promote a continuum of

¹⁰³ Scientific knowledge (matters of fact) seems to trump older forms of knowledge (matters of concern) and yet ‘reality is not defined by matters of fact. Matters of fact are not all that is given in experience’ (232). Latour, B. 2004b. “Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,” *Critical Inquiry* (30:Winter), pp 225-248.

¹⁰⁴ In the current medical system, alternative ‘non-allopathic’ forms of treatment (like homeopathy) have been deemed as non-scientific and consequently tend to be marginalized. Interestingly, that is not the case in places like India where homeopathy is considered to be a legitimate and deeply rooted medical practice, whereas modern medicine is often questioned.

preventive and treatment services and the use of a multidisciplinary team of providers. Overall, collaborative patient-centered practice is designed to ‘promote the active participation of each discipline in patient care. It enhances patient and family-centered goals and values, provides mechanisms for continuous communication among caregivers, optimizes staff participation in clinical decision making within and across disciplines, and fosters respect for disciplinary contributions from all professionals’ (Soklaridis et al. 2007: 1198).

From Fragmented to Collaborative Jurisdictions

Today we sit on the cusp. Left unchecked, this situation will inevitably produce 13 clearly separate health care systems, each with differing methods of payment, delivery and outcomes, coupled by an ever increasing volatile and debilitating debate surrounding our nation, its values and principles. (Romanow 2002).

Ironically, the Canadian constitution set in motion a fragmentation in the healthcare system that has been difficult to overcome. As a result, most jurisdictions have had little incentive to support a pan-Canadian collaborative vision of healthcare. Romanow (2002) found that the federal government had been attempting to uphold its role as the defender of the core principles of Medicare while simultaneously reducing its responsibility and risk for managing the increasing costs and changing expectations within the system. This had put the federal government at odds with the provinces and further fragmented the relationship between jurisdictions. For instance, many provinces are in a highly competitive race to attract nurses and nursing graduates. By using salaries to compete, those provinces that can afford to pay more are luring nurses away from those provinces that simply do not have adequate funds to compete.

The 2003 Accord on Healthcare Renewal set out an action plan for reform that ‘reflects a renewed commitment by governments to work in partnership with each other, with providers, and with Canadians in shaping the future of our public health care system’. Overall, there was a realization that a change in approach was needed as ‘the time had

come for governments to focus on a collective vision for the future, rather than the jurisdictional or funding issues that have been the focus of intergovernmental debate for much of the past decade. This collective vision must focus on achieving effective reform and modernizing the system. It must reflect the priorities of Canadians' (53). In other words: healthcare is fragmented, we must collaborate!

Fact 2: *This fragmentation problem is informational by nature, We need I.T.!*

People hold a common view of the system they want...they want a flexible health care system that maintains the five principles of the Canada Health Act, is integrated, is supportive of community action, and is *driven by information*. (National Forum on Health 1997: 4, emphasis added)

A recent international IBM Special Report on health care suggested that: 'Healthcare is in crisis...while this is not news for many countries, we believe what is now different is that the current paths of many healthcare systems around the world will become unsustainable by 2015'(Adams et al. 2007: 1). A more upbeat view of the Canadian system is presented in the Rock Report where it states that 'while Medicare is sustainable as Canadians want it to be, we now need to take the next bold step of transforming it into a truly national, more comprehensive, responsive and accountable system' (Rock 1999). In other words, this suggests that the question of whether the system is sustainable is not the right question to be asking, as we have little choice but to sustain it. More importantly, *we* have produced the health care system and therefore *we* have the power to make it as sustainable as we want it to be. Perhaps, the better question is how do we create a system that will be more sustainable than it is now?

In 1997, there were a series of reports that, in my view, for the first time brought attention to the idea that information technology had acquired the capability (through ongoing technological advancements) to help materialize a new vision of healthcare. This meant that a more coordinated approach to health information systems development would be needed in order to better support the sharing of data across the healthcare system (National Forum on Health 1997: 40). As a result of this line of thinking, developing a

collective vision or overall pan-Canadian strategy to guide the future development of healthcare was to become a high priority (Rock 1999: 6). I will now briefly describe the main line of argumentation that appears in two such reports in order to give the reader a better sense of what role information technology was expected to play in the renewal of the Canadian healthcare system.

Towards a Canadian Health Iway: Vision, Opportunities and Future Steps

One of the first published documents to make a strong connection between the challenges faced by the healthcare system and the possibility of IT enabling a solution was the CANARIE (Canadian Network for the Advancement of Research) report. In this report, it was stated that ‘Driven by fiscal realities, the recognition that there is room for improvement in the efficiency and effectiveness of our health services, and enabled by new technologies and new knowledge about the provision of quality care, our health system is being fundamentally transformed’ (CANARIE 1997: 3). The aim of this report was plainly stated as ‘to accelerate discussions among potential stakeholders and other public and private organizations in Canada leading to the development of the Canada Health Iway’ (CANARIE 1997: 1). CANARIE felt that now was an opportune time to begin a discussion on how Canada could leverage recent advances in information and communication technologies, commonly known as the Information Highway, to develop a national health information network. Importantly, they realized that getting various stakeholders involved in this dialogue was critical.

This report introduced the idea of a pan-Canadian network called the ‘Canadian Health Iway’, describing it as a virtual information centre that could be created and used by communities and individuals across Canada. More specifically, the Canada Health Iway would be ‘a network of networks, applications and people that collectively support a wide range of health-related systems, activities and services in support of Canadians in all part(s) of the country’ (CANARIE 1997: 1). Importantly, there was a strong acknowledgment that this network, formed by the interaction of both human and non-human elements, could enable a fundamental transformation of the healthcare system and

forge the way for a new vision of healthcare. The transformation was described in the following way:

We are moving from a focus on acute care and cure to a broader vision that includes health promotion and disease prevention; from a focus on central control of institutions to regional support of home and self-managed care; and from a reliance on medical specialists to a recognition by all citizens of the need to assume greater responsibility for their own health (CANARIE 1997: 3).

The CANARIE report also highlighted the need for a national strategy and framework in order to enhance the value of existing reform initiatives. This was one of the first times that healthcare information systems that ‘transcend traditional organizational, program and geographic boundaries’ (CANARIE 1997: 5) were being actively discussed. Importantly, the report also laid out a pan-Canadian vision of healthcare for the first time, along with specific acknowledgement of the many stakeholders that would need to be involved in the discussion. The vision of the kinds of things that the new system could afford was described as follows:

The Canadian Health Iway will be ‘a virtual “information centre” that is created and used by communities and individuals across Canada. It will be open and accessible, yet assure sufficient confidentiality and privacy to assist decision-making by health professionals and patients; support research and training; facilitate management of the health system; and respond to the health information needs of the public. The Network will be an agent of change for the health system and contribute to improving health of Canadians. It will foster the development of globally competitive technologies and services. (CANARIE 1997: 5)

In order to create the Canada Health Iway, three types of strategic partnerships were proposed: federal/provincial partnerships; private sector alliances with public sector organizations; and a partnership between Health Canada and Industry Canada to leverage

support from the private sector. Provincial/territorial governments would be held responsible for coordination, collaboration and the sharing of initiatives. Their aim would be to facilitate a team approach and minimize fragmentation. Health Canada and Industry Canada were to provide national leadership by stimulating and coordinating the development of the Health Iway and by promoting the development of the Telehealth and IT&T sector. More specifically, they would also be responsible for supporting Health Iway meetings, workshops and training opportunities and collaborative ventures. Telecommunications carriers were expected to work with the health sector to identify pricing options that would permit the integration of networked health systems into day-to-day operations. Even NGOs had a role to play by providing independent, non-governmental and non-industry viewpoints, as well as by taking on specific roles in specific initiatives. The Iway was envisioned as a truly collaborative venture.

The conclusion to the report was reflective of its more holistic view of technology: 'Developing the Canadian Health Iway is not simply a matter of building technological connections and defining a means of promoting economic growth. While such an undertaking focuses in part on technology and is an element in the development of Canada's information economy, developing the Health Iway will also deal with some of the fundamental values of concern to Canadians: health standards, public health promotion, training standards and the protection of personal privacy (CANARIE 1997: 15). This was a clear recognition that the building of a system of this magnitude would involve socio-technical factors that superseded technical concerns.

The Canadian Health Info-Structure: A Conceptual Overview

In the same year, the Canadian Health Info-Structure report was prepared as a background document for an upcoming National Conference on Health Infostructure. This conference, that was to be co-hosted by Health Canada and Alberta Health, was to take place in Edmonton in February of 1998. A major focus of the report was to look at what specific barriers existed that prevented the establishment of a health information system that would enable wider and better use of health information to support evidence-based decision-making. The desire to put an evidence-based system in place seemed to be

one of the major factors triggering the need for a pan-Canadian healthcare information system.

Notably, the report introduced a term that was to become a fundamental part of the future discourse in this area. Health Canada and Alberta Health, co-sponsors of the conference, coined the comprehensive term ‘info-structure’ to include four key components: a supporting technological framework; information and the application software needed to access, manipulate and organize it; the governance and management of information, including the standards to ensure interoperability, interconnectivity and reliability; people and organizations involved in creating the information, developing the applications and systems, constructing the facilities, and those using this infrastructure to deliver, maintain and improve health-related services for the benefit of all Canadians. Importantly, there was a realization that ‘in order for the health system in Canada to be organized and managed better to deliver health services, technology is a critical underpinning and an underlying enabler.... However, it is the use and management of information that will change the system’ (5). The overall implication was that simply focusing on implementing technology in healthcare would not be enough to bring about healthcare renewal. Social factors were important to consider too.

In identifying the key challenges moving forward, there was specific recognition of possible stakeholder issues originating in those aspects of the health info-structure that would ‘fundamentally change the way that stakeholders carry out their functions within the health system’ (23). A fundamental change in culture would ‘likely change the relationships between providers and consumers in a very basic way, shifting the current locales of information based “power” in the health system’ (24). There was also a realization that ‘a comprehensive health info-structure is beyond the capabilities of even the largest single jurisdiction’ (6) as ‘a wide variety of stakeholders are involved in the development process’ (7). Both of these observations implied that the lack of a collaborative approach to healthcare renewal could eventually impede change.

A couple of years later, building on the notion that such a system could enable a new vision for healthcare, the Rock report (1999) made a convincing argument that new

information and communication technologies should be strategically deployed as part of a pan-Canadian health information highway (what was now being called Canada Health Infoway, for short) to help ‘empower Canadians with better health information and new opportunities’ (Rock 1999: exec summary). Accountability appeared prominently in the logic: ‘if we are to build a better health system, we need a better information sharing system so that all governments and all providers can be held accountable to all Canadians’. By this time, there was an acknowledged realization that, due to current fiscal realities, the current ways of working in the healthcare system were no longer tenable. The focus of discussion, from this point on, was more on trying to find ways of capturing, analyzing and sharing information that would enable better healthcare outcomes. Overall, there was recognition that because the fragmentation in the healthcare system was mainly informational by nature, an IT solution was justified.

Fact 3: *The EHR will integrate healthcare information, We will get reformed!*

Some might wonder why a chapter on information would figure so prominently and be placed at the beginning of a report on the future of Canada’s health care system. The answer is that leading-edge information, technology assessment and research are *essential foundations for all of the reforms* outlined in subsequent chapters of this report

(Romanow 2002: 75-76, emphasis added)

In a knowledge society, information is considered to be the most valuable resource (Tsoukas 1997). Accordingly, the EHR system takes on special significance, as it becomes the means by which healthcare information is collected, stored, organized and presented. In other words, the EHR enables healthcare information to become more useful. After all, it is the present inability to effectively and efficiently use healthcare information to deliver better healthcare that has become one of the main impetuses behind the healthcare reform agenda in the first place as ‘all jurisdictions have recognized the need to improve the use of health-related information at all levels i.e. governments, institutions, professionals and consumers’ (Arlington Consulting Group 1997: 1).

But how is it that we have come to understand that Information Technology, and more specifically the EHR, is one of the best ways to achieve healthcare reform? In other words, how did it become so meaningful and central to everything else? What I hope to show, by going into this question, is that the EHR has come to be understood in this way as a result of the depicted essentialness of information in the myriad of other discourses that make up the healthcare reform agenda. *These other discourses serve as its ally and it serves as theirs.* I will now briefly describe several of the reform discourses that make up the larger healthcare reform discourse and how, in each case, information has been understood to be an essential aspect to achieving that particular reform. In other words, information, and by inference information technology, has come to be an Obligatory Point of Passage for healthcare reform (see Figure 2).

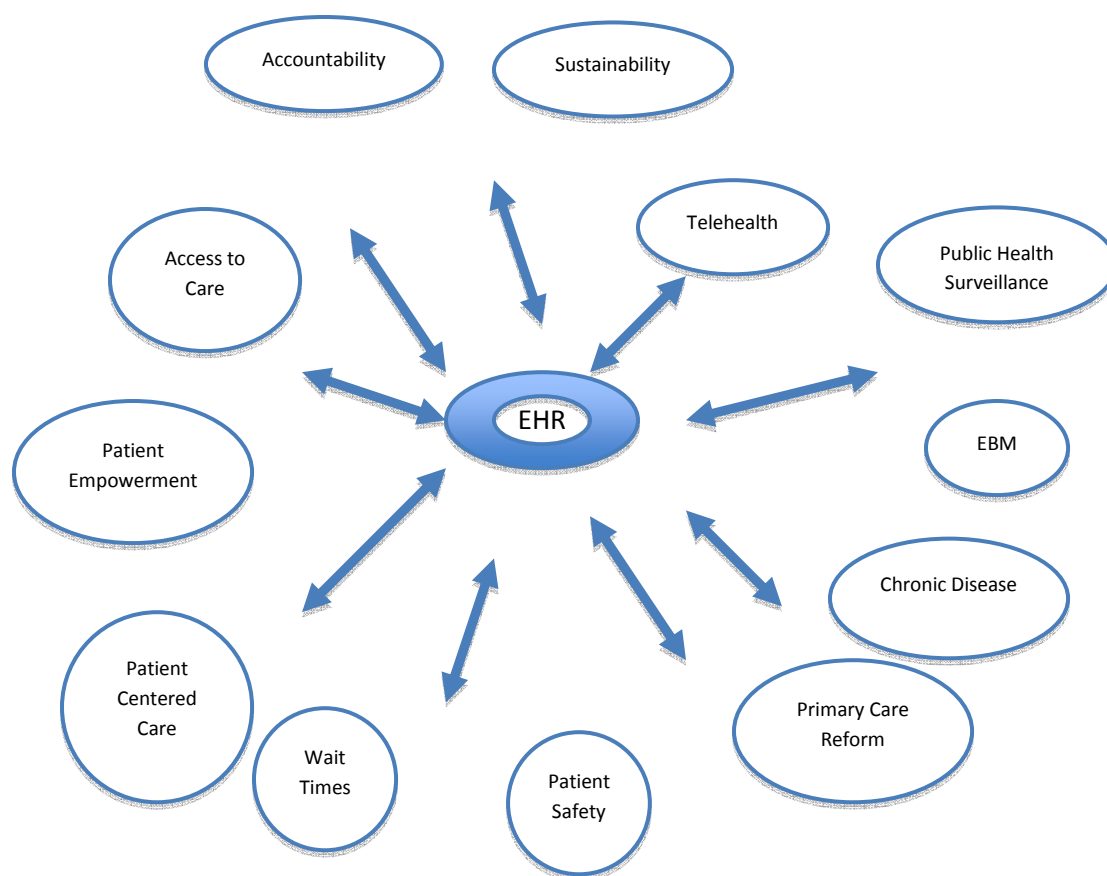


Figure 2: Obligatory Point of Passage

Canada Health Act

If you ask a Canadian for a defining characteristic unique to Canada and, invariably, most will mention the publicly funded, universally accessible health care system. Medicare is often defined as a core value of our society. In order for any discourse related to healthcare reform to have a strong ‘voice’ in Canada, it must be favorably associated with the vision of healthcare as specified in the Canada Health Act. The Canada Health Act, as discourse, carries considerable significance and influence in this country. Canadians remain attached to the core values at the heart of the healthcare system as ‘the basic principles of Medicare accurately reflect people’s values of equity, compassion, collective responsibility, individual responsibility, respect for others, efficiency and effectiveness’ (Romanow 2002: 4). Furthermore, it is well accepted that the public will not support changes to the health care system unless the essence of Medicare is preserved. Hence, a pan-Canadian vision, as outlined in the Canada Health Act, is important to this country and also important to this thesis.

I suggest that information has come to be understood as being integral to maintaining that vision. Canadians consider equal and timely access to medically necessary health care services on the basis of need as a right of citizenship. In fact, the principle of Accessibility outlined in the Canada Health Act demands that ‘insured persons in a province or territory have reasonable access to insured hospital, medical and surgical-dental services’. Therefore, information technology and telehealth, in particular, have come to play a key role in trying to guarantee accessibility to quality healthcare for all Canadians, even in remote areas of the country.

Accountability

Health care costs in this country consume more than forty percent of provincial budgets¹⁰⁵. Yet, there is a serious lack of accountability in the system. In order to gain more accountability, the general sense is that we need better information systems:

¹⁰⁵ <http://www.cbc.ca/canada/story/2010/04/22/f-vp-newman.html>

Information is a key ingredient. We are living in an age of laser surgery and are unlocking the mystery of the human gene, yet our approach to health information is mired in the past. We gather information on some health issues, but not on others. And much of the information we gather cannot be properly analyzed or shared.... If we are to build a better health system, we need a better information sharing system so that all governments and all providers can be held accountable to all Canadians (Romanow 2002: xix).

Currently, there is a lack of any principle in the Canada Health Act that specifically addresses accountability. According to press opinion, Canadians have expressed deep suspicions about the way governments have managed their health care system and where the money goes. As the owners, funders, and users of the health care system, Canadians believe they have a right to know how their system is being administered, financed and delivered, and which parts of government are specifically accountable for which aspects of the health care system. As suggested in the Romanow report, provincial, territorial and federal governments have a collective responsibility to clarify their roles and responsibilities, ensure adequate, stable and predictable funding, explain in an open and understandable way where the money goes and inform Canadians on the performance of their health care system.

Sustainability

Romanow also suggests that our system is as sustainable as we want it to be as governments are not powerless to change current spending trajectories. However, in order for governments to make informed choices about where and when to invest they need to have access to better information. This access will only be possible through better information systems that will enable more effective deployment of scarce financial and human resources. As a result, the system will support better management practices, more agile and collaborative institutions and a stronger focus on prevention, which can generate significant savings.

Telehealth

Telehealth refers to the practice where ‘authorized practitioners thousands of kilometers away are able to view a patient’s electronic health record, including lab tests, medications, digital X-rays and CT scans, and “see” their patient and the patient’s local health care provider’ (Towards a Canada Health I-Way: 5). In the 2003 Health Accord, First Ministers together agreed to place priority on the implementation of electronic health records and the further development of telehealth applications, both which they considered to be ‘critical to care in rural and remote areas’. First Ministers reiterated their commitment by further agreeing to ‘accelerate the development and implementation of the electronic health record’ as well as ‘acceleration of efforts on telehealth to improve access for remote and rural communities’. Historically, it seems that these two discourses have been closely related.

Evidence Based Medicine

According to the National Forum of Health, ‘a key objective for the health sector should be to move rapidly toward the development of an evidence-based health system, in which decisions are made by health care providers, administrators, policy makers, patients and the public on the basis of appropriate, balanced and high quality evidence. In doing so, the potential role of information technology should be explored’. The Forum goes on to call on the federal Minister of Health to ‘champion the creation of an evidence-based health system built on the foundation of a nationwide information system’ (National Forum on Health 1997: 20). An evidence-based system would give patients access to best-quality, easy-to-assimilate information on their health status and treatment choices. Administrators of health care services would have access to longitudinal and comparative data on service variations. Healthcare providers would have access to high-quality patient care evidence at the point of care. Policy makers would have access to patient care and cost benefit information in aggregate form to protect patient privacy, and information on the priorities, interests and values of their constituents.

Overall, in order to achieve the vision of an evidence-based health system in Canada, it is 'clearly necessary to not only change the culture of the health system and the way decisions are made, but to develop a supporting system of information that facilitates this new way of doing business' (Arlington Consulting Group 1997: 3). This alludes to the entanglement of evidence-based medicine and information technology.

Public Health Surveillance

There seems to be a growing interest in tracking population health and its determinants, especially after recent scares related to Mad Cow Disease, SARS, Avian flu, West Nile Virus and, more recently, H1N1. The Standing Senate Committee on Social Affairs, Science and Technology examined the infrastructure and governance of the public health system in Canada, as well as looked at Canada's ability to respond to public health emergencies arising from outbreaks of infectious disease. Their findings suggested that national level surveillance was weak, and that many of the existing systems lacked timely, accurate and complete disease information. These factors were 'seriously impairing Canada's ability to anticipate, prevent, identify, respond to, monitor and control diseases' (10).

Recent outbreaks had uncovered a pressing need to upgrade information technology at all levels of the health protection and promotion infrastructure. It was found that the lack of central information accessible by local, provincial and federal health authorities had an adverse impact on the flow of information to the public and to international agencies. The absence of appropriate and shared databases and capacity for interim analyses of data, also interfered with outbreak investigation and management, and constrained epidemiological and clinical research into SARS. Before the outbreak, agreements for data sharing between different levels of government, and the necessary information technology, were apparently not in place.

The recommendation that came through was that the federal government, through the Health Protection and Promotion Agency, invest \$100 million annually towards the realization of a National Immunization Program. A consolidated information system was

needed to track vaccinations and immunization coverage, as well as track vaccine-associated adverse events.

Chronic Disease

Chronic diseases are the leading cause of death and disability in Canada and account for the largest proportion of the economic burden of illness. Today, eighty percent of the need to send information outside of the doctor's office seems to come from the care of patients with chronic diseases like prostate cancer or diabetes¹⁰⁶. In *Recommendations for Reform*, the Committee indicated that about two thirds of total deaths in Canada are due to the following four chronic diseases: cardiovascular disease (heart and stroke), cancer, chronic obstructive lung disease (bronchitis and emphysema) and diabetes. The National Chronic Disease Prevention Strategy builds on current initiatives through better integration and coordination. Central to that initiative is that common information can be used to manage chronic disease and also eventually self-manage many aspects of it. For instance, there are already on-line programs that will help a patient manage their own diabetes (www.sugarstats.com).

Many argue, for example, that the information in electronic health records can be used to manage chronic disease better and gain a useful overview of the kinds of things that are occurring in the general population:

I know that's a big focus with most of the provincial governments, particularly here in Ontario, but in all the provincial governments, looking at the high cost of chronic disease and the impact that that has on the sustainability of the healthcare system... nobody is really looking at that population as a whole. You know, you've got multiple doctors maybe within a clinic, all whom have some diabetic patients but no one is really looking at that whole group. (16-2/3).

¹⁰⁶ From informal interview with family physician

Primary Care Reform

Right now the LHIN¹⁰⁷ needs to focus on primary care because that's the part that's not hooked together. So how does the CCAC¹⁰⁸ talk to the long-term care home or the nursing home? They don't right now, except by telephone or fax. How does the family doc talk to the mental health agency? They don't. We have twenty-five small mental health agencies inside our LHIN. How do they all work together? So it's helping to build that coordination and cohesion so that you can start to build the system differently and really make it a system instead of here's acute care, here's CCAC, here's primary care. (21-15)

The discourse of primary care reform is central to the overall healthcare reform agenda and it has also seems to have become one of the most contentious areas due to generally poor adoption rates of EMRs among primary care physicians. In the healthcare system, primary health care physicians serve a dual function. They provide first-contact health care services to patients, and they coordinate patients health care services to ensure continuity of care and ease of movement across the health care system when more specialized services are needed (e.g. from specialists or in hospitals). Traditional ways of delivering services are changing, especially with a growing emphasis on teamwork and interdisciplinary collaboration. As detailed in the Romanow report, the vision of Canadians to have 'access to an integrated continuum of care 24 hours a day, 7 days a week, no matter where they live' is forcing a strong connection between primary health care reform and the pan-Canadian EHR.

In September 2000, federal, provincial and territorial First Ministers agreed to work together on a primary health care reform agenda. In the words of the First Ministers' agreement: "Improvements to primary care are crucial to the renewal of health services. Governments are committed to ensuring that Canadians receive the most appropriate care, by the most appropriate providers, in the most appropriate settings" (FMM 2000). In

¹⁰⁷ Local Health Integration Network

¹⁰⁸ Community Care Access Centre

some ways, unlike many other reform initiatives, primary health care reform involves fundamental change across the entire health care system. It is about transforming the way the health care system works today – taking away the almost overwhelming focus on hospitals and medical treatments, breaking down the barriers that too frequently exist between health care providers, and putting the focus on consistent efforts to prevent illness and injury, and improve health.

Overall, there are a number of reform initiatives under way. Healthcare is becoming more coordinated, as Canadians need better access to a network of health care providers working together on their behalf to co-ordinate their care across different aspects of the health care system. This involves various kinds of care initiatives from counseling them on how to stay healthy to treating illnesses, providing hospital care, following up with home care services, or monitoring their use of prescription drugs.

Much of this coordination can be better achieved with an EHR system that spans across different points of service. As a result, more effective care can be provided at the front lines where people first come in contact with the health care system. With comprehensive information provided through electronic health records, healthcare providers can continuously monitor people's health, track their progress if they have certain illnesses, and take a broader approach to helping them stay healthy. Also, with effective primary health care in place, people would be less likely to rely on emergency departments to get advice or assistance with relatively minor ailments or persistent health conditions that cannot be properly dealt with in busy emergency departments.

By emphasizing prevention of illness and wellness, the long-term result should be a reduced need for expensive hospital treatments, especially for treating heart disease, some cancers, or a host of other illnesses that are directly related to lifestyle factors. Even when hospital treatments may be required, effective primary health care will ensure that people's care after they leave hospital is well coordinated with home care, prescription drug use, and rehabilitation to minimize the chances people will need to be re-admitted to hospital. This coordination requires good quality of information. Currently, most patients have only a passive role in decisions about their own health care and are able to exercise

only limited control. Innovations in primary health care focus on patients and give them a more involved role in decision- making about their own health.

Information is critical for primary health care, particularly given the flexible options, different types of care, and different health care providers involved. As Hutchison and Abelson (1996) suggest, information is essential to primary health care for many reasons. First, it helps patients make informed choices on available services as well as on diagnostic, therapeutic and preventive options. Second, it gives health care providers the information they need about their patients and their care so that they can provide continuity of care, monitor their health and provide appropriate prevention programs when necessary. Third, it allows health care professionals to keep up with the immense amount of knowledge necessary for good practice and to apply this knowledge to their patients' specific circumstances. Fourth, it gives health care administrators the information they need to ensure that communities' needs are addressed and that resources are allocated to priority needs. Finally, it provides in-depth knowledge of the health needs and expectations of the population and, at the same time, allows policymakers to assess the impact of different approaches on improving the quality of primary health care services. For these reasons, primary health care seems like it should be a major focus for actions designed to implement electronic health records and link patients and health care providers not only to patient records, but also to comprehensive sources of reliable information about illnesses, prevention, and prescription drugs.

Primary health care in Canada seems to be in the midst of evolving from solo and small-group family physician practices toward a new care model in which doctors (family physicians/general practitioners), nurses, dietitians, pharmacists and other health professionals work in teams to provide coordinated care. For instance, in Ontario, over 150 new family health networks bring together physicians and nurses, as well as nurse practitioners, dietitians, mental health workers, social workers, pharmacists, health educators and other care providers. Also, in Alberta, the Primary Care Network provides a defined set of core services combined with chronic disease management and ensures access to appropriate primary care seven 7 days a week, 24 hours a day. Overall, EHRs

enable the enhanced movement of healthcare information between different points of care.

Patient Safety

According to the 2003 Health Accord, the implementation of a national strategy for improving patient safety is critical. The EHR is considered to be a core component of that strategy. It has been estimated that there were 9,000 to 25,000 deaths a year due to medical error. Many of these deaths could seemingly be prevented with a more accurate transfer of health information between different points in the healthcare system.

Wait Times

According to the Romanow report, to make real progress in reducing wait times it will require several changes. First, physicians will have to relinquish their personal management of individual wait lists and participate instead in the development of objective and transparent assessment criteria to be applied to all patients. More than that, it will be important that regional health authorities, hospitals, and provincial and territorial health departments provide the infrastructure for central management and coordination of wait lists with the full participation of health professionals and the public. This will also require the provincial and territorial governments to work collaboratively in the management and co-ordination of wait lists for some procedures and services that are best managed interprovincially. The First Ministers also recognized that improving access to care and reducing wait times would require cooperation among many levels of government (2003 Accord on Healthcare Renewal).

Patient centered care

There is a fundamental change occurring in the way that healthcare is organized. Medicare is still largely organized around hospitals and doctors. With the move towards patient-centered care, the health record will move with the patient. This means that it has to be in a digital format, in order to be easily transportable.

Patient Empowerment

There is also a move towards enabling the people of Canada to take charge of their personal health care and to take part in health decisions made on their behalf. Technology is critical to this vision, as it enables access to information that formerly was not easily available.

Access to Care

Information and communication technologies have the potential to improve access to care considerably. With these technologies, for example, patients can access health care providers and manage their own health care more easily, health providers can communicate more easily and the system as a whole can track and plan services for patients more effectively. Telemedicine and Telehealth increase direct access to care, particularly for Canadians in rural and remote areas and those with mobility problems. Telemedicine—including telepsychiatry and teleradiology—lets doctors diagnose and treat patients long distance via satellite and internet. Telehealth provides primary health care by telephone, often seven 7 days a week, 24 hours a day. (N). Timely access to family and community care through primary health care reform is a high priority for all jurisdictions.

And Now for the Indisputable Conclusion

We have come to accept the following statements as facts:

Fact 1: *Health care is fragmented, we must collaborate.*

Fact 2: *This fragmentation problem is informational by nature, we need I.T.*

Fact 3: *The EHR will integrate healthcare information, we will get reformed.*

And now, for the indisputable conclusion: If We accelerate EHR implementation, reform will be accelerated!

Now, the case has been made and we are consequently led to the inescapable conclusion that accelerating the implementation of the EHR will accelerate reform. Hence, we should logically try to focus our resources on trying to accelerate implementation. However, I ask the reader to notice who the ‘we’ refers to in each successive statement. In the first three statements, the ‘we’ seems to refer to the major stakeholders including the government and care practitioners. In the conclusion, the ‘we’ seems to have shifted to refer to only to the government, which has been overly focused on accelerating reform. This is problematic for a couple of reasons. First, there is no sense that the public is included, even though they are definitely are key stakeholders. Second, in order for acceleration to be successful, it needs to include all stakeholders, especially the care practitioners who will undoubtedly influence the success of the overall project.

As Latour notes, ‘scientific rhetoric often channels the reader’s attention in a single central direction, like a valley cutting through mountains’ (Latour 1988:19-20). In this way, the interests of all the required stakeholders can be aligned appropriately as they become enrolled in the eHealth reform agenda. This is why the government seems to be intent on accelerating the implementation of EHRs and why we, as stakeholders, are intent on accepting their position. *However, by becoming aware that there is no ‘essential’ truth to such an argument, it is not a fact, we can then perhaps be more open to acknowledging other possibilities.* In other words, it allows us to ask once again the question ‘what change is needed?’ and not be forced to be satisfied with the commonly accepted answer ‘more information’.

In this chapter, I have tried to show how the case for EHRs has been made indisputable i.e. how is it that we have come to the understanding that EHRs are the best way to reform the healthcare sector. From that understanding, it can then be concluded that if we are interested in accelerating reform, then we should focus our efforts on accelerating the implementation of EHRs. As we shall see in the next chapter, such reasoning seems to help innovators to convince stakeholders to adopt new pan-Canadian technologies.

Chapter Seven: Doing Innovation – Re-Scripting the Healthcare System

Designers thus define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. *A large part of the work of innovators is that of “inscribing” this vision of (or prediction about) the world in the technical content of the new object. (...) The technical realization of the innovator’s beliefs about the relationship between an object and its surrounding actors is thus an attempt to predetermine the settings that users are asked to imagine.*

(Akrich 1992: 208, emphasis added)

In this chapter, I am particularly interested in understanding through what means the pan-Canadian vision of healthcare is being ‘inscribed’ into the Canadian healthcare system. This process of doing innovation is, in consequence, ‘a practice of configuring new alignments between the social and the material that are both localized and able to travel, stable and reconfigurable, intelligibly familiar, and recognizably new’ (Suchman 2002: 164). In my account, I intend to acknowledge many of those practices that combine in inextricable ways to constitute durable innovations. Therefore, in order to properly understand how the pan-Canadian EHR is struggling to gain its own meaning in a system of already existing meanings, a phenomenal framework of sorts (Gibson 1986), I will need to account for the enactment of both material and discursive heterogeneous relations. I contend that it is through the enactment of these relations that one privileged meaning comes to be built out of an indefinite number of possibilities, and innovation ‘gets done’.

An information economy requires more than infrastructure investment. It requires a new social contract derived from a new moral vision, binding members of the firm together in ways that contrast profoundly with the well worn emotional pathways of the industrial hierarchy

(Zuboff 1995: 13)

These pearls of wisdom from Shoshana Zuboff challenge us to consider what it would really take to bring about a new information-based healthcare system. More than just an investment in material infrastructure, such a system would also require a new social contract between all concerned stakeholders that was based on collaboration and cooperation. In this chapter, I will suggest that we are currently in the midst of a re-scripting of our current healthcare system. A script can be thought of as a commonly used way of thinking and working. More analytically, a set of goal-based instructions that direct some other actor what to do (Latour 2008). More colloquially, ‘how we do things around here’. I will try to show how the new script, which is predicated on more collaborative approaches to healthcare, is struggling to be accomplished through both material and discursive means. I will use Infoway and its ongoing activities as an example of how I think this is happening.

In the Canadian healthcare system, I characterize the working script as the way that human stakeholders interact with each other and with their associated non-human counterparts to produce healthcare. The script tends to emerge over time through practice as it comes to be the generally accepted and usually unquestionable way of doing things. These scripts are a part of what Bohm (2004) has termed the tacit ground. He suggests that ‘thought is emerging from the tacit ground and any fundamental change in thought will come from the tacit ground’ (Bohm 2004: ix). This tacit ground, and the shared meanings that emerge from it, are what holds society together by helping it to cohere. However, Bohm cautions that ‘society at large has a very incoherent set of meanings...in fact, this set of ‘shared meanings’ is so incoherent that it is hard to say that they have any real meaning at all’ (Bohm 2004: ix). For instance, such sharing of meaning has been shown to be critical in new product development, especially in organizations where there exist divergent occupational communities (Bechky 2003; Carlile 2002; Carlile 2004).

Framed in this way, the challenge of re-scripting the healthcare system involves trying to occasion more collective coherent ways of thinking and acting that comes from the sharing of meanings amongst a diverse array of stakeholders.

In 2000, the First Ministers of the federal, provincial and territorial governments formally recognized that the healthcare system was becoming increasingly fragmented, a situation that could no longer be tolerated in the face of escalating fiscal pressures. Consequently, an unprecedented agreement on health care renewal was reached in which a shared pan-Canadian vision of healthcare was committed to: ‘Canadians will have publicly funded health services that provide quality health care and that promote the health and well being of Canadians in a cost-effective and fair manner’¹⁰⁹. Together, they agreed to provide greater integration of hospital, primary, home and community care, more emphasis on health protection and promotion, and importantly ‘more effective information sharing within and across jurisdictions’. Furthermore, the First Ministers agreed to work together to strengthen a Canada-wide health infostructure in order to improve quality, access and timeliness of health care for Canadians. At the same time, the federal government committed to increase cash transfers to support healthcare. This meeting signified a new unified approach to healthcare renewal in which it was envisioned that all governments would be able to work together in a common direction that reflected their commitment to strengthening Canada’s publicly- funded healthcare system through partnership and collaboration.

This collaborative approach was further bolstered in the 2003 Accord on Health Care Renewal, in which governments publicly re-committed ‘to work in partnership with each other, with providers, and with Canadians in shaping the future of our public health care system’¹¹⁰. In particular, the governments acknowledged that electronic health records and telehealth applications were critical to care in rural and remote areas where the Canada Health Act’s principle of Accessibility was not being sufficiently upheld. As a result, an agreement was reached to ‘place priority on the implementation of electronic

¹⁰⁹ <http://www.releases.gov.nl.ca/releases/2001/health/0926n07.htm>

¹¹⁰ <http://www.hc-sc.gc.ca/hcs-sss/delivery-prestation/fptcollab/2003accord/index-eng.php>

health records¹¹¹. This was the first time that a pan-Canadian commitment of this nature was made specifically focused on the collaborative development of electronic health record systems.

Historically, collaborative practice had not been a high priority for healthcare stakeholders. However, more recently, collaboration has emerged to be at the center of three major shifts that were deemed to be essential¹¹² to the pan-Canadian vision of healthcare. First, the shift from institution-centered care to patient-centered care depends on hospitals and doctors, who are usually the gatekeepers of a patient's healthcare information, being willing to freely share that information with other healthcare practitioners in the system. Second, the shift from siloed practice to collaborative teams working together to address health issues also requires the free flow of healthcare information. Notably, for the first time, this shift includes patients as collaborators in the administration of their own healthcare. Lastly, the shift from experience-based care to evidence-based care would depend on the ability to integrate large pools of data across jurisdictional and organizational borders in a collaborative way to determine whether a particular treatment path was empirically effective or not. This would greatly depend on the development of pan-Canadian collaborative standards and a pan-Canadian system so that healthcare information could more easily travel and hence be integrated. As a result of these three desired shifts, governments seemed to be depending on electronic health record systems as a key way to enable and consequently inscribe a new pan-Canadian collaborative vision of healthcare (see Table 8).

¹¹¹ Ibid

¹¹² The question here is 'who' deemed them as essential? Many may not agree and hence may not be amongst those who get to deem. As Lucy Suchman remarked in a conference I recently attended at the LSE, "whenever you see 'we', the blinkers should go up, who is included in 'we'?"

More Fragmented	Working Script	Emerging Script	More Collaborative
Guarding of Patient Information	Institution-Centered Care	Patient-Centered Care	Sharing of Patient Information
Fragmented Work Practices	Siloed Practice	Collaborative Teams	Collaborative Work Practices
Individual Experiences	Experience-based Care	Evidence-Based Care	Collective Experiences

Table 8: Collaborative Vision

Inscribing the pan-Canadian Vision

Networks cannot be observed directly, any more than *the* organization can, hence we must focus on their traces – for example, on the inscriptions which circulate within and between them. (Bloomfield 1995: 495, emphasis in original)

In order to understand how the re-scripting of the Canadian healthcare system is being accomplished, I will try to follow some of the inscriptions that I believe have been instrumental in the innovation process. This process, which is ‘simultaneously a matter of substance and significance’ (Barad 2007: 3), involves an intertwining of the social (meaning) and the technical (matter). Both matter and meaning come to be inextricably intertwined, so much so that ‘we might call technology the moment when social assemblages gain stability by aligning actors and observers’ (Latour 1991: 129). From this perspective, the task of occasioning a pan-Canadian EHR system could be understood in terms of trying to align the relevant actors so that they are influenced to interact in pan-Canadian collaborative ways. Through inscription, the promoters of social change achieve stability and acquire control over the actor-network. This stability is crucially important to the innovator’s agenda, as the actor-network is highly dynamic by nature. Thought of in this way, it is not the technology implementation that is of main concern but the alignment of human and non-human actors that is more important. *Technology becomes just one way of trying to achieve this alignment.*

In this chapter, I will attempt to show through what means a new collaborative pan-Canadian vision of healthcare is being promoted throughout the network. Matter becomes one important way for this new meaning to proliferate and the new pan-Canadian script to stabilize. With this sociomaterial approach, I hope to be able to give the reader a better sense of the intra-active becoming of the pan-Canadian EHR in which this new way of working (involving a collaborative human agency) follows from the constitutive entanglement between materiality and sociality (Barad 2003).

In this next section, I will introduce the reader to the ANT concept of intermediaries in order to help me describe the process by which the pan-Canadian innovation is struggling to become established. By way of example, I will focus on some of Infoway's activities to illustrate this alternative view of how innovation gets done.

Intermediaries

An intermediary is anything that passes between human or non-human actors in a network and consequently defines the relationship between them (Callon, 1992a). They are also the way that intentions are translated from one actor to another. Importantly, a translation results in the creation of a link between actors that to some degree modifies them (Latour 1999b), as 'actors define one another in interaction – in the intermediaries that they put into circulation' (Callon 1992: 134). Examples of intermediaries could be scientific articles, computer software, disciplined human bodies, technical artifacts, instruments, contracts and money. According to Callon (1992a), there are 4 main types of intermediaries: texts, technical artifacts, human actors and money.

In practice, the world is filled with hybrid intermediaries that define actors as they are put into circulation. Intermediaries not only *describe* their networks in the literary sense of the term, but they also *compose* these same networks by giving them form. In this way, intermediaries thus both 'order and form the medium of the networks they describe' (Callon 1992: 135). This view promotes a more nuanced understanding of the innovation process, in terms of new network formation, and brings socio-technical sensitivities to the forefront.

The notion of intermediaries may seem similar to that of boundary objects that appeared in a previous chapter. There is one key difference. Boundary objects are grounded in a particular ontological understanding of the world in which it is assumed that the object retains some essential existence. Thus, even though multiple actors perceive the boundary object differently, the object in the centre remains untouched. On the other hand, intermediaries have no pure ontological existence. In fact, they are ontologically relative, in that different subjects enact different objects into existence i.e. reality multiplies. Therefore, if things break down ‘this is because there was inconsistency between different performances which reflects failing coordination between different object positions rather than differences between external perspectives on the same object’ (Law 2002a). Overall, I would suggest that one argument is epistemological and cognitive (boundary objects) whereas the other is ontological and performative (intermediaries).

In the next section, we shall see how Infoway was initially formed and scripted as an intermediary to promote the pan-Canadian vision of healthcare and the collaborative meanings associated with it. Infoway then delegated the achievement of this vision to other human and non-human intermediaries, which in turn were able to occasion spaces where dialogue and collaboration could occur. As such kinds of spaces were largely unprecedented in the healthcare system, these spaces were ‘new’ spaces.

Scripting Infoway

In September 2000, the federal/provincial/territorial First Ministers together committed to strengthening the national health infostructure by allocating \$500 million to the initiative. This initiative came out of recognition that governments had been making major investments in health information technologies in recent years to improve health care and health system management but the investments were not coordinated. There was a general sense that greater collaboration and support was needed in order to link the various initiatives and to help them achieve their full potential. The ministers unanimously agreed to work together to strengthen a Canada-wide health infostructure in order to improve quality, access and timeliness of health care for all Canadians. Specifically, they were concerned with developing electronic health records, enhancing

the use of enabling technologies like telehealth, and working collaboratively to develop common data standards to ensure the compatibility of health information.

A few months later, in January 2001, Canada Health Infoway was formed as a ‘strategic response by federal, provincial and territorial governments to the rapid development of diverse health information and technology initiatives underway across Canada’ (Infoway Annual Report 2002: 4). In June 2001, the Members of the Corporation — federal, provincial and territorial Deputy Ministers of Health — met in Saint John’s, Newfoundland, to formally elect and appoint the members of Infoway’s Board of Directors. In the inaugural year-end message from the Chair of the Board of Directors, the complexity of Infoway’s mission was acknowledged in this way:

As we head into our second year of operation, all of us recognize the magnitude of the challenge before us. A national health-care infostructure must connect with the thousands of health-care professionals who provide services to individuals across the range of institutions that comprise today’s complex health system. *Competing interests and conflicting needs must be reconciled.* Many hurdles lie ahead.

(Infoway Annual Report 2002: 1, emphasis added)

Being forged out of collaboration, Infoway held a keen recognition that if this initiative was to be successful it had to carefully attend to the competing, and often conflicting, interests of the diverse array of concerned stakeholders. Furthermore, the first President and CEO of Infoway noted that even though the organization’s mandate was to help build the information and communications foundation for the Canadian health-care system of the future, this was also a public system, ‘a system that Canadians viewed as a cornerstone of their national identity’ (Infoway Annual Report 2002: 2). Therefore, in some way, the public also had to be brought into the fold if any sort of initiative that would overhaul the healthcare system was to be successful.

Stemming from the realization that many different types of stakeholders needed to be brought on board, collaboration became a core focus of Infoway’s approach. Those in charge of the organization understood that any successful pan-Canadian system would have to be built on a foundation of pan-Canadian partnerships. Overall, Infoway

endeavored to work collaboratively with the provinces and territories, the health-care community, the private sector and eventually the public¹¹³. They understood that their core undertaking would include ‘investing with partners to develop, replicate and deploy robust, reusable, interoperable EHR solutions faster, better and more cost-effectively than any of our partners can do alone’ (Infoway Business Plan 2003/04: 3). Collaboration even figured prominently in Infoway’s mission statement which was stated thus: ‘to foster and accelerate the development and adoption of electronic health information systems with compatible standards and communications technologies on a pan-Canadian basis, with tangible benefits to Canadians. Infoway will build on existing initiatives and *pursue collaborative relationships* in pursuit of our mission.’ (Infoway Business Plan 2003/04: 3, emphasis added).

Infoway’s collaborative approach involved such things as harnessing the innovation of stakeholders, focusing on common standards to ensure interoperability, centering on best practices and lessons learned to minimize risk and maximize cost effectiveness, avoiding duplication and achieving economies of scale by leveraging innovation from one part of the healthcare system into another. In fact, in the 2002 Annual Report, it was emphatically stated that ‘Infoway’s role is to lead, facilitate, promote and foster the accelerated development and adoption of a pan-Canadian health-care infostructure, focused initially on interoperable electronic health record solutions. *Infoway’s role is NOT to develop and implement solutions*’ (18, emphasis added, capitals in original). In other words, Infoway was purposely avoiding taking any kind of active role in the development and implementation of solutions, as the National Health Service had in the United Kingdom. Instead, in my view, Infoway was more focused on creating spaces where collaboration could more easily occur and thereby help a pan-Canadian collaborative health system to more easily emerge.

In September 2003, the First Ministers meeting was specifically convened on healthcare. In that meeting, Infoway was given a strong vote of confidence when federal, provincial

¹¹³ Working with the public has only now seemed to become a major priority. From my research, I got the sense that Infoway only wanted to get the physicians and public involved once the core infrastructure was close to being built.

and territorial Deputy Ministers of Health unanimously endorsed Infoway's three-year business plan and, consequently, reaffirmed their support for Infoway's collaborative approach. Richard Alvarez, the President and CEO, summed up his organization's general approach with the following message:

Infoway's success now – and in the future – is *powered by partnerships*. This deceptively simple observation lies at the heart of every initiative, every investment and every incremental benefit to health care, which we hope to bring to Canadians today and in the years ahead. *I joined an organization that is 100% dependent on collaboration* among levels of government, regional health authorities, healthcare providers, patients and the private sector, and I recognize that *our success will be entirely proportional to the input of partner organizations* working across the full range of health care in every corner of our country...Infoway is not here to develop compatible electronic health record systems in a vacuum, but rather to *accelerate development in a collaborative environment*...Infoway has a unique opportunity to *act as a facilitator and catalyst for collaboration, best practices and exchanges of ideas and information across the country*. *This is our role and we are uniquely positioned to make it happen*. (Infoway Annual Report 2003/04: 3, emphasis added)

There was also a developing awareness that Infoway's ability to fulfill their mission depended greatly on many social variables that needed to be properly attended to. As further stated:

A strong focus on investments and results is certainly a big part of the Infoway strategy – but it is not the only part. *The Infoway equation must also balance technology with people, coupling investments in EHR systems with initiatives to engage the people who use them*. To build momentum in this direction, Infoway will accelerate its outreach to the people and partners who are critical to the success of EHR systems. This will include *developing substantive on-going relationships* with important groups such as chronic care and professional organizations, medical education networks and university faculties. *There is a tremendous opportunity for Infoway to leverage its role as a national catalyst, facilitator and intermediary for ideas, innovations, best practices and dialogue*. *In the future, this role will become an increasingly central part of Infoway's approach to building*

successful EHR systems. (Infoway Annual Report 2003/04: 14, emphasis added)

The President's message in 2004/05 Annual report again accentuated the essentialness of a collaborative approach to Infoway's overall agenda:

Making electronic health records (EHRs) a reality cannot be ordered, decreed or unilaterally implemented. Real change comes from *listening to the needs* of the provinces, health authorities, healthcare practitioners and patients. Then we must *build bridges, a common understanding* and a plan of action that makes a difference to the quality of Canada's health care... *Our prime product is partnership.* Infoway plays a more active role nurturing investments with partners. Canada's First Ministers launched Infoway on the fundamental premise that the challenges of creating a productive, modern healthcare system based on information technology would be best met by a *collaborative national approach*. This would reduce costs and risk, while accelerating implementation by sharing best practices, replicating successes across the country and ensuring interoperability. The power of that vision became apparent this past year, as provinces and territories across the country worked together to build on each other's successes. (Infoway Annual Report 2004/05: 11, emphasis added)

In fact, Infoway's unique collaborative approach involving the federal, provincial and territorial governments seemed to be drawing international attention. 'Interest in the "Canadian approach" has been expressed by governments and health organizations in Germany, France, the UK, Australia and the US, as they too grapple with the hurdles associated with automating their healthcare systems quickly and cost-effectively' (Annual Report 2003/04: 4).

At the core of Infoway's collaborative approach was the practice of leveraging, which involved reusing and replicating accomplishments from one jurisdiction into another. Accordingly, Infoway had become an expert resource to provinces and territories, 'contributing technical and business perspectives that can save time and money, and ensure interoperability across healthcare organizations' (Annual Report 2004/05: 20). Furthermore, Infoway was broadening its engagement with various groups of healthcare professionals recognizing that "change" is not a quick fix – it will require the ongoing

collaboration, commitment, ingenuity and perseverance of every healthcare organization across the country' (Annual Report 2005/06: 30).

Infoway Scripting

Due to the sheer variety of stakeholders involved in the implementation of the pan-Canadian EHR initiative, Infoway understood that they would need to build widespread critical support. They needed allies. Infoway's pan-Canadian view of the sector had enabled them to develop a keen awareness of the full range of stakeholders and the kind of roles that they needed to play in order to fulfill their mandate. This know-how is reflected in the following statement:

Implementing EHR solutions involves a wide range of stakeholders. Infoway works actively with *co-investors and project implementers* (e.g., health ministries, public sector sponsors, regional health authorities, hospitals, etc.) as well as *technology enablers* (e.g., vendors and suppliers) to build partnerships and alliances. We consult, identify mutual interests, negotiate project investments and work together to achieve common goals. *Health care providers and their associations, regulatory colleges, IT trade associations, and academia are also key stakeholders* whose involvement is crucial to the successful implementation and adoption of EHR solutions. Infoway's primary role with these stakeholders is building awareness, stimulating interest, and promoting and developing specific knowledge and understanding of EHR solutions. Active involvement by these stakeholders in the design and implementation of EHR solutions is achieved by Infoway's partners and through its investments. *Ultimately, Infoway has an important role in raising awareness, building understanding and gaining acceptance of EHR solutions with the Canadian public.* (Business Plan 2003/04: 6, emphasis added).

This know-how was becoming even more critical, as the EHR initiative moved from planning to implementation and deployment. The breadth of the stakeholder community was also steadily expanding.

In the balance of this chapter, I will describe some of the material ways that Infoway is using to help build that support, by delegating its interests to other actors (Walsham and Sahay 1999). By inscribing other actors with a pan-Canadian vision of healthcare (a new

script based on a collaborative meaning of how healthcare should be administered), Infoway is managing to protect and promote its own interests thereby helping to bring about a re-scripting of the healthcare system. I will describe some of the different types of intermediaries that Infoway is putting into play, thereby promoting my argument that technology is but one among many material ways of promoting particular interests. Overall, we shall see how, through the entanglement of meaning and various forms of matter, the pan-Canadian collaborative vision of healthcare is struggling to become occasioned.

Scripting Human Agents

Human agents can serve as intermediaries through their skills, knowledge and know-how (Callon 1992). For instance, technicians have been shown to mediate communication between engineers and machine assemblers by facilitating the co-creation of common ground and shared understandings (Bechky 2003). Human actors can be scripted in much the same way as non-human actors. They can be trained to perform particular actions in particular ways. For example, in some senses, military training is about making human actors ‘less human’, in that they become much more predictable in their actions by reacting to particular stimuli in their environment without reflecting on what they are doing. In other words, military personnel are ‘inscribed’ to behave in particular ways through regimented training.

Because of the nature of the challenge facing Infoway, they seemed to realize early on that scripting human agents and delegating the mission to them was important if they were to get any traction in the highly social healthcare system. This meant that collaboration with other stakeholders would have to be an integral part of their strategy. Once these stakeholders found meaning in the innovation, Infoway hoped they would turn around and promote it to others, thereby becoming champions of change.

Infoway not only focused on partnering with other organizations, but also importantly, encouraging more partnerships in the marketplace. For example, they looked for opportunities to encourage the private sector to collaborate with others:

I mean, the truth is there isn't any organization that is able to lay claim to the EHR as their turf. It is a federated system and because of that *partnerships are essential, private and public sector partnerships, private to private sector partnerships, there's never a case where one proponent gets an entire EHRS in any of the jurisdictions*. It's always consortia that are coming together so it's been very interesting to see that some of the relationship building between private sector partners has in fact manifest itself as partnerships that survive the project and end up being business partnerships. (17-4)

I will now provide some examples of the kind of partnering with which Infoway has been involved:

- **Partnering with various Associations**

Infoway has worked with a wide range of healthcare professional associations to develop common national standards for EHR terminology and technology. Other examples of partnering include working with the Canadian Medical Association on a joint survey to assess physician adoption and working with national healthcare organizations to align e-health solutions with Canada's healthcare renewal priorities, including the Canadian Patient Safety Institute, the National Pharmaceutical Strategy, the Canadian Institute for Health Research and the Health Council of Canada. Other associations have also been involved in the renewal agenda. For instance, the pharmacist association helped develop Infoway's drug information strategy and participated in several standards projects, the radiologist association helped develop guidelines for image compression and transmission and the nurse association was an active participant in the Standards Advisory Committee (Infoway Annual Report 2005/06: 16).

- **Developing Strategic Alliances with the Private Sector**

As provinces and territories start to consolidate their requirements and purchasing, the market for commercial off-the-shelf products is expanding. Accordingly, jurisdictions are reducing their reliance on expensive custom solutions, and are opting to acquire more cost-effective commercial solutions as they become available. Infoway runs briefing sessions across Canada to inform the private sector about emerging opportunities,

requirements for interoperability, and updates to the pan-Canadian Blueprint architecture. Vendors actively work with Infoway on trying to understand how their products could better comply with the Blueprint. Vendors participate in Infoway standards work and serve on the Standards Advisory Committee and pan-Canadian standards review groups. An e-Health collaboratory helps vendors test their products for clinical usability and interoperability with the other Blueprint-compliant systems (Infoway Annual Report 2005/06: 19).

- **Fostering Clinician Acceptance**

In 2005-06, Infoway worked closely with professional associations, provinces and territories to finalize its End-User Acceptance Strategy for physicians, nurses, pharmacists and other healthcare providers. Nine projects with a combined budget of \$14.2M were approved, and a team of clinicians was established to work closely with provider organizations to support the implementation of the strategy (Infoway Annual Report 2005/06: 29).

Infoway and the jurisdictions also launched the Clinician e-Health Support Network to promote EHRs to fellow physicians, pharmacists and nurses on the ground. A network of peer leaders, or ‘super users’, was created to provide mentoring and hands-on support to their colleagues to ease their transition to an electronically- enabled practice (Infoway Annual Report 2006/07: 14).

Scripting Non-Human Agents

In many ways, non-human agents are better at ‘following orders’ than are their human counterparts. They are usually quite tireless in trying to achieve their objectives. Accordingly, any durability in an actor-network is usually on account of the continued participation of a non-human actor (Latour 2005b). In many cases, non-human agents also have much greater mobility than human ones, which is especially handy when an entire system needs to be re-scripted.

Bruno Latour (1991) describes a very interesting study that illustrates the role that non-human agents can play in influencing the behaviors of human actors. Latour noted that there was a sign behind the front desk of many hotels in Europe saying ‘Please leave your room key at the front desk before you go out’¹¹⁴. However, despite the sign, hotel management was still having a problem in that many guests would ignore the sign and leave the hotel with the key still in their pocket. As a result, a large cumbersome weight (key fob) was attached to the key. Unlike any other key the guests may have carried in their pockets, the key with a heavy fob reminded them that this particular key was not to be retained when they left the hotel as it was very uncomfortable and awkward to carry in their pocket. As a result, many guests did change their habit and left the heavy cumbersome key and key fob at the front desk on the way out. However, others did not. Management decided to use successively heavier key fobs until the desired effect was achieved¹¹⁵. We will now look at how Infoway delegated their vision to several types of non-human agents.

Scripting Money

Money, in all its different forms, can have a powerful effect on networks as it gets translated into orders, indicators and recommendations (Callon, 1992). Through its exchange, money demands something in return and therefore creates a mutual commitment. More often than not, that commitment extends among and aligns a whole array of heterogeneous human and non-human actors: ‘cooperate with X at ICI and Y from Laboratory Z to obtain a critical temperature of 150°K and you will get a loan of \$A’ (Callon 1992: 138). In this way, money also defines and distributes roles.

In the role as ‘strategic investor’, Infoway has used money to effect change in the marketplace. This has been a primary part of Infoway’s original strategy. For instance, in 2005, Infoway funded an expansion of Ontario Cancer Care’s chemotherapy e-

¹¹⁴ It is the practice in many older hotels in Europe that the guest is required to leave their metal room keys at the front desk whenever they leave the hotel. This is because many guests were losing their keys and the hotel did not always have a duplicate handy. This practice is less common in North America especially with the prevalence of easily replaceable electronic key cards.

¹¹⁵ Thus, if you travel to many of the older boutique hotels in Europe today, the key fobs are inordinately large.

prescribing system which was apparently ‘strongly endorsed by the physicians, pharmacists and nurses using it at 11 cancer centers in the province’ (Annual Report 2005/06: 20) and allowed them to collaborate in ways that were not easily possible before.

In order to take a more strategic approach to using money to effect change in the healthcare sector, Infoway developed investment strategies for their nine investment programs: Registries, Diagnostic Imaging, Drug Information Systems, Laboratory Information Systems, Interoperable EHRs, Telehealth, Public Health Surveillance, Innovation & Adoption and Infostructure. More recently, they developed a new program called Patient Access to Quality Care.

Infoway’s original approach dictated that they fund 50% of capital costs for projects that fell within their guidelines. In 2004-05, Infoway realized that the ability of provinces and territories to raise matching funds for projects was becoming a constraining factor that prevented Infoway from achieving its investment goals. As a result, a decision was made to make a change in the organization’s funding ratios, from an average of 50% to 75% of eligible cost (Infoway Annual Report 2004/05: 13). Infoway’s guidelines included things that were in the national interest. For instance, every funded project had to use pan-Canadian standards and the learnings should be able to be leveraged to other jurisdictions. Consequently, projects like the Western Health Information Collaborative (WHIC) that were of high strategic interest usually got funded.

The WHIC was a collaborative effort in which B.C. was lead partner along with Alberta, Saskatchewan and Manitoba. The WHIC was formed to develop a provider registry, which is an electronic directory of physicians and other healthcare providers. All partners agreed to use the same standards, designs, documentation, implementation strategies, computer programs and deliverables. Infoway supported the WHIC initiative, as it was thought to be a reusable solution that could be effectively used in other parts of Canada to help accelerate the overall pan-Canadian initiative (Infoway Annual Report 2004/05: 18).

Although the adoption of electronic health information technologies is underway in many countries around the world, it was Infoway's strategic investor role (and more recently some of the other roles) that seemed to particularly distinguish Canada's endeavor. By working closely with the jurisdictions and bringing a pan-Canadian perspective to bear, Infoway has used strategic investing to encourage greater alignment and support the implementation of electronic health record solutions from coast to coast.

Scripting Texts

Texts are literary inscriptions that could include reports, books, articles, patents and notes (Latour 1986). They usually circulate on material objects, like paper or USB keys, and, as such, are relatively immutable and mobile. They can also circulate in electronic form through means like the internet. Texts can define networks and actor roles through different methods. For instance, the choice of journal, language and title are methods by which an article seeks to define and build an interested audience (Callon 1992). More generally, 'words, ideas, concepts and the phrases that organize them thus describe a whole population of human and non-human entities' (Callon 1992: 135). Even more than just description, 'telling stories about the world also helps to perform the world...this means that in a (writing) performance reality is staged' (Law 2002a: 6). At the extreme, a text (or a body of texts) can come to re-present the network (or world) that it describes and thereby gain considerable power over it (Said 1978). Of note, Infoway has ramped up its focus on media communication in recent years. For example, overall media mentions totaled 1,560 in the 2008-09 fiscal year, a 31-per-cent increase over the previous fiscal year (Infoway Annual Report 2008/09).

- **EHRnews@Infoway**

In 2003, Infoway started publishing a quarterly newsletter, available electronically and by mail to interested individuals and groups. The newsletter covered some of the latest developments at Infoway, which included an update of progress on EHR projects across the country, EHR success stories and importantly a regular section called 'From the President's Desk'. At first look, the newsletter seems to be just a way to keep healthcare

stakeholders informed of the ongoing progress of EHR projects around the country. In that regard, it did present a nicely summarized view of current progress in a dashboard format. However, analyzed with a more critical eye, it seems to also be a way to promote particular meanings of electronic health records, some of them new. For instance, in the success story ‘Electronic Medical Records Deliver Better Front-line Care’ (EHRnews@Infoway, Fall/Winter 2009-2010), a doctor is quoted as saying ‘Without electronic medical records, we cannot practice the way we are supposed to nowadays, which is patient-centered, evidence-based, and with measurable outcomes...you can only do that with an EMR’. This kind of information serves to attach new meaning to electronic health records by suggesting that by adopting the innovation, the doctor will be at the forefront of shifts that are happening in healthcare and be able to practice the way he/she should be. This also implies that what the doctor is doing is somehow deficient. Further evidence that this newsletter was designed to promote a monologic view of the EHR (a showcase of success is one of the sections) was that in my scan of the last three years of its publication, I could not find one story about a failed EMR or EHR attempt. Perhaps, there are valuable lessons to be learned from failures and controversy that we are not seeing.

Furthermore, the message from the President’s Desk seems to provide an opportunity for the President of Infoway to comment on current affairs along with his take on events that may have transpired in the past quarter. For instance, most recently comments were made about the Office of the Auditor General of Canada’s (OAG) report on Infoway’s operations. In those comments, the Infoway President suggested that his organization has ‘already started doing a number of things the OAG refers to in its report - because we recognized they made sense and felt they were appropriate to implement as soon as possible’¹¹⁶. He also distanced Infoway from eHealth Ontario, which had been involved with several scandals, by saying that ‘it is important to understand that Infoway has not had any contracts with eHealth Ontario nor its predecessor’ (Ibid). These comments seem to suggest that part of the function of the message from the President’s Desk, and hence the newsletter, is also to maintain and promote the legitimacy of Infoway and its mission.

¹¹⁶ Vol 7, EHRnews@Infoway, Fall/Winter 2009-2010:2.

- **Infoway's EHR Solution Blueprint**

In 2003, Infoway collaboratively led and engaged in extensive consultations and collaboration with over 300 stakeholders across Canada including: healthcare professionals and administrators, IT specialists, technology companies, academics and Chief Information Officers from each of the jurisdictions. Their goal was to develop an EHR Solution Blueprint, which would define and encompass both the business and technology architecture, standards and guidelines for development of the new pan-Canadian system. In this way, it was innately sociotechnical. Importantly, this sort of collaboration marked the beginning of a key phase in Canada's e-health development as a consistent architecture was being put in place where one never existed before. The resulting Blueprint provided a framework for interoperability and importantly served as 'an evolving document which lays out the business and technical approaches that will guide the development and implementation of EHR solutions in Canada' (Infoway Annual Report 2003/04: 8). Overall, the establishment of the blueprint has helped to accelerate implementation and increase replication across Canada. The Blueprint allows jurisdictions to develop systems that meet their own priorities, with the assurance that all shared components will be compatible. This approach also encourages vendors to develop commercial, off-the-shelf solutions that conform to the architecture (Infoway Annual Report 2004/05: 12).

Internationally, the blueprint has gained widespread recognition. For instance, the blueprint won top recognition in the health category of the 2008 Service Oriented Architecture (SOA) Case Study Competition sponsored by the SOA Consortium and CIO Magazine. Infoway was the first not-for-profit organization to win an award in this competition. One of my informants remarked in the following way about the innovativeness of the EHR Blueprint approach: 'I can tell you that there are a number of global players that are watching the Canadian experience very closely. If we get the ball over the goal line, the pan-Canadian blueprint and the pan-Canadian HL-7 standards are in fact going to be the cookie cut used by a number of national EHR implementations' (17-11).

- **Joint Request for Proposals**

Before the advent of Infoway, joint RFPs were not part of regular practice. Jurisdictions were used to making decisions based on what was best for their own jurisdictions with little concern for others. Today, the idea of collaborating on RFPs is becoming more prevalent as numerous provinces and territories are jointly issuing or sharing RFPs, thus ‘benefiting from volume pricing while reducing the time and risk of purchasing new information technology (IT) systems. By consolidating their efforts, the provinces are creating a larger, more attractive market opportunity for Canadian vendors’ (Annual Report 2004/05: 2). In addition, joint procurement by health regions and between provinces has meant significant savings in time and money, estimated to be over \$100 million in 2006 (Annual Report 2006/07: 5). One notable example for the 2008-09 fiscal year was a national RFP for telehealth videoconference equipment, issued jointly with 11 jurisdictions, from which six manufacturers were chosen. Tactics such as this one seem to help lower costs, shorten timelines and optimize implementation choices (Annual Report 2008/09: 12).

- **Joint three-year technology and investment plans**

Another innovation in the market was Infoway’s insistence on jointly developing three-year technology and investment plans with the jurisdictions. This helped to better align its own investment programs with the information technology plans of each jurisdiction, as well as help align jurisdictional plans with each other. In summary, ‘the three-year plan provides a collective understanding of the national EHR direction and the resources required, aligned Infoway’s strategy with provincial and territorial implementation priorities; and encouraged projects based on long-term integrated goals and objectives, rather than stand-alone, isolated projects’ (Annual Report 2004/05: 11).

- **National Procurement Agreements**

In 20 07/08, Infoway announced three national procurement agreements for an EHR viewer, drug and lab information systems. By combining the buying power of health

regions and jurisdictions, the hope was that this practice will potentially result in cost savings that will be significant over the coming years. Existing preferred- pricing agreements and other procurement efforts alone have apparently helped Infoway and the jurisdictions avoid an estimated \$135 million to \$165 million in costs (Annual Report 2007/08: 3).

- **Vision 2015**

Reduced wait times. Increased patient participation in health care. Efficient chronic disease management. Improved access to care in remote and rural communities. Fewer adverse drug interactions. Better prescribing practices.
(Vision 2015: 1)

This is the opening paragraph of Infoway's Vision 2015 document, which has been promoted as a 'comprehensive health IT road map which would guide the country's next 10 years of investment' (Annual Report 2006/07: 5). At first glance, it depicts a vision of what health care could look like in Canada if stakeholders were to 'share' the vision and align themselves accordingly. However, as stated in the document, the vision is also supposed to serve as a strategic framework to guide Infoway's investments over the next ten years and therefore serves as a means by which to understand how Infoway has problematized¹¹⁷ the EHR project. What problems do they forecast and by whom?

Infoway argues that this vision is not their vision but the collective and broad-based vision of all interested stakeholders. In the report, it is stated that the 2015 vision¹¹⁸ was the result of interviews conducted by McKinsey in which over '100 stakeholders from across Canada and from all areas of the healthcare sector were consulted'. Through this process, McKinsey consulting 'heard from deputy ministers, hospital CEOs and CIOs,

¹¹⁷ Problematization is the initial step in the innovation translation process described in more detail in the next chapter. Suffice it to say for now that it refers to the way that the innovator defines identities and interests of other actors that are consistent with its own interests, and establishes itself as an obligatory passage point (OPP), thus 'rendering itself indispensable' (Callon, 1986).

¹¹⁸ It is stated in the report that the various stakeholders that were consulted in the creation of the Vision were as follows: Ministries 22%, Clinicians and Patients 20%, Regional Authorities 18%, Not-for-Profit Organizations and Government Agencies 12%, Hospital CEOs and CIOs 10% and Vendors 9%

clinicians, patients, health associations and government agencies' (Vision 2015: 1). Nonetheless, this is a document that has been endorsed by Infoway, defining the key actors (from Infoway's perspective) that need to be enrolled and mobilized in order for the EHR system to be put into play. In order to help achieve the vision, Infoway relies on the trope of information by suggesting that information is critical: 'stakeholders increasingly recognize that successfully delivering care across all these settings requires managing not only the patient and expenditure flows but also the critical information flow' (Vision 2015: 2). Therefore, a strong information infostructure is necessary to enable more effective and efficient healthcare practice. Information is once again the key ingredient on the recipe for success.

Scripting Technical Artifacts

Technical artifacts could include scientific instruments, machines, robots and consumer goods (Callon 1992). Technical artifacts can be seen as standing in for a program of action that coordinates a network of roles by defining and distributing roles to humans and non-humans (Akrich and Latour 1992). In other words, technical artifacts can stand in for scripts. Therefore, the designers of these artifacts transform themselves into sociologists, moralists, or political scientists at 'precisely those moments when they are most caught up in technical questions' (Suchman 2000). In this way, questions about design become of both a technical and social nature (Suchman et al. 1999). Texts and technical artifacts tend to be highly associated as codes, checklists, maintenance manuals and user handbooks tend to 'escort objects on their travels' (Akrich 1989b). Like texts, artifacts link entities together into networks, in ways that may be decoded (Callon 1992). It is through inscriptions that 'actors embed their social agendas into technical artifacts such as information systems...in contrast to inscribed material that is available for inspection, information systems are usually complex enough to hide the decision processes from view, thereby concealing the way that social interests are represented' (Holmstrom and Robey 2005: 169). Consequently, information systems are but one way, albeit an unobtrusive way, to promote particular agendas and interests.

- **Standards Development**

Overall, common standards are critical to fulfilling the EHR mandate of affordable, useable and interoperable solutions (Annual Report 2006/07: 12). Furthermore, common standards allow technology to be developed with less risk, technology solutions can be reused, information about systems can be more easily exchanged and vendors can more easily develop ‘off-the-shelf’ products that avoid costly custom integration. As evidenced by the state of many more local standard-less health information systems across the country, software prices tend to go up, development takes longer and systems become information silos. For the aforementioned reasons, Infoway has taken a leadership role in the development of common standards.

Before the advent of Infoway, each province seemed to be intent on developing their own standards. As a result of the lack of common standards, the smaller provinces and territories were at a clear disadvantage compared to the richer provinces. A big part of the problem seemed to be that vendors were used to using standards in order to compete in and capture particular segments of the market. For instance, a vendor would sell one product to a hospital and then essentially capture that market by making it difficult for that product to talk to other products (through in-house standards) unless they were from the same company. So the hospital had to make a choice: buy a product from another vendor or use the same vendor and avoid costly integration.

Infoway’s goal was to use common standards and architecture to create a market that was 33 million people and not a fractured market the way it was before. Accordingly, the hope was that vendors would no longer see these markets as fragmented and isolated opportunities, since even the smallest jurisdiction’s requirements would be better aligned with those across the country. Overall, Infoway has acted as a consolidator for these markets and thus helped to ‘create bigger markets and bigger market opportunities for systems vendors, which should ultimately result in lower costs and faster implementation for Canada’s healthcare system’ (Annual Report 2004/05: 19). In addition, by promoting a collaborative approach, a national market for health information technology has

allowed Canada's IT industry to grow and diversify beyond its traditional sectors, potentially opening important international opportunities (Annual Report 2006/07: 4).

During 2006-07, Infoway assumed leadership of EHR related standards activities for Canada by forming the Standards Collaborative (SC). Infoway was able to leverage its ongoing collaborative relationships with stakeholder groups in order to move ahead and form a stakeholder collaborative concerned with promoting common health information standards. The SC was approved by Canada's Deputy Ministers of Health to provide a single point of contact for 'collaboration, coordination, development and on-going support of pan-Canadian standards' (Annual Report 2006/07: 12). Such a sustained focus on standards was believed to ensure 'compatibility of EHR and e-health solutions now and in the future while also aligning Canada with international efforts' (Annual Report 2006/07:12). In December 2007, Infoway's Board of Directors voted that the SC, initially housed at Infoway on an interim basis, should be 'a service within Infoway for the duration of its mandate, subject to appropriate funding' (Annual Report 2007/08: 19). With the approval of a standards uptake strategy to encourage wider adoption, the stage was set for further gains (Annual Report 2007/08: 3).

The SC has continued to deliver its core services, which included 'governance, education, training, conformance, maintenance and client support services' (Annual Report 08/09:18). The SC has also openly published the Standards Collaborative Guide and Standards Catalogue that describes service offerings and details of the standards supported by Infoway. The guide elaborates on how to participate in SC committees and working groups, the process for influencing and approving pan-Canadian and international standards, and information about standards established in Canada for the EHR. As well, Infoway has developed a guide outlining the architectural and technical best practices and approaches for the implementation of the pan-Canadian EHR standards. The SC also develops and maintains conformance profiles and test cases for pan-Canadian standards to be used for jurisdictional initiatives and Infoway certification services to measure conformance to pan-Canadian standards.

- **e-Health KnowledgeWay Portal**

In May 2003, Infoway launched the e-Health KnowledgeWay portal to support knowledge sharing, collaboration, and informed decision-making¹¹⁹. The e-Health KnowledgeWay was a portal to a collection of Infoway screened white papers, Web sites, news articles, and other resources that cover areas such as privacy, patient safety, international experiences, and health informatics. This portal also provided a space for the ongoing exchange of knowledge and expertise. Through virtual communities, participants can share ideas and experiences, ask questions, or discuss issues with other e-Health professionals, advocates, and enthusiasts.

- **Infoway's Website**

Infoway's website (www.infoway-inforoute.ca) has been revamped several times over the last few years. The current website serves as 'a primary communications channel to multiple audiences' (Annual Report 2008/09: 15). As Infoway's collaborative approach requires it to address the needs of various external stakeholder groups, including the public, the website was designed to include specific sections for those implementing EHRs (i.e., jurisdictional partners), those working with EHR systems (i.e., health practitioners) as well as those building EHR systems (i.e., vendors). The latest version of the website features a number of multi-media presentations explaining EHRs and how they can improve Canada's health system. As well, success story videos profile the positive results being generated by jurisdictional partners as they implement new EHR systems.

- **Certification Service**

Launched on February 12, 2009, Infoway's certification service has been 'designed to ensure emerging consumer health solutions provide adequate privacy and security provisions and can interoperate adequately with existing components of the EHR infostructure currently being implemented by Canada's jurisdictions' (Annual Report 2008/09: 23). Certification ensures that 'consumer health solutions comply with Infoway's privacy security, interoperability and management standards and complement

¹¹⁹ <http://knowledge.infoway-inforoute.ca>

and leverage Canada's investment in electronic health records'¹²⁰. Infoway has published a certification manual to help developers of consumer health solutions understand how to gain certification for their products.

The benefit of certification for the private sector is that it is intended to provide these companies with greater market access, improve the quality of products developed, and enhance testing efficiencies. On the flip side, the public sector organizations that invest in Infoway-certified solutions can enjoy a higher degree of confidence that the products they purchased are reliable, interoperable, private and secure. Vendors whose solutions achieve certification will receive 'Infoway Certified' certification to mark their product and related marketing materials. This will serve as a signal to the market and help to foster a collaborative relationship between the public and private sectors. Eventually, the intent is to broaden the certification service to include a wider range of solutions such as consumer health applications and EHR solutions.

In this chapter, my concern was to explore in what ways the pan-Canadian vision of healthcare was becoming materialized or how innovation was getting done. I purposely presented a 'sanitized' description of innovation in which concerned stakeholders seem to unconditionally accept the innovator's attempt to change their existing work practices. Prevailing logic suggests that innovation usually happens because it is 'such a good idea' and, if it does not, it is because stakeholders have not yet seen the real value in it. Therefore, the innovator usually becomes focused on presenting strong and persuasive messaging relying greatly on the trope that 'technology is progress' to make the case for change.

I have endeavored to show how Infoway has tried to marry the pan-Canadian vision (meaning) with the pan-Canadian EHR (material) in order to make the compelling argument that 'the pan-Canadian EHR is the way to achieve the pan-Canadian vision of healthcare and you care about that, don't you?' This is what I would characterize as a more monologic approach to innovation, in which the innovator finds ways to promote their vision of innovation to stakeholders and takes steps to make it seem like it is the

¹²⁰ EHRnews@Infoway: Vol 7:4

representative and widely held view. In this way, the intent is to enroll and align stakeholders by persuading them to share the vision, the pan-Canadian vision in this case. After having spent so much time describing this view of the innovation process, in the next chapter, I will attempt to undo it.

Chapter Eight: Undoing Innovation¹²¹ – Occasioning More Dialogic Spaces

Reified (materializing, objectified) images are profoundly inadequate for life and for discourse. A reified model of the world is now being replaced by a dialogic model. Every thought and every life merges in the open-ended dialogue.

(Bakhtin 1984:293)

In this last chapter, before the conclusion of this thesis, I want to attempt to ‘undo’ what I consider to be a more reified view of innovation by undoing its associated discourses, thereby providing space to acknowledge the ‘deeply ambivalent and contested forms of ongoing practical activity’ (Suchman 2010). I begin by presenting a more dialogic model of innovation, an innovation translation model, which I feel more accurately reflects the controversy and contestation that inevitably occurs during the innovation process. Then, using this framing, I suggest that rather than trying to persuade key stakeholders about why they should be embracing technology and adopt a new supposedly more efficient way of working, the innovator should focus on trying to occasion more dialogic spaces in the innovation process, thereby ‘opening up questions and possibilities’ (Barry 2001: 211) rather than closing them down. It is in these spaces that human and non-human stakeholders gain the opportunity to re-align with each other, embrace new meanings and consequently the innovation itself seems to become better occasioned.

¹²¹ I must give credit to Prof. Lucy Suchman for juxtapositioning these two terms together in a conference presentation that I attended at the LSE in June 2010. Her paper explores ‘what new possibilities might be opened through some undoing of the prevailing discourses of ‘the new’’. She further explains that ‘the aim of undoing the trope of innovation is not to do away with it, but rather to respecify the ‘new’ as a strategic category, and as a gloss for more deeply ambivalent and contested forms of ongoing practical activity’. (<http://www.lse.ac.uk/collections/informationSystems/newsAndEvents/2010events/suchman.htm>)

Innovation Translation

According to the well-accepted diffusion model of innovation¹²², innovation is a social process in which subjectively perceived information about a new idea is communicated from person to person and thus, the meaning of an innovation is gradually worked out (Rogers 2003). Adopters can be plotted in a normal distribution based on when they decide to adopt the innovation into their work practices. Accordingly, the key factors affecting the rate of diffusion are the characteristics of the innovation, the nature of the communication channels, the passage of time and the social system (Rogers 2003). Research with this view tends to be focused more on trying to explain the successful adoption or rejection of an IS innovation by looking at such things as the functionality of the new system, the role of change agents, user reaction and speed of implementation (Tatnall and Gilding 1999). Put differently, a diffusion model explains innovation with reference to ‘the initial force that triggers the movements and which constitutes its only energy; the inertia that conserves this energy; and the medium through which the token circulates’ (Latour 1986: 266).

In contrast, an innovation translation model claims that the initial idea hardly counts, as the innovation has no inertia of its own and moves only if it interests one group of actors or another (Latour 1986). The movement of an innovation through time and space is understood to be in the hands of people, each of who may ‘modify it, deflect it, betray it, add to it, appropriate it or let it drop’ (Latour 1986: 286). Consequently, ‘instead of the transmission of the same token - simply deflected or slowed down by friction - you get...the continuous transformation of the token’ (ibid). A sanitized, and somewhat reified, model of the innovation process becomes replaced by a more dialogic view¹²³ that suggests that there is no transportation without transformation as ‘after many recruitments, displacements and transformations, the project, having *become* real, then

¹²² In industry, and especially marketing, the terms ‘innovator’, ‘early adopter’, ‘early majority’, ‘late majority’ and ‘laggard’ are well accepted and widely used.

¹²³ This view considers contestation, controversy and resistance as inevitable ingredients of the innovation process. I will be arguing that it is through this dialogic process that new meanings of the innovation become created and the innovation itself becomes more meaningful. Therefore, the innovator can better accelerate the innovation process by focusing on occasioning more dialogic spaces.

manifests, perhaps, the characteristics of perfection, profitability, beauty and efficiency that the diffusion model located in the starting point' (Latour 1996a: 119). In this view, faithful transmission, if it ever occurs, is actually a rarity that warrants explanation.

In a translation model, innovation is understood as an actor-network and the innovation process is the process of forming that actor-network (Tatnall and Gilding 1999). Innovations are created from chains of weaker to stronger associations of human and non-human alliances, within which each actor translates and contributes its own resources to the shape and the ultimate form of the emerging innovation (McMaster et al. 1997). Therefore, research becomes focused on trying to understand how actor-networks are created, strengthened and weakened by taking both material and semiotic factors into account: 'Contrary to the claims of those who want to hold either a state of technology or that of society constant, it is possible to consider a path of an innovation in which all the actors co-evolve' (Latour 1991: 117). In other words, with this view, the 'net-work' of innovators can be made more visible.

A translation perspective may be better able to explain the success or failure of particular innovations by accounting for factors that may ordinarily be overlooked in the more traditional diffusion model (See Table 9). In the innovation process, innovators attempt to create a forum in which all the actants¹²⁴ come to agree that the innovation is worth building and defending. They also attempt to influence detractors to accept their problem renditions and corresponding solutions as valid and legitimate. Through such politics, the innovator tries to arrange key human and non-human stakeholders in relation to each other thereby constructing the innovation network in a particular way (Callon 1986b). Some actors assume the authority to act and speak on the behalf of others, and those others usually accept being represented, thereby adding efficiency to the innovation process (Callon and Latour 1981).

¹²⁴ Actants are human and non-human actors

Adapted from McMaster et al. (1997)

	Diffusion	Translation
Innovation	A technology perceived to be new by the potential adopter.	A technology that has yet to be 'black-boxed'.
Communication	Communication channels can be categorized as cosmopolite or localite, and mass media or interpersonal. Innovations are transferred through these channels.	Translations are made by actors in enrolling the innovation.
Time	Speed of decision to innovate, earliness of adoption, and rate of adoption are important.	Network dynamics in enrolment, control, and dissemination are what matter.
The Social System	Homophily versus heterophily. Sharing of interests of human actors.	Interessement between actants, both human and non-human, and goals. Black boxes form when interests move in the same direction.
The Technology	Changes are being made to the form and content of the technology as a result of experiences during implementation (re-invention).	The technology is translated through being enrolled, regardless of whether its form or content is modified.
Socio-Technical Stance	The social system and the technology are separate. Diffusion is the adoption of technology by a social system. Technology transfer requires the bringing together of social and technical elements.	The social system and the technology are inseparable. Successful innovation and technology transfer gives the appearance of separation, but this is merely evidence that the actor-network has stabilised.

Table 9: Translation Perspective

In order to form an innovation network, the innovator's work becomes focused on trying to get actors to modify, displace, and translate their various interests. In this way, the goal is to arrive at some sort of makeshift agreement¹²⁵ between all concerned stakeholders. There are four moments of translation¹²⁶ that seem to constitute a successful translation strategy (Callon 1986b). First, there is problematization in which the problem becomes

¹²⁵ The idea of a 'makeshift' agreement is that it is an agreement for now, therefore purposely tentative by nature (and everyone understands this). This allows for the innovation agenda to move forward without having to get stakeholders to commit to particular positions. The agreement can then be re-assessed at a future agreed upon time. This also allows for plans to remain largely tactical by nature.

¹²⁶ These moments are not meant to occur in a strictly linear sequence, one after another. They are more accurately described as general stages, identifiable for analytical purposes, which make up the innovation process.

defined. An effective problematization defines the problem in such a way that it is of common interest to all those concerned, despite their different agendas and goals. During problematization, the innovator formulates the problem, proposes the logically appropriate solutions and then tries to sell their ideas to others. In this process, the innovator often attempts to establish itself as an obligatory point of passage (OPP) in which it becomes indispensable in the innovation process (Callon 1986b). For instance, I have contended that Infoway is trying to establish itself as an OPP based on, among other things, its unique positioning in the market (i.e. not being limited to jurisdictional borders). For instance, an executive from a technology organization made the following comment about Infoway:

Infoway probably is in the best position out of anyone in the country to provide really good and clear and up-to-date market information about who is adopting what standard and when and who has actually implemented it and what's on the books for the future and what is that particular province's overarching EHR architecture and with respect to the EHR what are their particular priorities, timelines, and plans. (18-10/11)

This positioning also helps Infoway to better influence various actants to join the innovation network and align to the new vision of healthcare (the two next moments of the innovation process called *interessement* and *enrollment*). Problematization usually involves questions like what is the problem that needs to be solved? Who are the important actors, human and non-human, that needs to be aligned? Spokespersons or 'spokesobjects' need to be identified that will represent large groups of commonly interested actants, like a union head that represents workers or like an MP that represents a constituency or the Canadian Medical Association to represent physicians or like the Canada Health Act that comes to represent the aspirations of a nation.

Second, there is the moment of *interessement* in which the network gets stabilized. The mechanisms of *interessement* are defined as a set of actions through which the innovator imposes and stabilizes the identity of other actants, thereby promoting the pursuit of the objectives and goals that have been attributed to them (as defined by the

problematization). The invited actant may either submit to the attempt at alignment or may, in fact, define his/her/its goals and objectives differently. The innovator will react by trying to sever or block the links between the invited actant and other networks or innovators that are interested in enrolling the actant in their agenda. At this point, the invited actant may (or still may not) submit to the construction of the problem and, consequently, buy into the problematization by agreeing to perform assigned roles. This may happen through negotiation or coercion. The end result is that alliances are built and competing associations are destroyed.

The third stage is enrolment in which an interrelated set of roles is defined and attributed to the actors. Through this process, interests become aligned. The actor's individual interests become translated into shared goals. Actors accept the roles that have been defined for them during *interessement*, 'to describe enrolment is to describe the group of multilateral negotiations, trials of strength and tricks that accompany the *interessements* and enable them to succeed' (Callon 1986b: 211). Meaning and visions are critical, as 'motivation is central to enrollment and is emphasized in what is termed "ideological control", which occurs by influencing actors' current evaluation of reality and instilling notions of more desirable states and how to reach them' (Holmstrom and Robey 2005: 168-169). There are specific mechanisms like training, IT infrastructure, meetings or even vision documents that are used to enroll and coordinate each group of participants in the actor-network.

The final stage is the mobilization of both human and non-human allies as 'action is simply not a property of humans but of an association of actants' (Latour 1999b: 182). At this point in the innovation process, the primary concern is to make sure that those designated as allied spokespersons/spokesobjects keep representing their constituency and do not betray the innovator's interests. This representativeness always has the potential to fail and the network may become in danger of falling apart. In this process, the innovator may also come to take care of the interest of others and speak in their name. As time goes on, actors become caught in a network of constraining links whose consensus limits each actor's room to maneuver. Eventually, enrolment becomes active

support for the innovation and it tends towards becoming irreversible. As the one who helps build the innovation by garnering support and then linking human/non-human actors, the innovator can be characterized as a heterogeneous engineer.

Heterogeneous Engineering

In his intriguing analysis of the success of Louis Pasteur, Latour observes that ‘it is pointless to claim that Pasteur's discoveries were believed because they were convincing. They ended up being convincing because the hygienists believed them and forced everybody else to put them into practice’ (Latour 1988: 123). In his analysis of the success of the Kodak camera, Latour (1991) suggests that the challenge was to build simultaneously a new object (the Kodak camera) and a new market (the mass market for portable cameras). Latour then asks ‘was the final consumer forced to buy a Kodak camera? In a sense, yes, since the whole landscape is now built in such a way that there is no course of action left but to rush to the Eastman company store. However, this domination is visible only at the end of the story. At many other steps in the story the innovation was highly flexible, negotiable, at the mercy of a contingent event’ (Latour 1991: 113). These two examples seem to nicely illustrate the work of the heterogeneous engineer (Law 1987).

Modernist planning usually assumes that there is a shared system of values among concerned actors that bring them together. However, empirical evidence would suggest that this is clearly not the case (Throgmorton 1996). Therefore, the work of the heterogeneous engineer (perhaps a post-modern planner of sorts, although Latour (1993) would argue that we have never even been modern so how could we be post-modern?) is to figure out how to deal with all the heterogeneous elements that need to be enrolled or brought into relation in order for the plan (or innovation) to work as intended. Indeed, the ‘problem of the builder of “fact” is the same as the builder of “objects” namely how to ally components so that they can resist controversies’ (Latour 1987: 131). As applied to building bridges or building information systems, ‘the work of technology construction is, to a significant degree, also the work of organizing’ (Suchman 2000: 312).

From a network perspective, the fundamental problem faced by system builders is 'how to juxtapose and relate heterogeneous elements together such that they stay in place and are not dissociated by other actors in the environment in the course of the inevitable struggles - whether these are social or physical or some mix of the two' (Law 1987: 117). Also, as a point of consideration, in order to enroll non-human elements in an emerging collective, 'one must first endow them with the social characteristics necessary for their integration' (Latour 1999b: 208). This means assigning interests to microbes in Pasteur's story or the pan-Canadian vision in the story of the informing of healthcare. Even then, the heterogeneous engineer can never be certain that such diverse discursive and material elements will remain integrated.

Overall, this body of work suggests that we should augment our established perspectives of technology with views that help us 'more effectively study and understand the multiple, emergent, and dynamic sociomaterial configurations that constitute contemporary organizational practices' (Orlikowski and Scott 2008: 433). This has important implications for the way we understand the relationship between the technical and the social, as we open the possibility to consider them not as two ontologically distinct entities, but more like phases of the same essential action (Latour 1991) or as a situated entanglement between technological performativity and human agency (Orlikowski 2005). This highly performative understanding of technology has radical implications for the way that we see ourselves in relation to the technologies we interact with in everyday life. Perhaps, 'we are the beings that we are through our entanglements with things - we are thoroughly hybrid beings, cyborgs through and through - we have never been otherwise' (Introna 2009:25). Also, with this framing, we shift the focus from thinking about 'multiple interpretations of objects [...] to thinking about multiple objects themselves' (Law and Singleton 2005: 334) in which technologies as well as people make objects (Latour 1987).

A relational ontology suggests that there is a perpetual interplay¹²⁷ between the technical (material) and the social (meaning) that involves a going ‘back and forth continually between the designer and the user, between the designer's projected user and the real user, between the world inscribed in the object and the world described by its displacement’ (Akrich 1992:210). For instance, ‘prototypes perform as working artefacts; artefacts whose significance is not given in advance, but is discovered through the unfolding activity of co-operative design-in-use’ (Suchman 2002: 172). In this sense, I see this interplay between material and meaning as a dialogic process, as living itself is participating in an ongoing dialogue (Bakhtin 1984).

Importantly, it is through a dialogic process that we are able to question our fundamental assumptions, thereby creating space for new meaning to emerge (Bohm 2004). This new meaning flows among, through and between us somewhere between the individual and the collective. In other words, ‘truth is not born nor it is found inside the head of an individual person, it is born between people collectively searching for truth, in the process of their dialogic interaction’ (Bakhtin 1984: 110). Through the process of this dialogic interaction, more collective coherent ways of thinking and acting may emerge (Bohm 2004). For instance, as one of my informants remarked about drawing lessons from the standards collaborative:

They can certainly learn a whole heck of a lot from the overall EHR architecture, they can learn a lot from the standards collaborative and how it has *brought multiple stakeholders together and come up with consensus building process on very broad and very, very deep and complex subject matter.* (18-16)

Infoway’s Problematization of the Pan-Canadian Vision

In order for technology-based innovation to occur in the healthcare system, various stakeholders have to be willing to change their existing ways of practicing healthcare. In

¹²⁷ The argument here is that even though the ‘technology’ may stabilize for a time (become black boxed) due to different reasons, user reinterpretation and reworking is always possible and probable.

other words, as argued in an earlier chapter, a new working script has to be materialized. However, such change has not only to be coordinated, but it also has to be oriented in a particular direction if a new system is to emerge. The pan-Canadian vision of healthcare is a means to try to accomplish such a shift. By interesting key stakeholders in the vision, the appropriate human and non-human actors may be enrolled and then mobilized. As a result, the new system may start to take hold and compete with the old system, gaining more inertia as more actors align themselves to the new pan-Canadian way of doing things. In order to get a more direct sense of how the pan-Canadian vision of healthcare is struggling to gain recognition, we will now take a nuanced look at the Vision 2015 document published by Infoway. I consider this document to be one particular material form of the pan-Canadian vision. As text, the Vision 2015 document strives to convince readers that the vision is worth sharing and, in so doing, is able to achieve some level of co-orientation between various stakeholders. There are other ways to materialize the pan-Canadian vision, such as the pan-Canadian standards, that are also trying to accomplish the same goals from a different angle.

The Vision 2015 document, as discussed in the previous chapter, can be understood as a prediction of what healthcare might look like in 2015 if stakeholders were to wholeheartedly embrace the pan-Canadian EHR. However, with a more critical lens, we may be able to see through to something more. As noted before, the document opens with the following statement in which the vision is presented and right after that Infoway is mentioned. This has the effect of creating a direct association between innovation and innovator:

Reduced wait times. Increased patient participation in health care. Efficient chronic disease management. Improved access to care in remote and rural communities. Fewer adverse drug interactions. Better prescribing practices...This is the future of health care in Canada. Since 2001, Canada Health Infoway, along with its partners, has been working to deliver a safer and more efficient healthcare system through electronic health records. (Vision 2015: 1)

In my view, Infoway has attempted to put forward a definitive version of the pan-Canadian vision of healthcare by producing a very glossy and official looking¹²⁸ immutable mobile¹²⁹ (Latour 1987), and now is trying to align the relevant actors in order to help make this innovation materialize. In the process, Infoway is attempting to place themselves at the center of that vision by suggesting that the way that the vision can be achieved is by adopting pan-Canadian EHRs and ‘by the way, we happen to be the go to guys’.

Infoway has defined the problem faced by a set of critical actors in a particular way so as to show how these actors should be necessarily concerned with helping to establish the EHR system. This is Infoway’s attempt to enroll these actors in the pan-Canadian vision. The actor’s roles (how they should relate to each other) and goals (the things that they want) are defined for them, if they choose to accept them. This process of problematization is always dynamic in that it reflects the movements and detours that must be accepted as well as the alliances that must be forged. It is also quite precarious in that the actors may or may not accept the problematization crafted by Infoway.

The problematization is done in such a way as to establish the EHR system as an obligatory passage point (OPP) in that it is argued that the actors will otherwise be unable to achieve their goals unless they ‘get with the program’ and help put the system in place. In other words, Infoway needs to convince the various actors that their interests lie in helping the EHR get implemented. This has two effects. It forms the basis of the mobilization of the actors, which will help to establish the EHR together in a cooperative fashion. Secondly, it establishes Infoway as indispensable in this process, as they are the ones that are most able to deliver the EHR based on their unique pan-Canadian perspective. In this way, in a double movement of sorts, Infoway is able to achieve its own goals and gain legitimacy in the market at the same time.

¹²⁸ I wish the reader could see the actual booklet. It really is fancy and much more impressive than the downloadable PDF version... believe me! By the way, that PDF version is available at [http://www2.infoway-inforoute.ca/Documents/Vision_2015_Advancing_Canadas_next_generation_of_healthcare\[1\].pdf](http://www2.infoway-inforoute.ca/Documents/Vision_2015_Advancing_Canadas_next_generation_of_healthcare[1].pdf)

¹²⁹ According to Latour, an immutable mobile allows centers of calculation to ‘act at a distance’ (229). In this case, Infoway appears to be using the Vision 2015 document to exert its influence at a distance amongst a whole array of heterogeneous stakeholders.

My analysis of the Vision 2015 document resulted in an overview of Infoway's problematization. I have produced a table (see Appendix 4) in which I list the stakeholders that have been identified in the document. I then try to identify the interests or goals of each of these stakeholders, the obstacle or problem they face in trying to attain those goals and the quote from Vision 2015 that makes the argument that the obstacle will be overcome or the problem will be solved if the stakeholder was to share the pan-Canadian vision and embrace the pan-Canadian EHR. From this analysis, one can see that there is something in it for everyone and that stakeholders have a different sense of what the EHR will do for them. I ask the reader to keep in mind that this is only Infoway's depiction of what all the relevant issues are. I am not claiming that it is definitive in any way. However, for my purposes, I am more interested in Infoway's activities and how they are promoting the pan-Canadian vision. The following figure is a more graphic depiction of the 'detour' that Infoway is asking concerned stakeholders to make (see Figure 3). In this way, Infoway is attempting to enroll all relevant parties into their agenda by suggesting to them that by embracing the EHR they will be able to accomplish their own goals.

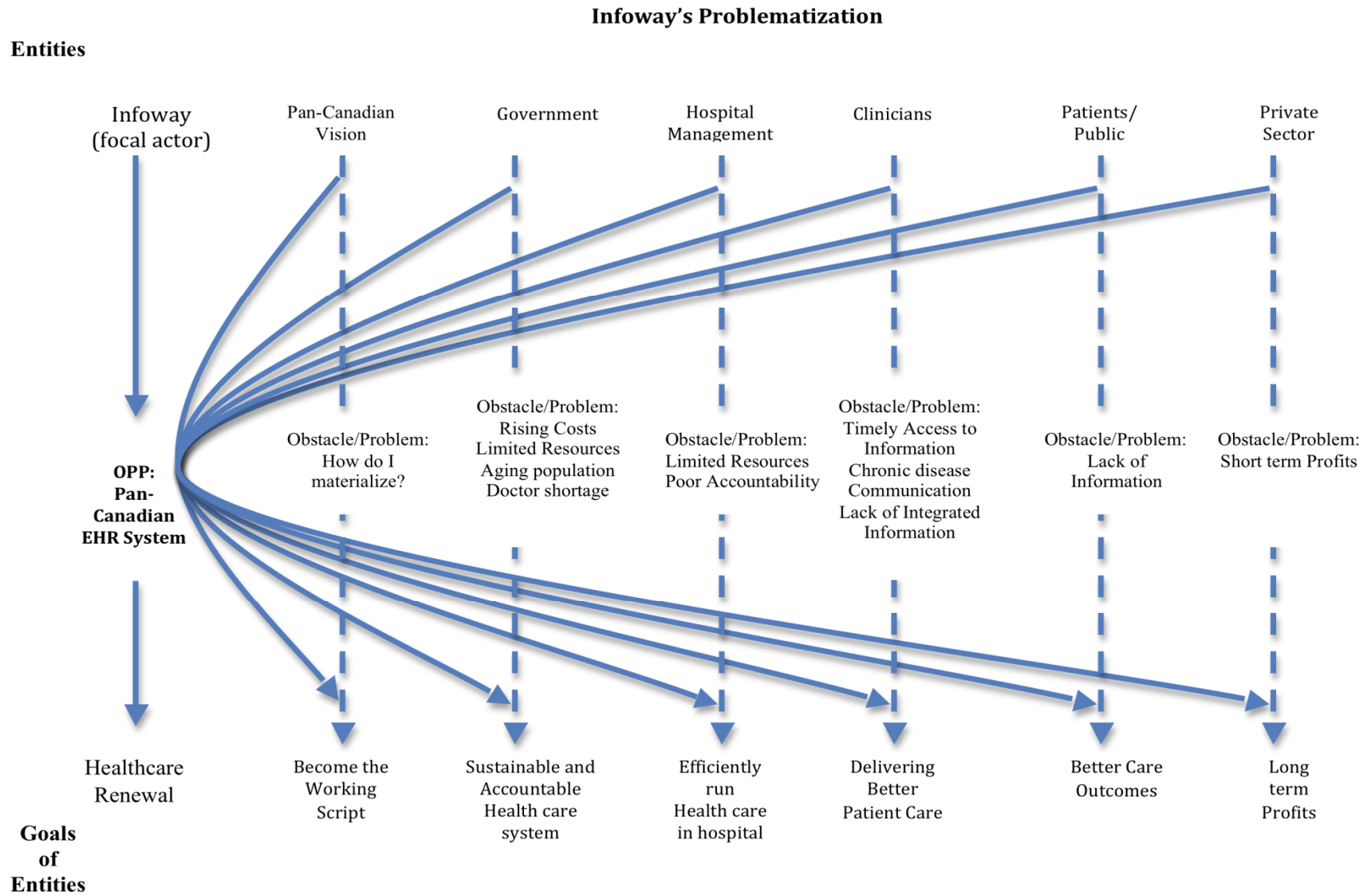


Figure 3: Infoway's Problematization

The story I am trying to tell now gets a little more complicated. In my view, Infoway's task was not just a matter of trying to align particular stakeholders to the pan-Canadian vision of healthcare. Indeed, that itself is a major task. However, on closer analysis, it seems that *Infoway also had to enroll, and keep enrolled, the pan-Canadian vision*. In other words, I am trying to suggest that a special alliance needed to be forged between two entities. First, there was the pan-Canadian vision of healthcare, which wanted desperately to be accepted and proliferate through the system, as any idea would¹³⁰. Importantly, the pan-Canadian vision had certain social characteristics endowed to it by others that would be helpful to Infoway's agenda. In fact, socializing non-human actors so that they are more able to join the collective is a critical step in network formation (Latour 1999b). This vision was collaborative, cooperative, equitable...all the characteristics that Canadians tended to view favorably. In many ways, it also embodied the guiding principles of the Canada Health Act. Put in this way, *who would not want to achieve such a vision for healthcare?*

On the other side of the proverbial pond was the pan-Canadian EHR that had a similar problem in that stakeholders were somewhat reluctant to change their existing ways of doing things. My hunch is that Infoway smartly figured out that if they could marry the two, and keep them married, a strategic alliance between both entities would perhaps have a better chance of succeeding in attaining what both wanted. In other words, meaning (pan-Canadian vision) found material (pan-Canadian EHR) with which to strike an alliance and thereby help it to proliferate. Also, material (pan-Canadian EHR) found meaning (pan-Canadian vision) that would help it become better accepted amongst stakeholders. It seemed like a somewhat perfect alliance. *If only stakeholders could see that the best way to achieve this new pan-Canadian vision of healthcare is by making that detour and accepting EHRs, then the system could be moved along and the innovation more easily occasioned*. For instance, the jurisdictions were key players in the innovation process, as healthcare was within their area of responsibility. However, this plan depended greatly on the pan-Canadian vision maintaining a strong alliance. This was the

¹³⁰ Actually, it's the promoters of the vision that want the vision to proliferate. As it proliferates, the vision and those associated with the vision become more esteemed.

best way to achieve the vision and stakeholders should not be allowed to think otherwise. EHRs needed to be seen as critical to the reform agenda and that way Infoway would also come to accumulate critically needed influence in the innovation process.

The Vision 2015 document, and more importantly the vision it professed to represent, seemed to be specifically designed to forge that connection. On the first page, it characterizes itself as ‘a comprehensive strategy - a vision - to guide the next 10 years of investment in healthcare information systems and identify areas benefitting from a pan-Canadian approach’. Here the document strongly associates itself with a *pan-Canadian* vision by claiming to represent ‘more than 100 stakeholders from across Canada and from all areas of the healthcare sector’. Then it goes on in the next paragraph to state that it ‘serves as a roadmap for advancing Canada’s healthcare infostructure and forms the strategic framework to guide Infoway’s investments and priorities in the years ahead’. So herein lies the trope. The pan-Canadian vision, EHRs and Infoway come to be inextricably entangled. Or, in the words of this thesis, the meaning (the pan-Canadian vision), the material (the pan-Canadian EHR system) and the innovator (Infoway) become nicely aligned. If any one of these were to become disinterested with the others, then the innovation process may become subsequently derailed.

The document states that it is defining the pan-Canadian vision or, as quoted in the document, ‘sets a vision for the integrated health infostructure required in Canada, based on the current and emerging health business needs’ (4). However, it also makes a case for that vision: ‘Canada will struggle to meet the increasing demands of all its stakeholders to deliver superior care at a sustainable cost’ (14). The important point in my argument is that Infoway is attempting to define the vision and also, importantly, become strongly associated with that vision. They even specify what the goal of the pan-Canadian approach is and in so doing, they define it in particular ways. The pan-Canadian approach represented an innovation in the way of thinking about healthcare in which collaborative practice was a key foundation of that new thinking. As stated in the Vision 2015 document (5), Infoway specified the goal of the pan-Canadian approach in the following way:

- Ensure the electronic health record elements are built with consistent standards, thereby enabling future interoperability within and across jurisdictions and simplifying the movement of knowledge and people across jurisdictions
- Serve as a catalyst for new infrastructure developments and ensure common platform quality across all jurisdictions
- Where possible, encourage cooperation, thereby eliminating redundancy and duplicative efforts in systems design, vendor negotiations etc.
- Reduce long-term costs and implementation time by leveraging scale and cross-jurisdictional knowledge.

The first two points had more of a technical focus, standards and infrastructure and the second two points were focused more on practice i.e. cooperation and knowledge. As an intermediary, the text tries to configure the reader into believing that ‘we need information. We can’t realize our goals without it’ (5) or, in other words, the pan-Canadian vision of healthcare can only be achieved through the collaborative implementation of EHRs. As reinforced in the opening of the most recent Overview of Federal and Provincial Audit Reports (2010) ‘implementing electronic health records in Canada is a pan-Canadian initiative that requires collaboration of stakeholders, including the federal government, Canada Health Infoway Inc., and the provincial and territorial governments, as well as other organizations involved in the delivery of healthcare’. This becomes an unquestioned assumption from here on out. Stakeholders need to believe in the vision and then collaborate to implement EHRs in order to achieve that vision.

Occasioning More Dialogic Spaces

The Euclidean view of space tends to neglect its created and lived aspects, as space is always intimately grounded within the material conditions of life¹³¹ (Soja 1996). Accordingly, ‘space must not be reified as a natural, pre-existing container of the social and the material, but is itself a performance’ (Law 2002b). If we accept that ‘we are, and

¹³¹ Some, especially anthropologists, seem to make the distinction between space (physical) and place (space with meaning attached).

always have been, intrinsically spatial beings, active participants in the social construction of our embracing spatialities' (Soja 1996:1) then the key questions, as it pertains to this thesis, become what is a dialogic space, why would we want to create more of them in the innovation process and if we believe the given argument, then how do we go about creating them?

A dialogic space can be thought of as a 'space of possibilities, opened up by dialogue, that allows for creative emergence' (Wegerif 2006: 155). So it is a creative space and, in my view, a space of innovation as the innovation itself emerges from here. The dialogic perspective suggests 'that the emergence of creative new insights presupposes a capacity for suspending assumptions and dissolving previous constructions in order to be able to enter more deeply into the space of dialogue' (156) (Wegerif 2006: 156). Importantly, in such a space, 'different logics not only coexist, but inform and shape one another' (Barry and Elmes, 1997: 444).

In Bechky's (2003) study, she shows how members of diverse occupational communities overcome work-related problems by *co-creating common ground* that transformed their understanding of the product and the production process. Whenever misunderstandings seemed to arise between the groups, it was in informal interaction, within spaces of innovation (as I choose to call them), that local understandings were transformed to a richer and broader shared understanding. This sharing of meaning, between diverse occupational communities (engineers and assemblers), was mediated by technicians and proved to be critical in the successful accomplishment of the necessary production work. Similarly, in new product development, it seems to be the ability to manage the movement of knowledge across occupational boundaries that becomes critical to the innovation process (Carlile 2002; Carlile 2004). So, it appears that it is in these dialogic spaces that shared understandings develop and participants tend to become co-oriented. In organizations, this co-orientation appears to be negotiated through dialogue and mediated by text (Taylor and Robichaud 2004). Furthermore, if the innovation is developed in context through various processes, then 'cultivating these processes through

tentative alignments can make development efforts more accountable to local contexts’. (Miscione 2007: 422).

If we accept that dialogic spaces are beneficial to the innovation process, then the next question becomes how does an innovator go about creating them? I suggest that dialogic spaces become occasioned... they are not *created* by the innovator. By definition, to occasion (used without an object) means ‘to give occasion for’ or to ‘bring about’¹³². The innovator strives to provide occasion for dialogic spaces to emerge. For instance, when investigating why the private sector did not seem to want to take more of a leadership role in the reform agenda, I found that there appeared to be a lack of dialogic space that connected the public and private sectors as each was upholding their respective customer-supplier positions with little room for interaction. Since this was not happening and the public sector seemed more interested in looking for someone to do the job at the lowest possible price, the private sector’s expertise that was well developed in other industries was not being properly harnessed for the healthcare sector. Another informant similarly remarked:

We are also thinking through what would it take to basically get the jurisdictions and the vendors at the same table ...we’ve got to break this awkward dance that everyone is doing and getting people to the same table and having open discussions about potential timelines and so forth is probably one of the only ways to break that cycle. (18-6)

A more specific reference pertains to the challenge of reducing wait times, which had become a highly visible issue for the Ontario government in particular, was given by another one of my informants:

Say for example in Ontario, they have and many provinces have got an issue with wait times. So rather than trying to come up with you know buy hardware or software from companies to come up with systems to manage this, *maybe they should just pitch out the wait time issue from an IT perspective* and, you know, have the targets the province wants to achieve and look for a company to come up with solutions and then reward the companies based on the success they have in implementing their technology

¹³² www.dictionary.com

and actually reducing wait lists, And then companies might be prepared to take on the risk of operating, you know, some kind of wait list information service for the whole of Ontario, you know, based on results. (14-12)

By way of summary, I have provided a brief overview of how more dialogic spaces compare to more monologic ones (see Table 10).

	More Monologic Space	More Dialogic Space
Consensus	Imposed – innovator strives for acceptance of their vision	Not needed – strive for ‘makeshift’ (dis)agreement – let stakeholders come to it on their own
Logics/Meanings	One logic/meaning usually comes to marginalize the others	Disparate logics/meanings are encouraged and fostered so that they can inform and shape each other
Meaning making process	Strive for finality to the process	Ongoing – process becomes more important than outcome
Innovator	More authoritative role – manages process	Less authoritative role - focus on creating conditions that will help open space for dialogue
Vision	Shared-by-all vision	Multiple visions are not only allowed to co-exist but are also encouraged
Stakeholders	Limited involvement – too many voices is seen as problematic	Critical involvement – strive to have representative voices of all concerned stakeholders
Innovation	Space of Communication – communication about the meaning of the innovation – is assumed to already be something meaningful	Space of Innovation – innovation given multiple meanings in the space – accordingly becomes more meaningful

Table 10: Monologic & Dialogic Spaces

In this next section, I will present two case examples of where I see more dialogic spaces are already operating and are starting to enjoy good success. These examples are not meant to be representative but are meant moreso to illustrate some of the features of dialogic spaces that I have noted above. I present them *to open a dialogic space for dialogue about dialogic space* (apologies for the tongue twister).

MARC HI project

In the summer of 2007, Mohawk College established an applied research centre in Health Informatics in reaction to an identified need for a reference implementation¹³³ of the pan-Canadian EHR. With the endorsement of Infoway, support from various private-sector partners and intellectual capital from Mohawk, efforts were made to build an EHR reference implementation on Infoway's published pan-Canadian standards including the current version of the EHRS (EHR Solution) blueprint. Consequently, the MARC HI (Mohawk Applied Research Centre in Health Informatics) project was born. A Project Advisory Board guided the project and was comprised of delegates from the following stakeholder groups: Mohawk College (2 delegates), Infoway (1 delegate), Clinical Practitioner (1 delegate), EHRS Provider/Jurisdiction (1 delegate) and Vendor Community (1 delegate).

The Advisory Board had adopted several key guiding principles, which seemed to be instrumental in sustaining its ongoing success¹³⁴. The project strictly adhered to the pan-Canadian standards and Infoway blueprint: 'We are not going to deviate from that and that's fundamentally important because, quite frankly, if we weren't going to abide that principle, we in fact wouldn't be informing the overall standards development process about whether these are good standards and whether this is a good blueprint' (17-8). Also, this was an applied research project, intimately involving the pan-Canadian standard, that's to say that 'it's a rubber-hit-the-road kind of a thing. We are not doing academic research. This is designed to build a working system' (17-9). Importantly, intellectual property that was developed in the project was open sourced to maintain academic transparency. Both public and private sector partners were relied upon to sustain the project by contributing resources in the form of cash, knowledge, hardware, software or other needed fundamentals.

¹³³ This is a non-proprietary tested implementation of the HL7 v3 standard that is made freely available to vendors as a reference for their product development work.

¹³⁴ Interview with consultant to MARC HI project.

Importantly, Mohawk College provided a physical (and as we shall see also a cognitive) space for the project. ‘As an Ontario Community College, they are a safe territory where private sector partners are able to collaborate even though in the marketplace some of these folks compete against each other’¹³⁵. Some referred to this kind of interaction as ‘pre-competitive’:

It’s people, it’s *vendors coming together in a pre-competitive manner* to work on basically challenges, issues, opportunities, anything that needs to be done to help increase the overall market size...having vendors come together and comment on standards is that eventually those will go into RFPs, okay. It’s better for them to come together and discuss the standards and help establish the standards before they go into an RFP so that they can *really help inform what they are all capable of doing and then compete on other aspects* such as workflow, software design, performance, speed, service, all the other sorts of things.... As opposed to some vendors saying no, no, no, no, no, standards is my core strength, my core competence, my competitive advantage ... I sell you forty different applications all of which can integrate so long as you buy applications from me. (18-2)

This kind of interaction was definitely non-traditional and required a change in mindset that focused more on ‘growing the pie’ and getting to know their own capabilities than looking for short-term profits. Vendors had to adopt a different approach before being involved in any kind of dialogue:

So it’s not about organizations coming to say ‘you know, here’s what I’ve got as a product’. It’s about organizations coming and saying ‘how does my product fit into these standards and this blueprint because we are holding those, we are religiously adhering to the pan-Canadian standards and the blueprint. (17-11)

The pan-Canadian EHRS Blueprint, as text, provided direction to the project through the activities of the Standards Collaborative and through its ongoing involvement with the project steering committee. Fact-based metrics regarding the performance of the reference implementation had been leveraged by Infoway to encourage adoption of the pan-Canadian standards by its partner jurisdictions. Furthermore, partner jurisdictions

¹³⁵ Interview with consultant to MARC HI project

were afforded the opportunity to prototype standards-compliant systems, using the reference implementation, as a basis for regional EHRS initiatives. Private sector partners seemed to have benefitted from their participation by being able to develop demonstrable, hands-on expertise regarding the pan-Canadian EHRS Blueprint and its companion standards. They had also been able to test for compliance and performance of their products against Infoway's EHRS Blueprint and standards and then communicate their results to their clients who were various Canadian health care providers.

My contention is that the MARC HI project is a good example of where a more dialogic space was occasioned in order to not only test the new standards but also to contribute to its robustness. Importantly, the dialogic interaction was occurring between both human and non-human entities. I suggest that this space meets many of the criteria that I previously used to describe more dialogic spaces (presented in Table 13 at the end). Importantly, Infoway took a less authoritative and somewhat tentative role in this highly creative space:

I think it's important to have a safe territory where organizations can come and, first of all, there's a lot of the story here for EHR is unwritten. I mean we are doing a lot of inventing, that's frankly the most important reason to have a reference implementation. I'll be very blunt with you, I mean Infoway is a very engaged participant in this project and yet the project is by no means Infoway's show which means if we find something doesn't work, we are very transparent about the fact that we have found something that doesn't work and has to be changed. (17-4)

This dialogic space is a safe territory where stakeholders come together for a common good i.e. to improve EHR standards. Infoway does not own the project; nobody really does, as it has the markings of a truly collaborative initiative. There are also multiple benefits for each of the participants i.e. they hold their own sense of what their participation signifies. For instance, the private sector benefits from being able to interact with the standard before it is released to the general public:

It has been interesting to see that the reward for those that came in early is that they are in some cases the only organizations in the country that have hands-on experience with some of these very new workflows and new

software technology...it's sort of an outside benefit for the private sector partners. They are now able to go with fact-based marketing messages to their clients and to their perspective clients because they've been, you know, they've rolled up their sleeves and they've been working with these technologies and, you know, to put it bluntly have been getting the scar tissue comes with working with things that are brand new and not yet proven. (17-4)

The public sector has benefited by mitigating potential risk on a project that has critical importance to the general sustainability of the sector:

I think for the public sector players, for the government sector players, the most important element that they can take out of involvement in this project is to mitigate risk. These are large systems that are being built and generally the track record for large system implementations is pretty poor in the IT community and that has been for decades. There's nothing special about the EHR in that regard. I think what is special is that right now, and I don't want to sound soap box'ish about this, but this is a fundamentally important initiative for Canada. (17-5)

Overall, many of the project participants seem to foster relationships that develop into something beneficial later on:

Some of these collaborative relationships that are forged at the Mohawk project, in fact, manifest themselves in business deals nationally and internationally. (17-11/12)

The case of Satyam Computers is interesting. Prior to their involvement with the Mohawk project, Satyam virtually had no brand presence at all in the Canadian Healthcare market. As many Indian companies have historically been to companies in the West, they were 'the bench strength for all of the people that actually went out and won the deals...so when the names that you recognize would win a deal in BC or in Alberta or in Saskatchewan, Satyam was providing them the bench strength' (17-11). However, according to my informant: 'Almost entirely on the strength of their participation in the Mohawk project, Satyam today has got terrific brand in the e-health marketplace and is recognized in its own right as a company that has demonstrable expertise regarding the pan-Canadian standards. Now they, I'm sure, are going to leverage that in the Canadian

market... So Satyam's opportunity is yes, there's a Canadian opportunity but there's this also global opportunity. I know that to be true of a number of the private sector participants in the Mohawk project but not all of them' (17-11). The Satyam case highlights the potential global applicability of learnings derived in the Canadian context¹³⁶.

Pan-Canadian Standards Collaborative

Information infrastructure standards have been shown to neither be ready-made nor neutral. They are more accurately described as works in progress that inscribe patterns of behavior in ways that are often 'complex and non-transparent' (Hanseth and Monteiro 1997: 183). In 2006/2007, Infoway, along with its jurisdictional partners, established a Pan-Canadian EHR Standards Collaborative that included both public and private collaborators. The Standards Collaborative provided 'leadership, expertise and core services to support the development, maintenance and implementation of pan-Canadian health information standards' (Standards Collaborative Guide: 1). The Collaborative's members include representatives from Health Service Delivery organizations, Laboratories, Pharmacies, Government health agencies/departments, Health solution providers and Clinicians. Membership levels included individual, student and corporate membership categories. Corporate members were divided into four types (see Table 11).

Corporate Member 1	Vendors, Consultants and Private Insurers
Corporate Member 2	Federal, Provincial, Territorial Ministries and Agencies
Corporate Member 3	Service Deliverers, Provincial/Regional Networks, Public Insurers
Corporate Member 4	Professional Colleges and Associations, Non-Governmental, Not-for-Profit Organizations and Academic Institutions

Table 11: Standards Collaborative Corporate Members

¹³⁶ This is actually one of the arguments that Infoway is trying to use to persuade the private sector to take on more of a leadership role in the renewal agenda in Canada.

This ensured a broad constituency of support in establishing the standards that are driving EHR development (Infoway Annual Report 2004/05: 22). In fact, one of the Collaborative's strategies was to 'engage a broad spectrum of stakeholders throughout the standards lifecycle to ensure the ongoing relevance of standards for all' (Standards Collaborative Guide: 3). It seems to be working relatively well as one of my private sector informants commented 'it's provided a lot of order to a previously very chaotic environment ...we see great value in the standards collaborative and what they've done to bring stakeholders together' (19-8).

The standards defined by the Standards Collaborative are the 'building blocks for the health information exchange that is essential for sharing clinically relevant information in real time across the continuum of care' (Standards Collaborative Guide: 5). Influencing the private sector to think more collaboratively about healthcare is quite a challenge considering they use those standards as a basis of competition:

You know, traditionally high-tech companies don't like adopting common standards just because of the competition factor but I think the big challenge is to get them to think differently about this sector, right. This is a totally different more complex type of sector. It's a kind of sector that due to the complexity is not just one company can walk in there and solve everyone's problems. You need that collaboration. You need those kinds of things.
(20-14)

From Infoway's perspective, this is an important issue, as their interest is in promoting common standards across Canada in order to make it economically profitable for private sector companies.

In the words of a former Deputy Minister of Health (Saskatchewan and British Columbia), 'pan-Canadian standards are the cornerstone of meaningful health information in Canada' (Standards Collaborative Guide: 41). Similarly to the approach of the Vision 2015 document towards pan-Canadian EHRs, the Standards Collaborative Guide shows how various stakeholders can benefit from adopting pan-Canadian

standards (see Table 12).

Patients	<ul style="list-style-type: none"> • Enables better health outcomes and minimizes medical errors • Better enables active participation by patients in their health care • Reduces the need to repeat health history or to carry paper results from different health care providers every time the health care system is encountered
Health Care Providers	<ul style="list-style-type: none"> • Improves tracking and monitoring of clinical information and enables secure, accurate real time communication of longitudinal health care information across the continuum of care • Decreases the time required to search for clinical information, minimizes unnecessary or duplicate test requisitions and reduces costs associated with storage of paper documents • Improves patient safety by providing access to key information (e.g. information on drug-to- drug interactions) and clinical decision support capabilities (e.g. automated alerts)
Service Delivery Organizations	<ul style="list-style-type: none"> • Enables solution reuse and opportunities to leverage lessons learned, change management and implementation strategies from other jurisdictions • Helps increase confidence in solution and vendor selection – organizations can better predict suitability for use, effectiveness and return on investment • Delivers a broader base of comparable data for monitoring and measuring the health system • Improves collaboration and the ability to interface with a vast array of EHR systems across regions, jurisdictions and health care settings
Vendors	<ul style="list-style-type: none"> • Decreases costs for vendors since they can implement the standards once and market on a Pan-Canadian and even international basis • Delivers a market advantage – companies are able to offer standards-based products demonstrating a commitment to delivering high-quality interoperable solutions • Builds global credibility for delivering best of breed interoperable EHR solutions
Jurisdictions	<ul style="list-style-type: none"> • Increases overall reliability and flexibility in the allocation of limited health system resources • Improves interoperability, accuracy and comparability of information, business processes and health service programs among organizations and across a wide range of settings • Informs capacity planning, program planning and resource allocation decisions, which promotes responsive policy decisions

Table 12: Pan-Canadian Standards

The Standards Collaborative governance structure was designed to ‘ensure participation by stakeholders at every level and provides opportunity for all perspectives to be considered leveraging the breadth and depth of Canadian expertise’ (Standards Collaborative Guide: 14). The pan-Canadian Standards Collaborative has responsibility

to select and approve standards using a structured *pan-Canadian Standards decision-making process* that is ‘based on the principles of transparency, consensus building, and timeliness’ (Standards Collaborative Guide: 16). Within this decision-making process, there is a key decision point called Stable For Use (SFU). A Stable For Use approval indicates that ‘the standard is ready for use by early adopters including both limited production rollouts as well as pilot implementations. Users of such specifications should understand that changes might arise from the experiences of these implementations as well as from potential ballot activities that may be underway. However, it is expected that these changes will be well-understood and documented for the benefit of potential adopters’ (Standards Collaborative Guide: 16).

There are nine Standards Collaborative Working Groups (SCWGs) with responsibility for different parts of the standard. The scope of these working groups is to ‘review and provide feedback on health information standards and architecture activities throughout the standards life cycle in accordance with the direction and guidance provided by the various Standards Collaborative governance committees’ (Standards Collaborative Guide: 14). When creating the standard, the committee members must consider ‘clinical appropriateness, interoperability, financial factors, governance, business and technical requirements’ (Standards Collaborative Guide: 16).

I assert that the two examples that I have provided illustrate some of the key features of a dialogic space¹³⁷. It is important to note that such spaces only seem to emerge through time, as participants move beyond just ‘good conversation’ into the space of dialogue. In the following table, I have summarized some of the common characteristics of these two projects that seem to make the space more dialogic by nature (see Table 13).

¹³⁷ Note that my study of these spaces led to the criteria I have posited. So it is a circular argument that I am actually quite proud of. Why? These criteria are not meant to represent essential categories of any sort by which a space can be measured as being more or less dialogical... I want them to remain ‘weak’ or tautological at best. My contention is that dialogic spaces become that way... we can’t make them so. Having said that, there are probably some lessons that an innovator can take away from this body of research and that I will present in the last chapter.

	More Dialogic Space	MARC HI project/ Standards Collaborative
Consensus	Not needed – strive for ‘makeshift’ (dis)agreement – let stakeholders come to it on their own	Dialogue encouraged between all concerned stakeholders
Logics/Meanings	Disparate logics/meanings are encouraged and fostered so that they can inform and shape each other	Various perspectives are able to interact within this space
Meaning making process	Ongoing – process becomes more important than outcome	Ongoing process of making new meaning (when standard fails testing) and then materializing that meaning in the standard
Innovator	Less authoritative role - Focus on creating conditions that will help open space for dialogue	Infoway plays largely backseat role
Vision	Multiple visions are not only allowed to co-exist but are also encouraged	Multiple visions co-exist but guided by standards
Stakeholders	Critical involvement – strive to have representative voice of all concerned stakeholders	Project Steering Committee – public, private, practitioner Broad based participation
Innovation	Space of Innovation – Innovation given multiple meanings in the space – accordingly becomes meaningful	Different benefits attained by each of the stakeholders – sustains continued participation

Table 13: Project Characteristics

Re-Inventing Infoway

Social innovation¹³⁸ is a complex business - these problems are not simple problems. They're not problems you can solve in deterministic, rational, straightforward ways. ... So if you enter into that world ... there are certain

¹³⁸ I would expand this observation to include socio-technical innovation.

kinds of rules and drivers in it. But *it's more about sensing them and aligning yourself with them*, than it is about making them happen or moving the system in a very deliberate way. ...I think the best social innovators are prepared to pay not just the price of working all the time and not getting rich, but *even the price of their convictions in order to truly create the change that they want*. In other words, they will change their minds¹³⁹. (Francis Westley, interview, 2008)

In the reflexively-oriented organization, managers seem to be less focused on making proper decisions and more focused on trying to understand what the organizational consequences of particular actions are (Schulman 1976). In this way, by closely attending to the connection between actions and their consequences, the manager gains a keener sense of the organization, its capabilities and its weaknesses. Taylor and Robichaud (2004: 397) argue that discourse, as text, enables such reflexive action as the organization becomes constructed as '*an* object of reflection and interpretation'. Accordingly, organizational members become co-oriented as they are able to relate to each other through some common object of concern. When the context changes, as it invariably does, those in a reflexive organization become aware that they also have to search for ways to reinvent their organization in order to be better able to achieve their goals. For instance, in response to the challenges in expanding telehealth coverage for First Nations communities, Infoway engaged in innovative funding arrangements that provided 100 per cent of eligible investments when a First Nation Telehealth initiative shared an existing telehealth network with a province or territory (Infoway Annual Report 2007/08: 3).

From their inception in 2001, Infoway had adopted a strategic investor role. Money was being used to promote pan-Canadian thinking and doing in the marketplace. In terms of positioning, this kind of role had been very beneficial to Infoway. However, playing the strict role of a hands-off investor using gated funding to restrict the movement of funds had put Infoway at odds with many of the jurisdictions. In more recent years, there appeared to be a growing awareness that things were not progressing as fast as they had hoped for. Infoway had accepted that they would be missing their goal of having fifty

¹³⁹ http://www.peopleandplace.net/media_library/audio/2008/11/26/frances_westley_interview

percent of Canadians on EHRs by 2010. Most of the shortfall seemed to be due to the slow movement in Ontario and Quebec, the two largest provinces. Since Infoway was first formed, the external environment seemed to have changed considerably as the pan-Canadian EHR initiative had moved out of the planning stage and had started to gain much more publicity: 'People who have never talked about an EHR in the past are talking about it now...the dialogue is active' (Regional CIO, Vision 2015: 8). On the beneficial side, according to the CEO of Infoway, the EHR and Infoway seemed to be progressively gaining more legitimacy in the market:

There is also unprecedented consensus on the benefits of electronic health records, and the specific priorities needed to complete our transformation to a safer, 21st century healthcare system. Significantly, the provinces, territories and Canadian healthcare leaders are acknowledging Infoway's essential role in addressing these priorities. No longer is the question "Why EHRs and why Infoway?" but rather "Why not more and why not faster?" (Infoway Annual Report 06/07: 3)

However, had acquired particular capabilities that it did not have in the early years. Relationship building was initially something that Infoway needed to be focused on in order to augment its role as a strategic investor. Now, it seemed like many of the relationships that had been nurtured over the years had become a core competency that could be leveraged by Infoway to better achieve their goals. This was especially true since most of the money that had been allocated to Infoway was already committed to projects. When I asked one of my private sector interviewees what Infoway could do to further promote their agenda, he promptly replied 'get more money'.

In general, politicians seemed to be becoming frustrated with the poor publicity they were generating from the general lack of progress on healthcare renewal. Hence, they were avoiding sinking more money into healthcare, which meant that budgets were likely to be cut in the future. Since not much more money seemed to be in the horizon, it was up to Infoway to think of ways to reinvent itself in order to better be able to achieve its goals.

Re-organization

If Infoway intended to bring pan-Canadian change to the healthcare sector they would need to build stronger relationships with the complex and varied array of stakeholders. Aaround 2007/2008, Infoway was re-organized to be more regionally focused in order to enable them to ‘work closely with jurisdictions, promote greater collaboration, and provide more support and expertise’ (Infoway Annual Report 2007/08: 21).

The reorganization was supposed to better help support jurisdictional partners as development and deployment became their dominant focus. For instance, working closely with the jurisdictions, Infoway helped develop key risk indicators for monitoring joint investments from three perspectives: project view, jurisdiction view, and the pan-Canadian view (Infoway Annual Report 2008/09: 3).

In further support of jurisdictional concerns, a new investment program Patient Access to Quality Care was recently seeded with \$50 million to support wait time management and other consumer-facing solutions. Wait times were considered to be ‘a priority area for partners and a focal point for public debate’ (Infoway Annual Report 2007/08: 3). Importantly, this new program seemed to signal Infoway’s evolution ‘from capital provider to an investor of broader e-health solutions’ (Infoway Annual Report 2007/08: 22) as related demonstration projects were designed to ‘showcase technology’s ability to not only improve patients’ access to quality care, but also highlight the pivotal role it was playing in modernizing and transforming health care delivery’ (Infoway Annual Report 2007/08: 3). In other words, Infoway was starting to widen its scope of concern in recognition of the complexity of the challenges it faced.

For instance, in recognition of the widening array of stakeholders with which Infoway needed to be in a meaningful relationship, the External Liaison role was recently created. Interestingly, the role was not just created because Infoway needed to develop relations with more stakeholders but also it seemed because Infoway was gaining more credibility in the marketplace and they recognized the need to leverage that.

Looking for new sources of funding

Infoway seemed to have a growing sense that funding could become an obstacle to attaining their goals. As a result, Infoway put together a Growth and Innovation Working Group drawn from their Board of Directors and management group, to investigate and assess options for obtaining new investment capital and generating new revenue that could be re-invested to meet Infoway's corporate objectives (Infoway Annual Report 2008/09: 23). This was of major concern and potentially something that could derail the progress made thus far. Infoway was actively thinking about new revenue models that could either generate funds directly for Infoway or open the market up to encourage more private sector investment. Overall, Infoway appeared to realize that an innovation in approaches was sorely needed, as the money required to fulfill their mission was not going to be allocated to them by the federal government. Hence, the shortfall was going to be immense.

Reflecting on core competence

Prahalad and Hamel (1990) allude to three criteria that describe a core competence. First, a core competence provides a 'potential access to a wide variety of markets' (Prahalad and Hamel 1990: 7). Second, a core competence makes a 'significant contribution to the perceived customer benefit of the end product' (ibid). Lastly, a core competence should be 'difficult for competitors to imitate' (ibid). Infoway appeared to be coming to the realization that their core competence has changed due to a change in circumstance. As they no longer had access to the kind of money as they once did, they needed to find other ways to shift prevalent thinking in the healthcare sector. There was a growing realization that they had developed a new core competence that involved building and managing relationships. This core competence could perhaps be leveraged to help accomplish their mission. Overall, Infoway seemed to be reflecting on their own unique positioning and abilities as an innovator in the healthcare renewal process and were starting to consider what that meant for the way that they approached their mission.

There was also a keen sense that the people that worked at Infoway were a major element of their core competence. Based on their varied experiences, they were able to effectively communicate with and understand various types of stakeholders and consequently, more efficiently build relationships:

A More Dialogic Approach to Innovating

As I reflected on the data I had gathered in my research, I began to sense that Infoway was beginning to employ a more dialogic approach to innovating. For instance, one general observation about how the environment had changed with the efforts of Infoway was ‘People who have never talked about an EHR in the past are talking about it now...the dialogue is active’ (Vision 2015: 8). However, my sense of dialogue was less that of ‘a better way to have a conversation’ and more of a ‘dialogic interaction’. A dialogic interaction is more than just a form of communication between two people as ‘even in relationships with inanimate objects and with nature in general, something very like communication is involved’ (Bohm 2004: 4). Through dialogic interaction, in the relationships between human and non-human entities, something new becomes created. What gets in the way of this creative process is when we hold on to assumptions and opinions i.e. old ways of thinking and acting. However, if we are able to create more coherent shared meaning then perhaps ‘truly new and penetrating understandings may emerge, often unexpectedly’ (Bohm 2004: xii).

What seemed to be missing from what had gone on thus far in the pan-Canadian EHR initiative was that there was a lack of shared meaning amongst the many involved human and non-human stakeholders. This lack of shared meaning manifested as mis-alignment. Stakeholders were imposing old meanings on new situations. In my view, in order to address this situation, more dialogic interaction was needed. Consequently, again in my view, more dialogic spaces were needed.

Through my interviews, I noticed instances where informants were valuing dialogic interaction in breaking down old ways of doing and thinking to make room to develop new shared meanings and understandings:

We are also thinking through what would it take to basically get the jurisdictions and the vendors at the same table ...we've got to break this awkward dance that everyone is doing and getting people to the same table and having open discussions about potential timelines and so forth is probably one of the only ways to break that cycle (18-6).

You can't let a huge very expensive system evolve with all kinds of different players who don't talk to each other or know what the other person is doing. You can't build a building with all kinds of consultants who don't talk to each other. It will be a really funny building (20-17).

Infoway also recognized the value in creating forums to specifically look at particular issues in order to develop shared understandings. For instance, Infoway and the jurisdictions created the privacy forum, which was described 'as an important mechanism for health ministries and privacy commissioners across Canada to exchange views and develop common approaches to support an interoperable electronic health record' (Infoway Annual Report 2007/08: 4). Understanding a whole is better achieved through participation rather than abstraction (Bohm 2004).

There was also a sense that shared meaning was an important factor that was missing, in order to better move the eHealth agenda along. Many stakeholders were not yet engaged and their voices were valuable especially if they came to echo what Infoway was saying. Infoway needed to do a better job at mobilizing potential allies in their cause.

'Its not just about technology ... its about sociomaterial alignment!'¹⁴⁰

Upon a visit to Kronberg castle in Denmark, the famous physicist Neils Bohr is reputed to have remarked to his colleague Werner Heisenberg:

'Isn't it strange how this castle changes as soon as one imagines that Hamlet lived here? As scientists, we believe that a castle consists only of stones, and admire the way the architect put them together. The stones, the green roof with its patina, the wood carvings in the church, constitute the whole castle. *None of this should be changed by the fact that Hamlet lived here, and yet it is changed completely.* Suddenly, the walls and the rampart speak a quite different language. The courtyard becomes an entire world, a dark corner

¹⁴⁰ I really do wish one of my informants had said this. However, this is me trying to make a point.

reminds us of the darkness in the human soul, we hear Hamlet's "To be or not to be". Yet all we really know about Hamlet is that his name appears in a thirteenth-century chronicle. No one can prove that he really lived, let alone that he lived here. But everyone knows the questions Shakespeare had him ask, the human depth he was made to reveal, and so he, too, had to be found a place on earth, here in Kronberg. And once we know that, Kronberg becomes quite a different castle for us'. (Tuan 2003: 4)

When it is imagined that Hamlet once roamed the castle grounds, the reality that is understood takes on a somewhat more romantic flavor. Technologies, as material and discursive practices, combine in ways that constitute durable objects (Barad 1998). Consequently, from a performative perspective, 'technologies have no inherent properties, boundaries or meanings, but are bound up with the specific material-discursive practices that constitute certain phenomena' (Orlikowski 2010: 135). For instance, reflecting both its material and semiotic influences, email can serve as both a source and symbol of stress (Barley et al. 2010).

Infoway seemed to understand very well that their project was not just about the technology but that there were many other social factors that should be taken into account. In fact, in a very recent newspaper article, the CEO of Infoway remarked that 'it's not technology or money that's lacking but a culture of collaboration...once you have that...anything is possible'¹⁴¹. Both material content and social context had to be built together as the meanings that stakeholders gave to the pan-Canadian EHR would come to be highly consequential in effecting its acceptance. For instance, in the UK, patient safety had become a major impetus for implementing EHRs. Infoway also understood that they had little power in addressing this particular issue as physicians came under provincial/territorial jurisdiction. Furthermore, the alignment of incentives for physicians was critical in order to help the EHR take on new meaning, and yet this was something that was not in Infoway's control but in the control of the provinces and territories. They had to create the right alignment of incentives in order to move the agenda along.

¹⁴¹ Globe and Mail (pA14, Friday, Nov. 12, 2010)

In this chapter, I have tried to show how Infoway has come to recognize the benefit of occasioning more dialogic spaces in the innovation process. It is through such dialogic spaces that questions and possibilities can be raised. It is through such dialogic spaces and the dialogic interaction that ensues that innovation happens. In my view, dialogic spaces are the mechanism of innovation.

Chapter Nine: The Future is Now!

Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world's becoming, to contest and rework what matters and what is excluded from mattering.

(Barad 2003: 827)

In this chapter, the final chapter of this thesis, I will try to advance some general insights that have emerged from my research. I feel that each of these insights warrants a more nuanced consideration, which will no doubt occupy much of my future research agenda and therefore, are by no means complete. These are things that I have seen as I have reflected on some of my learnings. My hope is that my readers will have seen some of the same things I have seen, as well as other things that are unique based on their own knowledge and expertise.

In *The Pasteurization of France*, Latour makes the argument that one of the greatest scientists in French history was more of an adept politician than an astute technician. Politicians, in ANT speak, are those who are able to efficiently and effectively align heterogeneous entities to create coherent networks. Hence, we can also refer to them as heterogeneous engineers. According to Latour, Pasteur's power emerged from the way that he constructed the microbe from old elements using new associations and then was able to convince key stakeholders to buy into this new vision¹⁴² that he had helped to create. In this way, he was able to *make* the rod bacterium, identified in his laboratory, into the cause of anthrax by replacing 'each element that composed of the definition of the anthrax with its own term and thus convince the minister, the veterinary surgeons, and the peasants, as well as the fellow microbiologists' (Latour 1988: 78).

The term 'microbe' was just beginning to take on meaning, a meaning that was becoming progressively embedded in associated artifacts and practices (Clarke and Fujimura 1992). Thus, Pasteur was able to manipulate and shape the way that meaning emerged in order to achieve his own ends. He became the 'official spokesperson' for the microbe and, in so doing, made his lab into the 'official site' of its investigation. Somewhat inadvertently, he also managed to reverse the role of the physician who was 'no longer a confidant of the *patient*, but a delegated *agent* of public health to the patient.... *Disease was no longer a private misfortune but an offense to public order*' (Latour 1988: 123 emphasis in original). By re-casting the disease object, through a manipulation of meaning, the subject positions of those associated with that object also seemed to be accordingly recast¹⁴³. In this way, Pasteur forever changed the way that medical practitioners would understand and relate to disease.

Indeed, history shows that change agents frequently do not sense or understand the entire extent of the social impacts of the innovations that they struggle to introduce (Rogers

¹⁴² It's important to remember that buying into a vision, in ANT terms, means being enrolled by that vision which means being aligned by it.

¹⁴³ A similar argument seems to be made about risk objects and risk positions in Hilgartner, S. 1992. The social construction of risk objects: Or, how to pry open networks of risk. In J. F. Short, Jr & L. Clarke (Eds) *Organizations, uncertainties, and risk*: 39–51. Boulder: Westview Press. Steve Maguire of McGill University is currently working on extending this thinking in the management field to develop a theory of organizational-stakeholder relations (source: personal communication).

2003: 451). I would add that the full extent of the impact could never be fully known, as the innovation only becomes what it is as it is picked up by people in different ways. Having said that, I hope that this thesis has delivered a somewhat better understanding of some of the social impacts of the efforts to technologize healthcare in Canada. However, that has not been my main intention. I have been more interested in trying to trace the process by which the pan-Canadian EHR system is unfolding and trying to understand the role that Infoway is endeavoring to play in that unfolding.

From this study, my hope is to be able to generally contribute a more nuanced sense of how an innovator might better promote technology-based innovation, as well as, more specifically, what Infoway might do to better promote the pan-Canadian EHR. Furthermore, because of the unique institutional context of the healthcare sector, I hope to be able to use some of the learnings from this study to further refine our understanding of extant innovation theory (Chiasson and Davidson 2004). Finally, I feel that some of the methodological approaches that I have used in this thesis work have important implications for the way that we generally tend to study innovation. If we choose to reframe our understanding of innovation, then our methods of investigation also have to accordingly be reconsidered.

Overall, I contend that this research has some important insights for practice, theory and method. It's important to note that I am positing these simply as insights and not conclusions, as in my mind they are still open to discussion, reflection and importantly further research. They are not, by any means, the final word. Through a largely dialogic process, I hope that my own insights multiply into many insights for many innovators and researchers working in many contexts. In the balance of this chapter, I will describe each of these insights and then end this thesis with some closing remarks.

9.1 Practical Insights

The emergence of a fundamentally new environment driven by dictates of globalization, consumerism, demographic shifts, the increased burden of disease, and expensive new technologies and treatments are expected to force fundamental change on healthcare within the coming decade

(Adams et al. 2007: 1).

The healthcare system is in a state of flux. Through controversy, it appears that stakeholders are becoming increasingly fragmented and therefore, seem to be even more reluctant to engage in any kind of collaborative reform. Inevitably, it seems that a myriad of factors including 'financial constraints, counterproductive societal expectations and norms, the lack of alignment in incentives, short-term thinking, and the inability to access and share critical information' are inhibiting 'the willingness and ability of healthcare systems to change' (Adams et al. 2007: 1). Consequently, the innovator's job becomes more challenging, as what is already a rather complex environment seems to be becoming even more complex¹⁴⁴. However, the implications if we do not take on this challenge could be even graver¹⁴⁵ as the current paths of many healthcare systems around the world may become unsustainable by 2015¹⁴⁶ (Adams et al. 2007: 1).

In such a complex environment comprised of a diverse array of stakeholders with differing priorities, rational approaches to planning seem to have limited usefulness. As Throgmorton (1996) poignantly puts it: 'rational planning takes place inside one man's (the "decision makers") head and the decision maker's goals are defined in advance...what happens when the planner or decision maker discusses his goals and plan with others, especially when those others have differing goals and concerns?' (Throgmorton 1996:

¹⁴⁴ Evidence of this is Accenture's walk away from a \$3.73 billion NHS contract (the largest non-military IT project in history) in September of 2006. On a more local level, it was mentioned to me in an interview with the CIO of London Health Sciences that many consultants have said that healthcare is the most complex organizational environment that they have ever worked in.

¹⁴⁵ It should be noted that there are those who would disagree and argue that the system is in fact sustainable if the economy continues to grow. Dhalla, I. 2007. "Canada's Health Care System and the Sustainability Paradox," *CMAJ* (177:1), pp 51-53. Nonetheless, everyone would agree that the challenges are complex.

¹⁴⁶ I am not sure if I agree that they will be unsustainable by 2015. I do, however, think that we are currently on a path which will make our healthcare system unsustainable at some point in the near future unless we change our current approaches.

24). To meet such complex challenges, managers and management researchers will need to engage in fresh thinking, novel approaches and new theoretical models of innovation (Hirschheim 2007). Also, it seems that a highly integrated approach will be needed that can perhaps only come from unprecedented levels of collaboration between for-profit, government and non-governmental organizations (Kanter 1998).

There are three main insights that I have come to from reflecting on my thesis work, which I feel could possibly inform practice. Rogers (2003) uses the following Machiavelli quote to open his landmark book *The Diffusion of Innovations*:

There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new order of things...Whenever his enemies have the ability to attack the innovator, they do so with the passion of partisans, while the others defend him sluggishly, so that the innovator and his party alike are vulnerable.

(Rogers 2003: 1)

This quote alludes to the overall difficulty of bringing about innovation. In a multi-stakeholder environment, like the healthcare sector where there are many types of stakeholders that need to be convinced that the new idea is worth making a change for, the task of innovating is made even more challenging. Therefore, it is not surprising that Rogers (2003: 1) argues that ‘a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation’. Innovations usually spread at disappointingly slow speeds, especially when multiple stakeholders are involved and the change must be collaborative to be effective.

My research indicates that Infoway, as innovator in the pan-Canadian EHR space, is in a similar predicament. However, my view is not that the innovation is diffusing slowly, as if it were a pre-existing entity promoted by an innovator and adopted by a user. Indeed, in reality, there is no pan-Canadian EHR to ‘diffuse’. I, instead, take the perspective that the adoption of innovation is a ‘negotiated outcome’ (Maguire 2002). Taken from this position, even the term ‘adoption’ seems to be a relatively misleading term. In fact, I prefer to think of the stakeholder as ‘harmonizing’ to the pending innovation, which accords importance to the socio-technical relationship and not simply adopting as if it

was an on-off state. As a negotiated outcome, it makes more sense to think of the innovator as cultivating the emergence of the innovation (more about this later) and not simply promoting its adoption and diffusion, as if it already existed. In other words, and an extremely important point in my view, is that the innovation is an effect that hopefully materializes at the end of the story (although that can never be guaranteed) and not something that we assume already exists even before the story has begun. Latour (1996) puts it eloquently when he says: ‘after many recruitments, displacements and transformations, the project, having *become* real, then manifests, perhaps, the characteristics of perfection, profitability, beauty and efficiency that the diffusion model located in the starting point’ (Latour 1996a: 119).

I will now briefly suggest three approaches to innovation that I believe could be worthwhile for an innovator to consider:

Activating the Vision

Rogers (2003) defines an innovation as ‘an idea, practice, or object that is perceived as new’ (xx). Promoting something new to replace something legacy that is often well established, well-used and well-worn (Zuboff 1995) can be an onerous task. Paper-based patient records in the form of case summaries date back to at least Egyptian times and mainly functioned to compile salient clinical information for the purpose of follow-up care or scholarly work (Safran and Goldberg 2000). They have remained that way ever since. In fact, the only major innovation in health records over the past several hundred years has been its re-engineering to serve as a tool to aid physician decision making and communication for the purposes of guiding and teaching (Weed 1968). Digitizing health records would be the next major innovation in health recording.

My study of Infoway’s activities suggested that they were trying to find ways to activate their vision, thereby making it more compelling¹⁴⁷. The challenge was to promote the pan-Canadian collaborative vision of healthcare in a system that was largely

¹⁴⁷ Compelling, in my view, refers to the alignment of stakeholders i.e. they are influenced in various ways to buy into the vision.

fragmented and disconnected. This new vision would involve many new collaborative practices and information sharing, as well as many new technological innovations such as distributed computer systems and e-prescription. Infoway managed to find various material ways to activate the pan-Canadian vision. For example, as explained previously in this thesis, they promoted the pan-Canadian standard through the Standards Collaborative. They also created the Vision 2015 document. Such ‘technologies’ became ways to materialize new meaning in the world and thereby activate the pan-Canadian vision by making it real. However, there were other ways.

In my view, Infoway needs to find more ways to activate their vision, thereby making change even more compelling. The more ways they can find to inscribe human and non-human agents with their vision, the vision accordingly gets more powerfully activated and the innovation can be better accelerated. I have reframed ‘acceleration’ in terms of finding more ways to activate the vision (a wider sense) as opposed to just getting more users to adopt the technology (a more restricted sense). Activating, importantly, involves occasioning dialogic spaces¹⁴⁸. Interestingly, these spaces can have greater significance beyond just being occasioned to help effect and accelerate change. If they persist, they could also be permanent sources of reflection and renewal in an ongoing innovation process.

Cultivating for Emergence

To cultivate something, whether crops or the mind, means to foster its growth. Growth is the objective and fostering, which indicates a qualitatively different approach than managing, is the mode. For instance, Thomas Malone in his forward-looking book *The Future Of Work* nicely describes the cultivation of employees, which he argues, will become the management model of the future because it is a model based on organic approaches as opposed to the more mechanistic ones we have historically tended to use

¹⁴⁸ There seems to be some connection (which I have yet to understand fully and is beyond the scope of this thesis) between dialogic spaces and what Foucault calls heterotopias. Heterotopias are ‘absolutely different from all the sites they reflect and speak about’ and yet unlike utopias, they are ‘places that do exist and are formed in the very founding of society’ Foucault, M. 1967. "Of Other Spaces," *Diacritics*, pp 22-27. Future research may look at this a little closer.

today. He says 'To cultivate something successfully - whether it's your farm, your garden, your child or your organization - you need to understand and respect its natural tendencies at the same time you try to shape it in ways you value....rather than just trying to impose your will on the system, you try to balance the right kinds of control with the right kinds of letting go.' (Malone 2004: 154). Rosabeth Kanter has similarly argued that it is impossible to approach innovation with a traditional business school mentality, as managers must learn to operate more intuitively (Kanter et al. 1997).

For an innovator trying to bring about innovation, this suggests that a different orientation and mindset is required. Importantly, the innovator should operate with the understanding that the path of innovation is less linear and more organic by nature. Kanter has aptly used the metaphor 'Let a thousand flowers bloom' to describe the kind of conditions required to foster the cultivation of innovation in organizations (Kanter 2000). She suggests that innovations are like tiny seeds that are nurtured carefully until they grow and are able to blossom. Horticulturalists and farmers are both focused on particular key elements of the environment like soil conditions and climate i.e. conditions that will help better foster the growth of flowers or crops.

I prefer to think of innovation using the metaphor of the Bonsai: 'Bonsai are kept small and trained by pruning branches and roots, by periodic repotting, by pinching off new growth, and by wiring the branches and trunk so that they grow into a desired shape'¹⁴⁹. In contrast to what many in the West believe, the Bonsai is 'not a genetically dwarfed plant...kept small by cruelty in any way'¹⁵⁰. In fact, the cultivation of Bonsai has deep links to Zen Buddhism in which man, nature, elements and change are all intertwined through the acts of meditation and expression. This form of horticulture has many foundational principles. For instance, the Bonsai's roots are never planted directly in the soil. Also, the Bonsai is always planted off center, as the center point is where heaven and earth meet and therefore nothing should occupy that place. The art of Bonsai growing, a particular horticultural methodology, is a lifelong practice that is supposed to sensitize its practitioner to his/her relation to nature and change. In many ways, it relates

¹⁴⁹ <http://bonsaisite.com/intro1.html>

¹⁵⁰ Ibid

to my definition of a dialogic space, as human and non-human entities are able to come into harmony through a ‘mutual understanding’¹⁵¹ of each other.

We have talked about cultivation, but what does it mean to cultivate *for emergence*? By nurturing the innovation process, the innovator is able to nurture (not control) the way that the innovation emerges. Keeping in mind that the innovation is an effect, something we eventually arrive at like ‘the Bonsai’ itself, then the innovator can intervene in its becoming (like a cultivator of Bonsai). Importantly, however, this intervention should be done in such a way as to enable the stakeholders involved to also participate in and shape the innovation’s becoming. Their voices must be heard. As stakeholders are brought into relation with each other, a dialogic space is occasioned. In fact, the dialogic space takes the form of that relation and does not exist separately from it. I would also go as far as to say that the innovator should be primarily focused on occasioning dialogic spaces and perhaps be less focused on achieving their particular vision of the innovation. In this way, the innovation comes to emerge mainly out of the efforts of the stakeholders and not from the desires of the innovator. The innovator provides the necessary conditions to help foster emergence. In this way, the innovator occasions rather than effects the innovation.

The Romanow (2002) report nicely alludes to what I have called ‘cultivating for emergence’ in terms of multiple visions, dialogic spaces and the role of the innovator:

Different approaches, different priorities and different visions of what the health care system should look like are part and parcel of living in a country as large and as diverse as Canada. In some ways, a certain level of disagreement is always going to be present. But disagreements can be handled in either a productive or unproductive manner. They can lead to finger pointing and distrust where the goal is to lay blame for a problem rather than resolve it. Alternatively, disagreements can lead to a tradition of compromise and negotiation that results, in the end, in decisions that are in the best interests of Canadians and the health care system itself. In the Commission’s view, those charged with the governance of the health care

¹⁵¹ I know that when I use the term ‘understanding’ to refer to bonsai, many of my readers will feel uncomfortable. My purpose is not to suggest that plants have cognition, that is a debate for another day, but to point out that the bonsai plant is able to come into harmony with its human horticulturalist through the bonsai growing process. This process of coming into harmony, whatever that may be described as, is what I term ‘mutual understanding’.

system need to restore a level of *mutual respect and trust* that has been missing in recent years, especially in the relationship between the federal government and the provincial and territorial governments, and among the various actors in the health care system.

(Romanow Report: 46)

The least intuitive aspect of cultivating for emergence has to do with controversy. As Romanow (2002) states above: ‘a certain level of disagreement is always going to be present’ (46). Traditional wisdom would suggest that controversy is something that should be avoided and dealt with as soon as possible. However, cultivating for emergence would suggest that *controversy should actually be encouraged and allowed to fester for a while, as it is through dialogic interaction that new understandings unexpectedly emerge*. As Heraclitus once wisely said, ‘A wonderful harmony is created when we join together the seemingly unconnected’¹⁵². This connection, and the spark that potentially could emerge from it, is what the mindful innovator should strive to evoke.

Being a Mindful Innovator

Weick (1999) argues that mindfulness is ‘less about decision making, a traditional focus of organizational theory and more about inquiry and interpretation grounded in capabilities for action’ (Weick et al. 1999: 81). Provocatively, he goes on further to say that ‘the shift to anarchy is part of the ongoing project of mindful action’ (Weick et al. 1999: 49). By definition, the state of anarchy implies ‘confusion; chaos; disorder’ (or controversy) but also ‘the cooperative and voluntary association of individuals and groups’¹⁵³, without direct or coercive government. This does not imply a total lack of order, but just an order of another kind emerging from people through time and not imposed top down from the outside¹⁵⁴. This kind of approach nicely captures the kind of positioning that I suggest an innovator should adopt in relation to the innovation being promoted. The mindful innovator is always looking for ways to ‘put the power in the

¹⁵² p59 ‘Expect the Unexpected (Or you won’t find it)’, Roger von Oech, 2001, Free Press, NY

¹⁵³ <http://dictionary.reference.com/browse/anarchy>

¹⁵⁴ This reminds me of Lincoln’s Gettysburg address where he ends his speech with the famous words ‘this nation, under God, shall have a new birth of freedom -- and that government of the people, by the people, for the people, shall not perish from the earth’.

hands of those who could make the change' (Westley et al. 2007: 103) and should also be constantly aware that 'any "familiar" event is known imperfectly and is capable of novelty...this ongoing wariness is expressed in active, continuous revisiting and revision of assumptions, rather than hesitant action' (Weick et al. 1999: 81). For the innovator, breaking down previously held assumptions is key to being reflexive and being mindful in the way that innovation is approached. Westley sums it up nicely when she advises 'learn to live the paradox of action as reflection and reflection as action' (Westley et al. 2007: 91).

Rogers (2003: 31) remarks that 'seldom are change agents able to predict an innovation's meaning, the subjective perceptions of the innovation by the clients'. This suggests two things to me. First, there are invariably multiple meanings of the innovation held by various stakeholders, and it is most likely socio-technical forces that are responsible for one or two meanings coming to marginalize the many others. Second, the innovator really has little ability to predict what the innovation is going to look like or how it will eventually end up emerging¹⁵⁵. So, by taking a more reflexive stance, the innovator gives up on the notion of wanting to achieve their particular vision of the innovation and, instead, gives this task over to the stakeholders themselves in order that they may determine what that vision should look like i.e. putting the power into their hands. Thus, I suggest, the innovator should be more concerned with looking for ways to break down 'past meanings that are imposed on present situations' (Bohm 2004) or 'dogmas of the quiet past' (Lincoln, 1862) in order to make room for new meanings and understandings to emerge¹⁵⁶. This breaking down process works in two directions: towards stakeholders and also, importantly, back towards the innovator. Old meanings need to be broken down and their influence neutralized, regardless of where they may reside.

¹⁵⁵ I am reminded of my car the Honda Element. Honda developed this car with a target market of yuppies that do a lot of outdoor rugged activities. They marketed it that way but did not realize that the slightly higher price tag might be a barrier to purchase. Luckily for them, the vehicle took off amongst young couples with small children who liked the versatility of the vehicle and especially liked the fact that it had a rubberized interior that could be easily washed when junior dropped his food.

¹⁵⁶ Krishnamurti would call this emptying the cup before trying to fill it.

Much of being a mindful innovator involves moving away from monologic approaches to innovation, and adopting a more dialogic stance. As one of my informants put it: ‘So we talk a lot about effect and change through influence not authority...how do you influence people to get on board with the vision and alignment as opposed to telling them to get on board and get aligned because it doesn’t work very well, that telling people’ (21-11). In the case of technology-based innovation, a dialogic approach can be difficult to achieve, as the technology itself tends to be monologically inscribed i.e. its word is the final word. In other words, the designer designs the technology with a particular understanding of the world and then inscribes that in the object (Akrich 1992). For instance, Kennewell et al. (2007) have shown that ICT in the classroom has failed to transform pedagogy as early adopters of ICT had envisaged. He uses the example of the Interactive White Board and argues that it gives new impetus to traditional, teacher-centered approaches. In the classroom and other such spaces where human and non-human stakeholders interact together, ‘oppressive power relations often appear natural and neutral rather than socially constructed, political, and historical in origin’ (Gutierrez et al. 1995: 450). Indeed, when those power relations are embedded in technology, they become even more inconspicuous.

Through my thesis research, I gained the sense that Infoway was being somewhat mindful and reflexive, although I felt that they could still do more to move away from common monologic approaches to innovation. For instance, they restructured their organization in reaction to the recognized need to further cultivate their relationships with various types of stakeholders. In light of the pending reduction in future funding, they seem to also have been reflecting on their overall role in healthcare renewal as it relates to their core competencies. They are grappling with the possibility of trying to further their agenda without relying on funding as a primary mechanism to trigger the needed change. For instance, one possibility is to put more focus on communicating particular messages to the public and dispensing with certain commonly held beliefs:

Two out of three Canadians think that we already have an Interac for health information. It’s absolutely astonishing to two-thirds of Canadians that we don’t have an EHR already and honestly, I think that might be motivating

some of Dick Alvarez's commentary that if Canadians want to have this, they are going to have to start demanding it. Sadly, two-thirds of them think they've already got it and that might explain why the government is being let off the hook on this particular topic. (17-13)

Several months after this interview, and during the writing of this thesis, Infoway launched a new public education campaign called 'Knowing is better than not knowing',¹⁵⁷ (www.knowingisbetter.ca). Besides television commercials, the media mix also included 'online ads, print ads built to run around newspaper content and a microsite that explains (via a user-friendly animation) how EHRs are being implemented and who is involved',¹⁵⁸. According to Wendy Novachko, marketing director for Infoway, 'EHRs are seen as nothing more than something administrative...we needed to create relatable situations that invoked an instant understanding of the impact this important and complex task will have to making health care better for all Canadians',¹⁵⁹. This appears to support my contention that Infoway is being more mindful in their approaches, as they have realized that they needed to focus more on communicating with the public about the value of EHRs (bottom-up approach) as opposed to relying heavily on a top down approach like in the past. Through this storytelling approach (presenting citizens in compromising healthcare situations), Infoway is trying to manipulate the way that the EHR is being understood i.e. they are trying to manipulate its meaning. Importantly, the public is allowed to come to their own sense of what the EHR might mean to them, as storytelling fosters the emergence of multiple interpretations (Boje 1995).

My research suggests that something that Infoway could perhaps be more mindful of is in their general approach to the promotion of the EHR and particularly as it relates to the private sector. One of my informants described the matter in the following way:

This is a supply chain that today is quite dysfunctional and one of the truths is that the improvement of the efficiency of the supply chain will allow you to either invest or divest that efficiency...so in Canada we don't actually need to as the U.S. does, for instance, we don't need to reduce the cost of

¹⁵⁷ <http://www.mediaincanada.com/articles/mic/20100928/healthinfoway.html>

¹⁵⁸ Ibid

¹⁵⁹ Ibid

healthcare. In fact, that's probably the wrong way to approach it. As soon as you said that, that would be the goal of the EHR, you are going to have all sorts of enemies come out of the woods because they are going to worry that they are the ones that are being disintermediated. Instead if you say you are going to invest the efficiency improvement, then improving the healthcare supply chain will create capacity. Well, we sorely need that. (17-6).

I think there has been, in my view, a bit of a problem with the whole EHR initiative in that it's been mistakenly marketed and by that I mean the following: the EHR is for something. The EHR in and of itself, it's the means to an end. It's the end that we should be marketing to Canadians... I mean, the act of having electronic health records is – its purpose is to help us have a better more efficient healthcare system. Better outcomes, I think that's a trap. (17-13).

Another area that Infoway could also be more mindful of is in the way that they define the EHR. As one of my informants points out, Infoway could consider expanding their definition of EHRs, thereby drawing other things into their mandate:

I think broader and an extension and an expansion of the definition of the electronic health record...and then using that not only for patient care but for making better decisions, sort of health analytics, if you want. So those are the kind of things that we see or that I see coming, kind of more of the same, more depth and more improved technology at sort of the current Infoway definition, expansion, extension, and then again some additional analysis. (16-2).

Sometimes, technology also reveals (Heidegger 1977). Because of adopting a reflexive stance, the mindful innovator is always open to whatever the technology may reveal. For instance, 'the electronic patient record has actually brought to the forefront the whole issue of privacy. It's not that it wasn't there before but it really accentuates it because you can now monitor it' (21-9). The innovator should be willing and flexible enough to change whenever the situation reveals that change is needed.

Another example of an opportunity revealing itself is to do with the relationship between the public and private sectors. As mentioned at the beginning of this thesis, Infoway asked me to research and write a case about why the private sector did not seem to be

more willing to take on a leadership role in the healthcare renewal agenda. Through my research, I was surprised to find that it was the general relationship between the public and private sector that was in dire need of renewal, on both sides of the equation:

I think the whole purchasing approach is much still based on the traditional methods of buying commodities rather than buying services and I think that needs to change. You know, if the health service, if Infoway started to focus more on buying services rather than buying, you know, or solutions rather than just buying products, it might be better ... I think they [public sector] kind of treat the private sector more in an adversarial supplier customer relationship rather than a partner. And a partnership to a lot of people in the public sector just means a low price. (14-13/14)

In other words, it was not that the private sector did not want to take on more of a leadership role, but that they felt like they were not being brought in as full-fledged partners. Governments seemed to be sending the wrong message. When there was something that needed to be done, a RFP (Request for Proposal) was usually issued. A RFP is an invitation to suppliers to submit a proposal on some work, the specification of which had already been defined. The government was simply looking for the most efficient way (most usually the cheapest way) to get the work done. This traditional practice seemed to be preventing the private sector from contributing any of their expertise in finding the most effective way to solve the problem at hand. As one of my informants remarked, an RFP is ‘just, in the end, a collection of software and it’s not really a solution, is it? (14-13)

The Saskatchewan provincial government decided to change their practice and try to send a signal to the private sector that they valued their involvement in developing a solution for their problem. However, they had to find a way to activate their vision. They did this by using an RFI¹⁶⁰ (Request for Information):

¹⁶⁰ The common meaning of RFI is Request for Information. I prefer to think of it in terms of Request for Innovation (and apparently so does my informant). Ultimately, government is looking for innovative ‘out of the box’ thinking to solve a particular issue they have.

The Province of Saskatchewan led an RFI instead of an RFP and I think that's a very useful posture for governments to take...and what they did was they said 'here is what we need to accomplish and rather than us telling you the system that we want you to bid on, we are asking you for either ways that that can be approached or if you've got some out-of-the-box thinking. (17-16)

This approach seemed to work well as the creativity, expertise and know-how of the private sector was being better captured. The private sector was also being brought into more of a partner relationship. Infoway could be mindful of this opportunity, as they were seemingly trying to be, and consider in what ways they could better foster and cultivate this practice in the marketplace. I suggest that a mechanism of RFIs (I will call it Request for Innovation) could perhaps be used to harness the creativity of the private sector, as well as activate the vision of a more collaborative innovation process. If Infoway was mindful of this opportunity, they could engage in means that would help cultivate the practice of using RFIs and also take steps to identify and neutralize the barriers preventing its emergence.

9.2 Theoretical Insights

Concern about the character and significance of new technologies, as they are introduced into organizations, has preoccupied much of academic thought from the early days of management, as evidenced by the classic article 'Management in the 1980's' (Leavitt and Whistler 1958). Since extant innovation research has been historically dominated by the normative or functionalist paradigm (Avgerou 2007; Hirschheim and Klein 1989; Schultze and Leidner 2002), the social context within which innovation is invariably embedded has been largely downplayed or not adequately considered (Avgerou 2001). However, there have been several streams of research that have given due importance to both the social context of the innovation and the political behavior of the actors involved in the innovation process (e.g. Avgerou 2007; Avgerou et al. 2004; Ciborra 2002; Markus 1983; Orlikowski 2000a; Orlikowski and Gash 1992; Orlikowski et al. 1995; Spicer 2005; Walsham 1995a). By taking into account that innovations become reinvented as they introduce social change (Rice and Rogers 1980; Rogers 2003), this type of research is

more concerned with looking beyond the users and their functional use of technology in order to understand the more complex contextual issues that can critically affect the IT-based innovation process (Marcon and Compeau 2003; Orlikowski and Barley 2001; Orlikowski and Iacono 2001). My thesis research continues in this tradition by confronting theoretical assumptions of current innovation theory that has tended to be developed in more traditional institutional settings. In this way, by studying innovation in the inherently complex healthcare system, I hope to have contributed more contextually nuanced theory that has implications for the way that we understand the innovation process.

Many studies have argued that the political process of shaping technology use involves a dialectical interplay between agency and technical structure (e.g. Barley 1986; Barley 1990; Orlikowski 1992). Others have suggested that a central way that actors attempt to shape technology use is by manipulating the meaning given to that technology (Bijker et al. 1987). Some have gone as far as to suggest that, in practice, the 'meaning given by relevant social groups actually constitutes the artifact' (Bijker 1995: 77). Consequently, it is doubtful that technologies have any intrinsic scientific or instrumental logic that drives their evolution to a particular end (Bijker et al. 1987). This insight suggests that the discourses inscribed into a given technology may indeed shape how potential users understand that technology and its possible uses (Joerges and Czarniawska 1998; Munir and Jones 2004), and therefore technology could be interpretively flexible, thereby taking on multiple meanings (Collins 1985). When technology is framed as text, the designer is portrayed as one attempting to impose particular meanings on the artifact and thereby constraining the possible interpretations open to the user (Grint and Woolgar 1997). On the other hand, the user attempts to produce readings of the text that best suit their own purposes. It is within the dynamics of this interaction that the focus of this thesis research is situated. Instead of focusing on *what innovation is*, I have tried to more fully account for *how innovation becomes*.

In this section, I would like to discuss my general approach to thinking about innovation and what that may mean for our theoretical approaches.

Thinking Condition Effect

‘Kuhn argues that scientists create new ways of thinking about a particular phenomenon not because they have discovered some greater truth about it; rather, by creating new ways to talk about that phenomenon, the perceived truth about it shifts to be commonly understood in terms of the new model created by the new language’ (Dobrin 1997: 67).

My contention is that thinking in terms of conditions and effects introduces a new way to understand the innovation process and the role of the innovator in relation to that process. I begin by describing cause-effect thinking.

When we encounter an event, our impulse is to ascribe a reason for the occurrence of that event. When the event recurs, apparently as a result of the ascribed reason, we treat the reason as the “cause” and the recurring event as “effect”. This simple mechanism, cause-effect, has characterized the Age of Reason, from Descartes and Bacon to the present day, and has helped us build human civilization as it exists today, Internet, economy and all. Yet, there seems also to be a growing and uneasy realization that the difficulties we face today can be traced back to this very same mechanism, the cause-effect model, and the thinking that has been predicated on it.

Grounded in the modern scientific approach, cause-effect thinking focuses the inquisitor on a search for an underlying cause for a given observed effect. Once the causal-link (the link between cause and effect) is scientifically (or statistically) established, this knowledge ‘becomes fact’ and it is supposed to enable us to generate the desired effect at will or, as the case may be, to prevent an undesirable effect from recurring. Therefore, instead of waiting for the effect to recur and then dealing with the consequences, we are now able to produce or prevent the effect whenever we desire according to our own timetable. This ability to manipulate our present, based on our collective accumulated know-how, not only gives us the power to predict the future but also, in some ways, to determine it. However, through everyday experience in the world, we repeatedly come across things that we are unable to manipulate in the way that we expected, leading to unexpected and often undesirable outcomes.

Furthermore, we have accepted, over time, that the social world is much harder to manipulate than the natural world. When the object of study is human instead of non-human entities, we expect to more often fail in prediction. Interestingly, when our established knowledge of the causal link leads to such failure, we reason that we must have misidentified ‘the cause’ and proceed to look for ‘the real cause’. In our efforts to isolate a more reliable cause, we come to believe that the newly identified cause is again the main factor responsible for creating the effect. In this way, we sustain the cause-effect model instead of bringing it into question. But what if that observed effect actually had multiple equally critical causes¹⁶¹, a collection of heterogeneous and often unobtrusive entities that were together responsible for the effect? What if each element alone was unable to affect anything worthwhile? Let me sketch out a simple example that will hopefully clarify this point.

Imagine this. You are running to catch the bus. It is winter and there is snow on the ground. You slip and fall. Using cause-effect thinking, you might quickly conclude that the reason you fell was due to the abundance of ice that you encountered on the path as you were running to catch the bus. This will probably be your first thought, your primal thought¹⁶². Accordingly, you may decide to vent your frustrations to whoever was supposed to maintain the path and threaten to sue them for not clearing the ice properly. However, what if you stepped back (cognitively, that is) and instead asked yourself a simple question: was it really the ice that caused me to fall or does it just seem that way on the surface (excuse the pun)? Was the ice the only thing that needed to be present at the time of your fall? What if the ice was not the cause but only one of the many conditions that needed to be present at that particular moment in time? If so, what were some of the other conditions? Well, the condition that you were running, the condition that you were late, the condition that you were not paying attention, the condition that your shoes had no grip, and there are more. You can see that this collection of conditions

¹⁶¹ I use the term ‘critical cause’ to denote a cause without which the effect would not occur.

¹⁶² In some senses it is a primal thought as cause-effect thinking is a product of our ‘will to power’ in which we desire to control (have power over) things in our environment. This kind of thinking is founded in the earliest days of man when man’s environment had many dangers that needed to be understood and controlled for survival.

is very heterogeneous, including material and social things, that all became associated together at that particular moment in time to precipitate the effect of your falling. If any one of these conditions remained absent at that exact moment, would the effect still have occurred? For instance, with firmer grips on your shoes you most likely could have made the bus in good time, without slipping. This kind of thinking is what I am calling condition-effect thinking.

So, what is so powerful about condition-effect thinking? Why is it important to consider in the way that we approach our research and, more specifically, in the way that we think about innovation? First, condition-effect thinking opens our minds to considering multiple conditions instead of just one cause. By labeling something as ‘a cause’, we often blind ourselves to all those other conditions that needed to be present in order to generate the observed effect. We ascribe the entire agency to this one cause. In the end, this renders us somewhat myopic with a narrow view of the phenomenon of interest. We may focus on the ice as being the problem that we have to solve. So, accordingly, we try to get the ice cleared more diligently or we may be more careful by watching out for ice next time we are running for the bus. Would this added attention to the presence or absence of ice actually reduce our chances of falling? Probably, yes. But would our attention to the poor grips on our shoes, perhaps resulting in a change to better gripping shoes, reduce our chances of slipping even further? Probably, yes. If we fall again, despite taking added precautions, we come to the realization that there are other influential factors that perhaps we have not adequately taken into account. It’s only when our efforts at manipulating the attributed cause fails to generate the desired effect that we realize that things are perhaps not what they appear to be or, more accurately, the way that we have ascribed them to be. So again, in condition-effect thinking, the ascribed (and most obtrusive) cause becomes one of many conditions. At least we are aware that we should be looking for more.

Second, cause-effect thinking influences us to look for a cause that has occurred temporally before the effect. In other words, the effect always occurs after the cause. But what should we make of effects that actually occur prior to the cause? Where do they fit?

For instance, a promised police presence in a rough neighborhood that is announced in a press conference could have the effect of reducing the crime rate even before the first cop ever hits the streets. A similar argument could be used for an information technology that generates effects in the organization even before it has been implemented. For instance, the threat of work computerization had effects in a Health Maintenance Organization even before anything was ever implemented (Prasad and Prasad 1994). So, what about effects that co-exist with causes, in the present? When I slip on the ice, the ascribed cause and the effect are present at that exact moment in time. If anything, the cause remains in the next moment and the effect vanishes, as the slip happens and then is gone. In contrast, condition-effect thinking does not require any kind of temporally based link between condition and effect. This is because effects and conditions are understood to actually co-exist in the present; in fact, they are made of the same socio-technical material. Therefore, it is often difficult to tell which are conditions and which are effects. As effects instantaneously become conditions for further effects, we could just as well argue that there are only conditions or, for that matter, that there are only effects. So, unlike the chicken and the egg (or like the chicken and the egg, depending on your view), it really does not matter which came first: the condition or the effect. All we need to know is that a confluence of particular conditions tends to precipitate particular effects. These effects become conditions for further effects and this cycling can occur indefinitely from moment to moment (many micro-movements accumulating into a macro-movement).

Third, as opposed to a causal link in which the cause is believed to probabilistically lead to the effect, condition-effect thinking maintains a tentative link between the two. This is because it is not one condition but multiple conditions that are required to occur at the same time in order to result in the given effect. Therefore the effect may or may not be realized when any particular condition or combination of conditions are put in place. Importantly, unanticipated effects could occur at any time from any given combination of conditions. These effects become conditions for further effects. In this model, we would anticipate (and that is one of the strengths of the model) that we most likely would not be aware of all the conditions that are required to achieve the desired effect. This strength also presents one of the weaknesses and main challenges for an innovator - how can all

the relevant conditions be identified? I suggest that only through experiential knowledge can we (more accurately our informants) get to know what the appropriate conditions could be. This is part of being mindful and reflexive in our approaches. Even then, we can never be guaranteed that the effect will recur. However, this tentativeness is very important to uphold in a condition-effect approach to innovation.

Fourth, context in the cause-effect model is treated as something that is external to both cause and effect. It's the space within which the 'reaction' occurs, like a container of sorts (a very porous and leaky container, I suppose). It's something that existed before the reaction occurred and something that usually remains after the reaction is over. As an externality¹⁶³, it can be largely ignored. In the condition-effect model, the context is not something 'out there'. The context is simply other conditions that we ourselves produce. There is no container, as a Cartesian model would have us think. By recognizing that we ourselves *create* context, *we can make efforts to create a different context*. Indeed, the efforts of an innovator should not only be on the innovation, but also the context within which that innovation will operate. Both have to be designed appropriately.

So let us summarize the argument thus far. Cause-effect thinking has limited the way that we have come to understand things in our world. Yet, it has also enabled us to create. In fact, most technologies have been a product of cause-effect thinking. We have understood that we have certain problems (most likely caused by humans) that can be solved by *applying* technology. This is why most information technologies have been strictly designed for compliance (automating) and surveillance (informating) (Zuboff 1988). This is also why techno-political discourse has been so powerful in getting things done, especially in places where traditional types of political discourse have failed (Callon et al. 2001) (I see evidence of this, and I hope the reader does too, in the way that the pan-Canadian EHR system is being promoted in order to achieve healthcare reform). As technologies have become more pervasive in our society, they have further reinforced the

¹⁶³ In classic economic theory, an externality of an economic transaction is something that has an impact on a party that is not directly involved in the transaction. Corporatist thinking is largely predicated on this in which externalities are not usually considered in decision-making in order to simplify the process. In other words, corporations focus on promoting their own interests, with less regard for others, by maximizing their externalities and thereby maximizing their profits. Ultimately, it is society that bears the cost of these.

cause-effect thinking that spawned them. For instance, electronic health records used in medical practice have further accentuated the mechanistic and fragmented view of the human body that has been largely based on the modern Western scientific model of medicine. This cycle of reinforcement makes it even easier to marginalize more traditional holistic ways of thinking about the human body and perhaps will prevent them from ever becoming legitimate¹⁶⁴.

So why is all of this important to consider in our research? What will we gain? What will we lose? The paradox of cause-effect thinking is that, on the one hand, it liberates us by allowing us to focus only on the causal link with everything else held constant. This makes the research object much more amenable to being questioned by extant quantitative research methods. On the other hand, cause-effect thinking also has the tendency to blind us to much that may be consequential in our telling of the story of what is going on in the scenarios that we study. We tend not to look for other conditions if we are not aware that they could exist. So, how does condition-effect thinking address such a paradox? Overall, condition-effect thinking influences us to search for conditions that together will result in the desired effect. We don't stop when we find one. Granted, we lose much of the advantage of being able to focus exclusively on one thing. However, in confronting the real-life complexity of the situation, we are perhaps better able to understand what is really going on...better able to see through to what is. Maybe, it is only by taking complexity head-on, in a complex or as Latour would say in a complicated way, that we can eventually achieve some clarity of thought. Let me describe an example from my thesis research that will hopefully make my argument a little clearer.

The pan-Canadian EHR system promises to provide every Canadian with an electronic record of their health. At the present time it is only a vision, with components of that vision coming to be slowly materialized. Once the system is fully developed, the EHR is supposed to be fully portable, thereby being able to move with the patient from point to point within the healthcare system. Using a cause-effect approach, the EHR can be

¹⁶⁴ Berg (1996,1997) has argued that medical records play a fundamental and constitutive role in medical practice as it does 'not simply represent this body's history and geography; it is a central element in the material rewriting of these' (Berg & Bowker, 1997:513).

thought of as a cause and healthcare reform as an effect. Therefore, an innovator can focus on bringing about healthcare reform by focusing efforts on getting the EHR diffused, and hopefully used, in care giving by those in the system. The innovator may use arguments such as ‘if you care about healthcare reform, then you should care about the EHR’ or, like Infoway’s present campaign, ‘Knowing is better than not knowing’. As I have shown, this line of reasoning has been used in EHR discourses in which the EHR is being presented as an integral enabler of many aspects of healthcare reform including wait times, primary care reform, Telehealth and greater system accountability. Potential users can be more easily categorized as innovators, early adopters, early majority, late majority and laggards based on their willingness to adopt the new technology. The many benefits of this new technology could be ‘sold’ to these potential users through focused marketing and communication campaigns devised for each group. Progress could be measured in increments, perhaps using adoption rates as a marker (which is commonly used by Infoway), with each minor effect achieved (or project completed) understood to eventually roll up into the major effect of reform. This cause-effect characterization would influence the innovator to try to figure out what things could enhance adoption, and then manipulate those causes to better and more quickly generate the desired effect. One of the issues with this approach, as it applies specifically to this case (but also in many other cases I suppose), is that there really is nothing to adopt. Paradoxically, the EHR system is still in development, and yet buy-in by healthcare professionals and others is needed *now* if the system is even going to come to fruition. In reality, the system is being developed incrementally, one project at a time, until it eventually emerges. Thought of in this way, the pan-Canadian EHR system seems to be more of an effect than a cause.

Now that we have arrived at some understanding of the benefits as well as the drawbacks of a cause-effect approach, we are ready to consider what a condition-effect approach might look like in the context of the topic of this thesis. First of all, as I have argued before, I see the pan-Canadian EHR system as an effect. It is something we arrive at, not something we start with. The current healthcare system has been mostly tending towards fragmentation, a trend that is manifested as fragmented thought and fragmented practice.

Those who have an interest in seeing the EHR implemented argue that more collaborative thinking and more collaborative practices will arise, which will enable better care outcomes. Therefore, if we were to view the EHR system as a form of practice or an ordering of work, then we would characterize it as involving more collaborative practice or a more integrated work order than we have now. Put differently, we hope to generate a more collaborative healthcare system triggered by the diffusion of the EHR. This follows logically (in cause-effect thinking) from the causal link between greater exchange of information (through information technology) and more collaboration. This idea is based on the opposite assumption that less exchange of information, as has traditionally been the situation in the healthcare industry, has sustained fragmented practice.

It is important to recognize that we really have no way of knowing exactly what our pan-Canadian healthcare system will end up looking like. However, we may gain a vague sense by studying the kind of trajectories that are currently being played out. As discussed previously, we can try to cultivate its emergence by influencing its growth to exhibit certain features that we are interested in (much like the Bonsai). But, what if our ‘vision’ of the EHR system was merely an educated guess? What if that vision was only one possibility among many possibilities? What if other better possibilities were getting ready to reveal themselves as the system was unfolding, but we prevented that from happening? *Even if the system that eventually materializes is not the one that we initially envisioned, it will most likely be the right system for all concerned stakeholders as long as they have an ‘adequate’ voice in its development.*

The corollary to this is that ‘wrong’ systems emerge when stakeholders are not given appropriate voice because, as I have argued, there are not enough dialogic opportunities (which implies a lack of dialogic spaces). Consequently, we should help the system emerge on its own terms by occasioning more dialogic spaces. This will happen if we are mindful of preventing our technologically oriented understandings from suffocating all other ways of understanding the world. In this way, we may create the opportunity to occasion a more equitable system for all. Such a system would not be predicated on causal thinking that privileges technology as a problem solver (with humans usually

being the problem). This is why technological discourse tends to carry so much influence, as it suggests that technology is only there to *solve our problems...therefore, how can it be bad?* Such a system would be predicated on condition-effect thinking that first acknowledges the inherent paradox that manifests itself within technology (it is both good and bad for us), and then looks for ways to embrace this tension rather than ignore it.

If I have done a reasonable job of establishing that a condition-effect approach is a promising way to think about the innovation process, the question that may come to mind is why is this type of approach not more common? My sense is that it is not easy for an innovator to know all the conditions that are important in order to bring about innovation. In the case of technology-based innovation, it is much easier to focus on implementing the technology itself as quickly as possible, hoping that it will be able to effect the desired changes. However, in practice, this rarely tends to be the case. In many cases, the technology, being paradoxical by nature, seems to make it even more difficult to bring about an innovation in work practices. For instance, there is evidence that the EMR has started to bring about more communication in the healthcare system, but not necessarily more collaboration, as was originally intended¹⁶⁵.

What conditions need to be addressed? Conditions are elusive and not readily apparent since they make up the tacit ground on which society and work systems are based. They are able to exert influence through material things (I have called these intermediaries). Conditions also constitute contextual space and therefore reside in a place where we traditionally have been reluctant to look. We want to keep context under control, severing all ties between it and the main effect, rather than letting it manifest itself. Another reason that we find it difficult to identify conditions is that we are not looking for them, one of the previously discussed pitfalls of cause-effect thinking. When conditions can't easily be identified, the innovator often becomes paralyzed and prefers to fall back on cause-effect thinking. This is because the innovator feels the need to 'know'. What if the innovator gave up this need to the collective and let the collective figure out how to 'know'?

¹⁶⁵ This was pointed out to me by a family physician who was part of a Family Health Team that had just implemented EMRs.

In the next section, I will suggest that dialogic spaces are one mechanism through which we can come to reveal those conditions that are critical to innovation. Only the collective can effectively identify those conditions as ‘an alternative way towards understanding the whole arises through participation rather than abstraction’ (Bohm 2004: xii). Therefore, the occasioning of dialogic spaces becomes crucial to achieving effects and, thus, to the innovation process in general.

Occasioning Dialogic Spaces of Innovation

In my thesis, I have previously argued that dialogic spaces are spaces of possibility, saturated with the forces of creative emergence. As human and non-human stakeholders are brought into relation, old ways of knowing the world get broken down and innovations in thinking and practice become more likely. In this way, a shared understanding is better able to emerge or, as Heraclitus says, ‘a wonderful harmony is created’. Importantly, in agreement with Bohm (2004), I suggest that such a dialogue is not simply a better way of having conversations. In my view, it is not the dialogue but the dialogic interaction that is important. As I have tried to show, in this dialogic interaction, *both human and non-human stakeholders are involved*. This has been one of my novel contributions and an area that needs more research to better understand the terms of that interaction. Also, importantly, multiple perspectives¹⁶⁶ are held in tension and allowed to co-exist. *The creative friction between these multiple perspectives, and the deeper forms of listening that dialogic interaction entails, will most likely lead to the emergence of shared meanings and the formation of new arrangements of actor-networks*. Listening is an extremely important and yet under researched component of creative dialogue: ‘Thus, in dialogue, each person does not attempt to make common certain ideas or items of information that are already known to him. Rather, it may be said that the two people are making something in common i.e. creating something new together... but people must be willing to listen to each other’ (Bohm 2004: 3). I would note that it is not that non-human actors don’t listen; it’s just that they don’t listen very well. In other words, they have one

¹⁶⁶ Non-human actors also have perspectives...it is what they have been inscribed with.

viewpoint (the one they have been inscribed with) and are not usually willing or able to change it for anything.

I further contend that it is through such interaction that critical conditions are more likely to get revealed. Granted, it is common knowledge that we should have meetings and discussions as we strive to implement any new system. But this is not what I would call a ‘dialogic’ interaction. Such meetings seem to be more centered on trying to negotiate details around the implementation of a new technology, with the innovator more concerned with managing stakeholders in order to achieve a preconceived or predetermined vision of the innovation. Notably, conditions seem to be more easily identified by those who are a part of the system. This is because to understand what conditions are needed to result in a particular change in the future requires an intimate understanding of what conditions exist at the present that are not right. Those who help produce and reproduce the healthcare system every day are the ones who would usually understand the nuances of their current situation the best. They would understand in what ways the current system needs to be refined and what conditions need to be occasioned for change to occur. We need to find ways to get them involved, and keep them involved.

All those who have a ‘stake’ in the system, who are concerned about the well being of the system, are the ones who can best identify those conditions that are problematic. But there is a problem. Those who have a stake in the system are not always given an appropriate arena in which to voice their opinion. Most debates usually occur in political arenas among politicians who act as ‘authorized’ representatives, but often only represent their own interests (Callon et al. 2001). Some concerned groups may be represented, whereas others may not. Often, there is no ‘democratic’ parliament in which their opinions can be voiced (Latour and Weibel 2005). So part of the challenge for an innovator interested in reforming the system is to create those ‘spaces’ where such debate and dialogue can occur¹⁶⁷. Such dialogue will potentially lead to the revealing and

¹⁶⁷ Interestingly, as I was writing this, I received an email informing me of a seminar highlighting the link between public spaces and sustaining community happiness. I can imagine that public spaces are essential in that they foster a sense of belonging and provide a place for continuing dialogue to occur.

identifying of conditions that need to be addressed which, in turn, will make it easier to precipitate the desired effect.

So how are these spaces created? Obviously, when I talk of spaces, I do not mean physical spaces, although the physicality of the space may indeed be a consequential factor. I mean occasions where assembly can occur. Just the act of assembling different stakeholders kick starts the process of ‘presenting’ conditions. I mean this in two ways. First, ‘making present’ in the Heideggerian sense of present at hand (Heidegger 1962). Conditions are part of the tacit ground and, hence, first need to be made present or explicit before they can be debated. Second, ‘presenting to’ in the sense of revealing conditions to concerned stakeholders in order that they may initiate dialogue around them. Thus, assembly is important, as an opportunity is presented for true dialogue to occur. Important to note, it is only the opportunity, as people can never be forced into dialogic interaction. And, if they were, it would not really be dialogic anyways.

Technology as a Materialization of Meaning

In the course of this thesis, I have presented a view of technology as a materialization of meaning. Importantly, I have suggested that technology is but one way to materialize meaning and, as such, there are others. For instance, the pan-Canadian collaborative vision of healthcare is being materialized in pan-Canadian standards but also in Canada Health Infoway and the Vision 2015 document.

I feel that there are several advantages to framing technology in this way, some of which I will describe now and others that I will most likely discover in future work. For instance, thinking about the meanings of electronic health records may help us be more sensitive to some of the controversy and resistance currently surrounding their implementation. When going from a paper-based system to an electronic system, there are subtle differences in the way that information is displayed, input and made portable. From an affordance perspective, ‘paper’s integration of storage and display offers affordances for predictability that are lost in electronic documents, which separate the two’ (Gaver 1996: 4). This has implications for social conventions that surround

particular technologies. For example, electronic health records can easily be changed without much of a visual cue (unless adequate security measures are taken), which cannot be as easily afforded in paper documents. This means that health practitioners may be less confident in the healthcare information that is presented to them in electronic form as compared to the paper charts they are more used to. Such logic, centered around meaning, may better explain why physicians seem generally reluctant to adopt EHRs. This is in contrast to common explanations that are usually predicated on the user's fear of technology.

If there is some truth to the affordance perspective, then Infoway should perhaps be more focused on improving physicians' confidence in electronic health records, as a recording technology, as opposed to simply trying to promote their enhanced functionality and numerous benefits. Maybe the medium really is the message. Perhaps electronic and paper health records may be better thought of as being complementary, as opposed to one being able to fully replace the other. Such insight is only apparent when the innovator is willing to think about things differently and adjust approaches accordingly. Indeed, 'successful practice depends on accommodating ourselves to such affordances and resistances' (Archer 2007:9). The innovator should change approaches as the conditions for innovation evolve.

Another advantage of framing technology as a way to materialize meaning is that we become more sensitive to the competition amongst meanings. Existing meanings struggle against new meanings and in the end one meaning usually comes to marginalize others. How this actually happens in practice is beyond the scope of this thesis but also something to investigate in future research. For instance, the pan-Canadian EHR carries meaning that is anchored in collaborative health practice. This new meaning struggles to get established against existing meaning, which is imbued with fragmentation. Overcoming old meaning is difficult, as legacy meanings have established themselves over many years and usually become well accepted and upheld. Many stakeholders have vested interests in keeping particular legacy meanings in place. The innovator can either leave things to develop on their own or intervene in the way that the system is becoming

by trying to find ways to materialize more collaborative meanings. For instance, the remuneration schemes for doctors can be modified to encourage the use of electronic health records and other related more collaborative information-sharing practices. Importantly, the innovator needs to fully appreciate that resistances will also have to be taken as legitimate and duly addressed. If things are done right, this non-human actor (the remuneration scheme) could be recruited into the pan-Canadian offensive and perhaps even become one of its greatest allies.

9.3 Methodological Insights

If we recast the development of systems, not as the creation of discrete intrinsically meaningful objects, but the 'cultural production of new forms of practice' (Suchman et al. 1999:404), then we need to find methods that can uncover and describe such practices (Law 2004). The vast majority of innovation research has been conducted using survey methods, with the adopter or adopting organization serving as the focal concern with relatively less attention paid to the rich web of cultural, political and technological influences that serve as context (Marcon and Compeau 2003). Due to methodological bias, much of the work has been fixated on identifying potential antecedents that will increase innovation adoption, assuming that only the most appropriate innovations will be adopted by rational users (Jeyaraj et al. 2006). However, studies of innovation diffusion should 'rely on "moving pictures" of behavior rather than "snapshots" because of the need to trace the sequential flow of an innovation as it spreads through a social system' (Rogers 2003: 127).

Unfortunately, most social science methods are ill adapted for the study of complex, messy objects (Law and Singleton 2005). Studies of technology should be assessed in relation to the sites of their production and use (Suchman et al. 1999) as we always operate in local situations in the context of interactions (Knorr-Cetina 1981). When an innovation is introduced, the network of alliances is most important and needs to be given due consideration since the content of innovation is variable and open (Westphal et al. 1997). Inevitably, innovating with technology involves dismantling existing associations and creating, and then stabilizing, new ones (Latour 1996a).

I will now present what I believe are three methodological contributions of my thesis work. The first two present a possible means for researchers to approach the study of innovation, keeping practices at the forefront. The last presents a way to communicate and record the results of this new approach to studying innovation and, as such, is a retrospective look at what I have tried to accomplish in the more dialogic way that I have attempted to craft this thesis.

Visions of the Present not the Future

One of the main goals of this research has been to provide a rich and historically-grounded contextual description of how the EHR is being deployed. Instead of trying to identify and present the multiple visions of the EHR (as if they had some essential quality about them) and how they interact, I have chosen to take the approach that discourse is not just what is said, it is also importantly that which constrains and enables what can be said (Barad 2003). With this more performative view, my interest has been in understanding how the pan-Canadian vision of healthcare is being materialized i.e. by what process is this happening? My concern has been less with the vision itself, as I assign no essential existence to it, and more so with trying to trace the networks that it inhabits. In my view, I understand that visions are not simply a depiction of what the future could look like but, as a methodological tool, gives the astute researcher a way to gain a more nuanced understanding of the present i.e. what conditions exist in the present to allow for such visions to be sayable and believable.

My hope is that this project, and future work that is inspired by it, will help the information systems field rethink some of our extant approaches to studying innovation. Rather than focusing on the innovation itself as a static entity that gets adopted or not, as has been the general approach of the dominant paradigm in adoption research, my research takes into account that IT is usually intertwined with the social fabric of the organization in a highly emergent and incremental way (Avgerou 2001) and, hence, adoption is not simply a binary state but more of a process (Orlikowski 2000a). In many cases, the process of innovation compels user identities to change so that new alliances can be formed (Munro 1995). These alliances become a part of new forms of cooperation

that are nonetheless challenged by older ones that resist (Barnett and Carroll 1995; Van de Ven and Poole 1995). Therefore, the innovation is never static and if it ever is, there is usually a socio-technical actor hiding that needs to be uncovered.

In a broadly interpretive perspective, reality is socially constructed through language, consciousness and shared meanings (Prasad and Prasad 2002). However, this research takes the approach that reality emerges through the interplay of human and non-human actors, and not inside the mind of any one individual (Cordella and Shaikh 2006). Extending such thinking, I see the discursive *and material* representations of the innovation (the vision), as being very consequential in the way that innovation unfolds. Indeed, if the vision lends meaning to the technology, then it may in fact constitute it (Bijker 1995). In order to tease out the multiple representations of the pan-Canadian vision, I have tried to account for a myriad of inter-, intra- and extra-organizational factors. Notably, our existing adoption/diffusion models have been unable to adequately manage these added levels of complexity (Lucas et al. 2007) and our existing research methods have been unable to properly investigate them (Law 2004). My goal has been to direct research attention away from either the social or the technical and more towards the ways that they become associated and then re-presented. One way to accomplish this is by mapping controversy.

Mapping Controversy

Controversies are not summed up in the simple addition and aggregation of individual points of view; their content is not mechanically determined by the content in which they unfold; they are not confined to friendly discussions or by debates intended to conclude with an agreement. By trial and error and progressive reconfigurations of problems and identities, socio-technical controversies tend to bring about a common world that is not just habitable but also livable and living, not closed on itself but open to new explorations and learning processes. What is at stake for the actors is not just expressing oneself or exchanging ideas, or even making compromises; it is not only reacting, but constructing. (Callon et al. 2001: 35, emphasis added)

When controversies surround a socio-technical innovation like the EHR, it is an indication that the knowledge associated with that innovation is unstable and, therefore, not yet fully formed. Inevitably, such incoherence is a reoccurring feature in the practice of everyday life (De Certeau 1988). Concerned stakeholders, holding differing understandings, become entangled in 'legal, moral, economic and social questions',¹⁶⁸ for which there are no clear-cut answers. A debate ensues, and through this debate, stakeholder positions become uncovered. This presents an opportunity for a researcher to study the way in which knowledge becomes created before it ends up eventually achieving a stable form. In my thesis, I have tried to follow the chain of arguments in order to determine how actors define, associate and negotiate the controversies that make up their world.

Through controversy, various actors express their points of view but also, importantly, figure out how to better align themselves. It is through this alignment that new networks come to form and these networks, in turn, help the innovation to emerge. The EHR, understood as an actor-network, will begin to emerge as all the relevant stakeholders align themselves. At that point, controversies will be minimized as concerned stakeholders come to some sort of makeshift agreement and this allows for a shared, but also makeshift, vision to develop. As I have suggested, helping stakeholders arrive to this point by fostering appropriate conditions should preoccupy the mindful innovator. Overall, as research method, the study of socio-technical controversy reveals various stakeholder positions, how problems and identities are being reconfigured, and importantly, how the world is being constructed and reconstructed. In other words, controversies are innately performative.

The Dialogic Dissertation

When one human being tells another human what is 'real', what they are actually doing is making a demand for obedience...they are asserting that they have a privileged view of reality. (Humberto Maturana as quoted in Bohm 2004: xi)

¹⁶⁸ <http://www.demoscience.org/MappingControversies2009.pdf>

In my thesis, I have tried as much as possible to avoid positing what is ‘real’. Rather, my intention has been to describe the world building activities of those I study, from their point of view not mine, and then give the reader adequate space to draw their own conclusions about what I say. As opposed to obedience, I hope that my reader gained adequate space to fully engage the material I presented. This entails bringing to the content the wisdom of past experiences and being open to what may end up emerging. In this way, my hope is that my readers have become fully-fledged co-creators in this somewhat polyphonic dissertation you have before you.

In the polyphonic novel, the reader, too, participates in the dialogue.

(Morson and Emerson 1990: 247)

I would argue that every dissertation, no matter how it is written, enters into some degree of dialogue with its reader. Hence, the question is whether this dissertation could be written to be *more* dialogic than less. A less dialogic or more monologic text depends greatly on the centrality of an authoritative voice (Bakhtin 1984). Accordingly, a researcher would write the thesis in such a way that would ‘channel the reader’s attention in a single central direction, like a valley cutting through mountains’ (Latour 1988: 19-20) in order to displace the reader’s own interests and beliefs. By using various ‘strong’ forms of scientific rhetoric, like inferential statistics or quoting Rogers on the topic of innovation¹⁶⁹, the reader is somewhat forcefully aligned to accept the arguments of the researcher. After all, it was the researcher that was in the field (as it appears) and not the reader. Consequently, if the researcher has done a decent job, the reader’s own interests become marginalized through this process and the conclusions, as stated, remain unquestioned. In my view, this seems to be a great loss as the depth of experience that the reader brings to the dissertation is mostly obviated and, therefore, prevented from entering into any type of meaningful dialogue. I want my insights to be questioned and then see what emerges.

¹⁶⁹ I admittedly did this so that if you disagreed with me you would also be disagreeing with Rogers *and you would not want to do that, would you?* Even though I was critiquing the model behind the Diffusion of Innovations, Rogers was also my ally at times.

A more dialogic dissertation would therefore try to incorporate a ‘plurality of unmerged consciousnesses, a mixture of ‘valid voices’ which are not completely subordinated to authorial intentions or the heavy hand of the omniscient authorial voice/narrational voice’ (Gardiner 1992: 24) or, more simply put, ‘a genuine polyphony of fully valid voices’ (Bakhtin 1984: 6). Using various discursive methods¹⁷⁰, the researcher may try to decenter his/her voice, thereby allowing for the reader’s own voice to more easily enter into the dialogue. For instance, in this thesis, I try to relate several narratives of innovation in order to allow the reader to engage in their own interpretations (Boje 1991; Boje 1995). I also tried to start the thesis in a very tentative way, gradually cultivating the ideas I presented. I then moved to more concrete statements later on, but still making sure that the concrete was never quite dry i.e. *I wanted the reader’s footprint in my newly poured sidewalk*. In this way, readers may come to their own meanings and conclusions of what they experience in the text. For example, extant research suggests that dialogic approaches in the classroom, in which ‘pupil voice’ is highly valued, have been shown to promote reflective learning and, consequently, carried much greater transformative potential than more usual monologic approaches (Lyle 2008). Conceivably, the reader’s ‘arrived at’ insights may not be any better or any worse than mine, but they would most certainly be either similar or different. If they are similar, this makes my conclusions even more believable. If they are different, this makes my narrative even more compelling as it is able to trigger a variety of equally valid insights.

Overall, my ambition has been to write my thesis in a more dialogic way. I have tried to present my ideas as possibilities rather than definitive facts. In this way, I hope that my thesis stands not as a matter of fact but more as a matter of concern in which many voices can participate. In other words, I wish that my thesis stands not only as a contribution to

¹⁷⁰ My original desire was to also use various material ways to involve the reader in my thesis. For instance, I pondered the idea of setting up a website that presented all the positions and arguments of the various stakeholders involved in the controversy around EHRs. That way, the reader could have navigated the website according to their own desires and ‘constructed’ the EHR quasi-object in their own way. (Bruno Latour runs a course called ‘Mapping Controversy’ that is based on this idea...the idea is his not mine). In the interest of time and not knowing if the Faculty of Graduate Studies would accept this innovation in the way a thesis is presented, I decided to abandon that idea. Maybe this is something I will see one of my students do one day.

an ongoing dialogue on other ways to reform the healthcare system, but also as an evoker of dialogic space that helps make such a discussion even possible.

9.4 Conclusion

To assemble is one thing; to represent to the eyes and ears of those assembled what is at stake is another. (Latour 2005a: 18)

Through the text of this thesis, I have tried to represent some of what is at stake as we attempt to re-script the healthcare system. Therefore, only my reader (as one who has chosen to join in the assembly) can determine whether I have succeeded or not. I have argued that trying to achieve the pan-Canadian vision of healthcare should be a ‘matter of concern’ and not a ‘matter of fact’ (Latour 2005b). Investigations around matters of fact are mainly focused on uncovering the objective truths about phenomena, assuming that such phenomena are given in the natural order of things. Accordingly, the assembly that occurs around matters of fact involves only those who have official status (Callon et al. 2001). As it pertains to the EHR, that would include government representatives and only particular kinds of healthcare stakeholders (those with powerful representation). Ongoing agreement and conformity amongst stakeholders is the goal.

On the other hand, investigations around matters of concern are focused on opening the black boxes of controversy and dispute. In this way, the scholar must take into account and become accountable to many views, whether mainstream or marginalized, and the hope is to construct a different, and hopefully more faithful, representation of what is at stake. These discordant views brought together are ‘highly uncertain and loudly disputed...these real, objective, atypical and, above all, *interesting* agencies are taken not exactly as object but rather as *gatherings*’ (Latour 2005b: 114 emphasis in original). It is in such gatherings that the relevant people and the relevant issues can be brought forth, not by the researcher who is destined to remain on the outside (although there is always the danger that he/she could ‘go native’), but by those who are assembled.

In this thesis, I hope to have been able to alert my readers to the idea that assembly is worthwhile and innovators should try to find ways to involve all those relevant human

and non-human actors who have something to contribute to the developing storyline of the EHR. That includes all healthcare stakeholders (even the marginalized ones), the public, compensation schemes, non-governmental organizations, technology standards, the private sector and many other human and non-human actors that can help. In this way, my project has been a critical one, for ‘the critic is not the one who debunks, but the one who assembles. The critic is not the one who lifts the rugs from under the feet of the naive believers, but the one who offers the participants arenas in which to gather’ (Latour 2004b:246). In my efforts to have my thesis serve as such an arena, I have tried to create a more dialogically oriented dissertation. In the process, I hope to have provided a somewhat rigorous account that has aspired to address, not answer, my research questions.

Briefly Revisiting the Research Questions

Different genres of interpretive research have demonstrated that they are as rigorous as positivist science, even though their rigor necessarily needs to be judged by criteria that are markedly different from those used in conventional empirical research (Prasad and Prasad 2002). According to Golden-Biddle and Locke (1993), a written research account based on ethnographic research appeals to readers when they find it convincing. Three dimensions central to the process of convincing are authenticity, plausibility and criticality. Authenticity results when the reader is convinced that the researcher was indeed present in the field and grasped how informants understood their world. Plausibility results when the narrative presented in the text is coherent and the reader consequently feels that its explanations are believable. Finally, criticality results when the text encourages the reader to re-examine taken-for-granted assumptions that underlie their work. I trust that my work has done all three.

I hope that my insights have appealed to my reader. I provided excerpts from many of my interviews and many of the documents that I analyzed to provide evidence to my reader that I was, indeed, mindfully in the field. I also tried to piece together my arguments based on what I was being told by my informants and used the texts I studied to provide further validation. I tried to influence the reader to re-examine taken-for-granted

assumptions about the innovation process. Ultimately, I tried to leave most of the judgment of whether my narratives were plausible to my reader¹⁷¹.

To close, I will now briefly review my four research questions. I will start with research question 4, the one that emerged afterwards during my investigation.

RQ4: How has the EHR come to be so meaningful in the healthcare reform agenda?

If we accept the possibility that discourse is not just what is said but it is also what constrains and enables what can be said, then the way we talk about innovation inevitably comes to frame the way we are able to think about innovation. I have tried to show in this thesis, through the presentation of a series of successive ‘facts’, that our thinking has been channeled to arrive at an inescapable conclusion about the role and meaning of the pan-Canadian EHR in healthcare reform: healthcare is fragmented and therefore requires more collaboration to improve it...this fragmentation is mainly informational in nature...the EHR is able to integrate information...therefore, *in order to accelerate the reform agenda we need to accelerate the implementation of the EHR*. As the discourse surrounding the EHR becomes less controversial and more accepted, questions become answered and then closed. They become factual. Thereafter, reopening old questions becomes increasingly difficult. I have suggested that this is the real danger, as technology becomes understood as a magic bullet solution, becomes excessively meaningful in healthcare reform and, consequently, we become blinded to many other things that are crucial to consider in the innovation process.

RQ1: How has the process of deploying the EHR unfolded thus far?

In this thesis, I have described the process of deployment of the EHR in terms of the entanglement of matter and meaning. The pan-Canadian vision of healthcare is struggling to get established in a healthcare system that has been mainly predicated on fragmented

¹⁷¹ One of the most satisfying comments I received about my thesis was from one of my colleagues who read my manuscript and said ‘this made me think differently about my own work’. This is my primary goal, as I strive to entice my reader to enter the dialogic space that I have tried to create...on his or her own volition...allowing novel insights to unexpectedly emerge.

practices and thinking. In order to effect change in the system, the vision is being inscribed in material things (otherwise, it would simply remain an ideal or utopian vision in the minds of a few people). These human and non-human material entities include the pan-Canadian EHR, as well as the Vision 2015 document and Canada Health Infoway. These things in turn align other entities and so on. This is the way that the system seems to be unfolding and this is the way that the innovation appears to be emerging.

RQ2: How do multiple stakeholder visions of the EHR inform our understanding of this process?

I have used stakeholder visions as a way to understand what kinds of conditions exist in the present to allow for such visions to be sayable. They are a view of the future but importantly have no primacy versus other views that other stakeholders have. The vision that eventually materializes depends on the powers that stakeholders derive from aligning other stakeholders, human and non-human, to their particular vision. The vision that aligns the most stakeholders seems to be the one that will eventually play out¹⁷². For instance, the pan-Canadian vision of healthcare may never materialize if one of the key groups of stakeholders, the medical practitioners, refuses to integrate EMRs into their practices and hence resists being aligned in this way.

RQ3: How does this understanding augment what we already know from extant innovation diffusion theory?

The bulk of this thesis has been dedicated to answering this question. Extant innovation diffusion theory would suggest that in order to better diffuse the EHR, the innovator should focus on communicating the benefits of the EHR to healthcare practitioners. The theory is that they will adopt the innovation once they understand the multiple benefits and how it will make their job more efficient and effective. This has clearly not worked,

¹⁷² For instance, Gandhi was eventually able to gain power and consequently independence from the British when he managed to align more stakeholders to his vision of India than was previously aligned to the British view of India. The British had found epistemological methods to get the Indians to think of themselves in a particular way i.e. they came to *need* the British. In other words, the British were able to colonize knowledge in a very powerful way. Cohn, B. 1996. *Colonialism and Its Forms of Knowledge*. Princeton, NJ: Princeton University Press. It took Gandhi a long time to break this most dangerous form of colonization...a colonization of the mind.

as despite Infoway's many attempts at convincing practitioners about the benefits there remains an extremely low adoption rate.

However, if we understand that the world is continually becoming, then we have a responsibility to intervene in that becoming, when we can, in order to make a better future for all. In my view, and the view that I have tried to promote in this thesis, the innovator has the ethical responsibility to create more opportunities for all stakeholders to get involved (the marginalized and the not so marginalized). Hence, the occasioning of dialogic spaces becomes critical. In this way, their voices will perhaps not only be better heard, but they will be better able to find their own meaning in the innovation and hence enhance, not hinder, the innovation process. Through controversy and dialogue, the innovation is given the opportunity to emerge on its own terms or not. The pan-Canadian EHR system, as Infoway envisioned it, might not even be the 'right' system¹⁷³. Infoway should be willing to accept such a possibility, as it is the pan-Canadian vision that they are interested in materializing not any particular technological arrangement. This is the sign of a mindful innovator ... one who is never in fear of being re-aligned themselves, but 'willing to serve and observe, able to listen, not seeking control ... daring to give themselves over to circumstance' (de Laet and Mol 2000: 252).

Limitations and Future Research

'When theories are particularly interesting or important, there should be greater leeway in terms of empirical support. A small set of interviews, a demonstration experiment, a pilot survey, a bit of archival data may be all that is needed to show why a particular process *might* be true. Subsequent research will of course be necessary to sort out whether the theoretical statements hold up under scrutiny, or whether they will join the long list of theories that only deserve to be true'.

(Sutton and Staw 1995: 383, emphasis in original)

I am well aware that my thesis has limitations. The bulk of my interviews were conducted with the Infoway executive team and only a few with others in the industry. I may,

¹⁷³ At a recent healthcare conference I attended, Jim Balsille from RIM made the argument that we should drop the pan-Canadian EHR idea (as it involves too much investment) and instead consider a system that runs using handheld devices. What if he is right?

therefore, have opened myself to the pitfalls of bias. However, in my defense, I was more concerned with trying to understand Infoway's world building activities from their perspective i.e. I wanted to understand how those at Infoway perceived themselves and their role in the renewal of healthcare. Consequently, I *wanted* a somewhat biased view. More specifically, I tried to track Infoway's relation to the innovation they were trying to promote. I used a wide variety of information sources, from government reports to attending conferences, to see what kind of narratives were being told and in what way. I had to track many of these narratives to a time before Infoway was founded as I found that they were influential on the kind of approaches that Infoway took. After all, organizations, too, are often born into circumstances out of their control. I also wanted to know how Infoway was going about learning and reflecting on their efforts and how they were accordingly adjusting their approaches. My sense is that only future research will determine whether what I have said in this thesis will be taken up or seen as merely a nice story. In the end, all I can expect from this dialogic thesis is that I can occasion more dialogue by sufficiently intriguing and interesting my readers. If I have done at least that, I would consider my endeavor to be a successful one.

My future program of research will be broadly centered along two avenues. First, I want to understand a little more about *the work of making dialogic spaces*. How are they made? By what means? What makes some spaces better than others? I have started to address some of these questions in this thesis but there is still a lot more to know. Second, I want to learn more about *how dialogic spaces can be made to work*. What is the full range of their effects? How do they lead to creativity? What conditions should be in place to help make them more effective? How do human and non-human stakeholders interact in these spaces? From these streams of research, no doubt, others will emerge.

Abnormal Discourse

According to Thomas Kuhn, 'abnormal' discourse emerges when a 'new vocabulary about a phenomenon evolves that in some way contradicts the normal disciplinary discourse and thus presents a new way of perceiving and understanding the subject' (Dobrin 1997: 69). In this thesis, I have attempted to introduce some abnormal discourse

about technology-based innovation. In particular, I have suggested that meaning of innovation is something we should pay more attention to as it comes to be entangled with material in practice. I have also suggested that dialogic spaces are the engine of the innovation process. My sense is that an innovator will benefit from understanding this and bringing that understanding into practice. As Winner (1986: 25) says, ‘if our moral and political language for evaluating technology includes only categories having to do with tools and uses, if it does not include attention to the meaning of the designs and arrangements of our artifacts, then we will be blinded to much that is intellectually and practically crucial’.

I am advocating a univocal assembly of all concerned stakeholders, as an *ethical imperative*. The word ‘univocal’ has come to be defined as ‘having only one meaning’ or ‘unambiguous’, as it was first used that way when it appeared in English print around 1599¹⁷⁴. However, the word’s etymology can be traced back to the Latin ‘uni’ which means ‘one’ and the noun ‘vox’ which means ‘voice’. Therefore, the more accurate translation, that is now no longer in use, is ‘speaking with one voice’. This older meaning tends to describe more accurately the kind of assembly that I am advocating. I believe that concerned stakeholders should assemble, not so that they can be persuaded to adopt one vision of the innovation, but more so that they can speak with one voice while holding many visions. Thus, stakeholders can take into account and be accountable to many differing viewpoints. By agreeing to disagree, they can come to some makeshift agreement and then move on with collaborative change. The agreement can then be continuously re-examined as the innovation evolves and new insights are uncovered. The aura of such an assembly is rooted in tentativeness.

As a matter of concern, the pan-Canadian EHR has the potential to bring healthcare stakeholders closer than ever, precisely because it presents a prime opportunity of drawing them into dialogic spaces. Through controversy and dialogic interaction, new meaning is created in places where it never existed before. Today, the healthcare system finally has the opportunity to achieve the pan-Canadian vision of healthcare that the

¹⁷⁴ www.dictionary.com

Canada Health Act has been struggling to deliver for many years. If assemblies are properly occasioned and maintained, the healthcare system could also become more ethical than it has ever been before, as it is through dialogic spaces that the system may be able to continuously speak to local emergent interests and better take into account and be accountable to many marginalized voices.

We tend to put the collaboration into the future by saying “we *will* achieve collaboration”. Accordingly, we are happy to believe that a culture of collaboration in the healthcare sector becomes an effect that will be achieved through a trigger like the EHR. But what if we were to think of collaboration as being one of the many conditions that is needed *now* in order to achieve a pan-Canadian vision of healthcare? Then we will not only ‘present’ collaboration, by attending to it in the present, but we will also be attuned to looking for other ways in other places to achieve a pan-Canadian vision. Perhaps this kind of healthcare system, in which all voices are properly accounted for, is one that we may all achieve together through collaboration...but only if we acquire adequate spaces in which to dialogue and if we are all ready to intervene *now* in its intra-active becoming.

Finally, I suggest that by trying to understand the innovation process in terms of controversies and dialogic spaces, we may reveal new insights that were not easily apparent before. Controversies seem to not only be inevitable but also very much essential to the innovation process. *We need controversy in order to learn*. If life is suffering, as Buddha says, then it is through suffering that we improve ourselves. Crisis helps to reveal circumstances and therefore seems to help us plan better for the future¹⁷⁵. Searching for dialogic spaces in the innovation process may provide insight into how things came to unfold in the way that they did.

We have more often tended to focus on studying communication *about* an innovation, as if the innovation and the communication about it were separate entities. Perhaps, we have failed to consider the possibility that such communication may in fact constitute the

¹⁷⁵ It seems strange to say, but many good things seemed to have emerged from the Tsunami disaster, the New Orleans levy breaks, the Pakistani floods and the Haiti crisis. At the very least we gained the opportunity to learn so that next time the impact would not be as bad. Many things were uncovered.

innovation. I would suggest that perhaps there is no separation between the two, as it is the innovation that becomes repeatedly performed through dialogic interaction. My sense is that this insight may not just apply to technology-based innovation, but may in fact be a universal characteristic of innovation that has generally been overlooked.

A Short Reflection on the Thesis of My Meaning

On the morning of June 10, 2010, I came across a story about how dolphins are helping to treat children with autism. Apparently, the children were responding to the high-pitched squeaking sound that dolphins use to communicate among themselves. It suddenly occurred to me that here was a powerful example of collaboration between scientists and dolphins, together trying to render a non-conventional treatment to children with autism. I later learned that the approach had been officially labeled Dolphin Assisted Therapy. I had no idea what the scientific explanation behind the treatment was or how change was actually effected, but I wondered, did it really matter? What mattered was that parents were reporting positive effects on their children...there was an undeniable effect of some sort (placebo or not). One thing I could be sure of...the dolphins did matter, somehow.

My hope is that we will be able to move into a new era of creativity in which we recognize that many of the intractable problems of our time can better be solved through collaboration amongst various types of human and non-human stakeholders. Someone else, or something else, may have a part of the solution that we ourselves do not have... if only we could recognize this and bring them into the dialogic fold. In my view, the solutions are already out there waiting patiently for their chance to be occasioned but only when their constituent elements become properly aligned. In many ways, through the mechanism of this thesis, I am really trying to put new meaning out there into the world in order to see what comes to materialize from it.

Perhaps Abraham Lincoln said it best in his Annual address to Congress on December 1, 1862, one month before the signing of the historic Emancipation Proclamation:

The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise -- with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country.

Can we rise with the occasion, not against it?

Appendix 1: Infoway's 'Knowing is Better than not Knowing' campaign

Example of Print Ad

Example of Internet Ad

Source: <http://www.infoway-inforoute.ca/about-ehr/public-education-campaign-about-ehr>

Appendix 2: Working Definitions of some ANT Concepts

Adapted from (Sarker et al., 2006: 6)

Actor

Any element which bends space around itself, makes other elements dependent upon itself and translate their will into the language of its own. Common examples of actors include humans, collectivities of humans, texts, graphical representations, and technical artifacts. Actors, all of which have interests, try to convince other actors so as to create an alignment of the other actors' interests with their own interests. When this persuasive process becomes effective, it results in the creation of an actor-network (Callon and Laiuur, 1981, p.286) .Actor Network

Heterogeneous network of aligned interests, including people, organizations and standards (Walsham and Sahay, 1999, p.42).

Punctualization

Treating a heterogeneous network as an individual actor to reduce network complexity (Law, 2003).

Translation

The process of the alignment of the interests of a diverse set of actors with the interests of the focal actor. The creation of an actor-network. This process consists of three major stages: problematization, intersement, and enrolment. Numerous actors within an organization may be involved in a different process of translation, each with its own unique characteristics and outcomes. For purposes of clarity, it is useful to focus on a single actor, from whose vantage point we wish to see the process of translation (Callon, 1986; Walsham, 1997).

Problematization

The first moment of translation during which a focal actor defines identities and interests of other actors that are consistent with its own interests, and establishes itself as an obligatory passage point (OPP), thus 'rendering itself indispensable' (Callon, 1986).

OPP

The obligatory passage point, broadly referring to a situation that has to occur in order for all the actors to satisfy the interests that have been attributed to them by the focal actor. The focal actor defines the OPP through which the other actors must pass through and by which the focal actor becomes indispensable (Callon, 1986).

Interessement

The second moment of translation which involves a process of convincing other actors to accept definition of the focal actor (Callon, 1986).

Enrollment

The third moment of translation, wherein other actors in the network accept (or get aligned to) interests defined for them by the focal actor (Callon, 1986)

Inscription

A process of creation of artifacts that would ensure the protection of certain interests (Latour, 1992).

Speaker/delegate/ Representative

An actor that speaks on behalf of (or stands in for) other actors (Callon, 1986; Walsham and Sahay, 1999).

Betrayal

A situation where actors do not abide by the agreements arising from the enrollment of their representatives (Callon, 1986).

Irreversibility

Degree to which it is subsequently impossible to go back to a point where alternative possibilities exist (Walsham and Sahay, 1999, p.42).

Appendix 3: Corollary questions pertaining to Sociologies

Source: Latour (1987)

1. Causality

- 1.1. How cause and effect is attributed (in the issue as presented and in the person's own point of view)?
- 1.2. How is cause portrayed? Singular? Whom or what is deemed the responsible agent? How is effect portrayed? Positive and negative? Long term/short term? Inevitable, controllable?
- 1.3. Are the links between cause and effects: assumed? substantiated? queried? What purposes do these attributions serve? Do they establish the problem? Support an action?
- 1.4. Do these attributions alter? If so, when?

2. Mapping

- 2.1. What points are linked to which other? Positionality: Assumes a position? Defers a taking a position?
- 2.2. Support for position: Data, information? Evidence (what kind of evidence and how much?) Reasons (economic, political, ethical, historical etc.)?
- 2.3. Assumptions: Identified? Queried? Substantiated?
- 2.4. Terminology: Understanding of?. Contextually appropriate use of?.
- 2.5. Other points of view considered: Number? Whose are not included? Strengths and weaknesses considered?
- 2.6. Consequences: Number? Kind: positive and negative? For whom?
- 2.7. Implications: Consistency and inconsistency (consequences accepted)?
- 2.8. Alternatives: Feasibility? Obstacles overcome and generated? Who do they serve and not serve?

3. Credibility

- 3.1. What size and strength these links have? Size: Number of associations? Range of associations (appeal to values, evidence, rhetoric etc.)?
- 3.2. Strength: To prove and/or explore? Negotiability (openness and closure)? Assertiveness (certainty and uncertainty)?

4. Legitimacy

- 4.1. Who and what are and are not selected? Who and what are legitimated? (emphasise evidence) What is assumed?
- 4.2. Who and what are not legitimated: emphasise evidence? What is queried, discredited, marginalised, ignored, excluded? Is bias delineated? If so how? (emphasise evidence) Negatively? Positively?

5. Movement and Change

- 5.1. How all these elements are/are not modified during the controversy?
- 5.2. What is and is not modified and when: Within a given issue (noting differing contexts therein)? Across contexts?

6. Reflexivity

- 6.1. What associations are upheld in the research context? Options: Singular, multiple, binary?
- 6.2. Representation: Who is not represented? To what degree is representation "equal"?
- 6.3. Reproducers: Who selected the issue (positive & negative biases)? Who produced the issue (positive & negative biases)? Who produced the questions (positive & negative biases)? What did the questions enable and constrain?

Appendix 4: Infoway's Problematization

Stakeholder	Obstacle/Problem	Interests/Goals	Vision 2015
Deputy Ministers and health region executives	Rising Costs of healthcare and financial/human resources constraints	Long term sustainability and accountability	<p>'Ensuring the system's long term sustainability through enhanced performance management of cost, quality and access, as well as management of critical resources' (3)</p> <p>'Improved overall system sustainability by driving performance management and lowering cost of care' (16)</p> <p>'Ensure sustainability of the healthcare system through superior performance management. This would include the key infrastructure to track process and outcome metrics (cost, quality and access) as well as resource management and purchasing management tools (17)</p>
	Limited resources	Reduced wait times and improved patient access	'Providing critical elements of the information required to manage wait times and improve patient access by triaging patients and scheduling according to urgency across the entire domain of qualified providers' (3)
	Aging population	Medically necessary healthcare for all Canadians (as laid out in the Canada Health Act)	'Driving significant benefits to the system by improving access and service through more coordinated communication and workflows across care settings, enhancing quality through reducing errors and adverse drug events, and making it easier for providers to practice proactive medicine' (16)
	Shortage of general practitioners GPs no longer single point of integration	Quality Healthcare	'The shortage of general practitioners creates a more sporadic pattern of care across multiple channels (e.g. walk in clinics, acute care emergency settings, specialists) in which the system can no longer rely on the GP as a single point of integration to generate and manage a holistic view of the patient over time' (2)
	Care setting shifting from acute to home care and other alternatives	Easier coordination of information across various care settings	'The electronic health record, containing critical health information and linked across sources of care delivery within a jurisdiction, is paramount to delivering healthcare today and in the future' (3)

	Coordinated, easily shared information across the healthcare system	Reduced exposure to risks from pandemics	‘Ensure health system preparedness to manage public risk. This would involve data warehouses, immunization, vaccine, outbreak and disease surveillance, and alerts as well as workload management tools that help carry out faster, more coordinated responses to potential epidemics’ (17)
	Lack of portability of information	Remote care	‘Enabling seamless communication across the continuum of care and into community-based settings. This would include integrating primary care physicians, specialists and community care facilities’ (16)
	Lack of statistical information about effectiveness of therapies in practice	Evidence-based medicine to control escalating drug costs	‘This will require further coordination across centers that traditionally lack information technology capabilities and the ability to request support as well as review the quality of care delivered’ (3)
	Limited funds	Improved access	‘Greater and more consistent access to health services by streamlining and freeing up capacity to reinvest in patient care’ (16)
	Demand for self-care from public	Patient self-care and empowerment	‘Empowering patients to manage their own care’ (16)
Hospital CEOs and CIOs	Limited resources	Reduced wait times and improved patient access	‘Providing critical elements of the information required to manage wait times and improve patient access by triaging patients and scheduling according to urgency across the entire domain of qualified providers’ (3)
	Poor Accountability	Better Performance management	‘The foundational elements will also enable managers to control system resources and performance by lowering unit costs (e.g. through reducing films and repeated lab tests), freeing capacity and making information available that can facilitate greater human resources flexibility and improved overall management’ (16) ‘Create the foundation that enhances the system’s ability to pursue the business needs’ (17)
Clinicians	Timely access to information and improved decision-making support	Delivering superior quality care	‘Lessen the incidence of inappropriate decisions stemming from a lack of “available” information’ (2)

	Dealing effectively with chronic and long-term patients	Better ongoing disease management for chronic and longer-term care	'Enhancing ongoing disease management for chronic and longer-term care by facilitating systematic follow-up, a higher level of patient involvement and education and more guideline-compliant treatment' (3)
	Communication amongst caregivers	Easily shared information	"There are so many people involved in care that communication is a large challenge. We need information that is more easily shared among providers. It saves time and helps us deliver quality care to our patients" - Clinician (2)
	Lack of time	Save time	
	Increased incidence of chronic disease (e.g. diabetes) and increased need for ongoing cancer care due to Canada's aging population	Quality Patient Management	'By their nature, these types of conditions require managing a patient through many different care settings for extended periods of time, rather than just 'traditional' acute care interventions' (2)
	Keeping track of Drug interactions	Drug interaction information readily available	'Extending the functionality to include order entry and other decision support elements in acute care settings to support the delivery of high-quality care. This would help physicians stay on top of an ever-growing flow of medical knowledge by providing patient-specific information, including diagnostic and prognostic details, and particularly therapeutic suggestions and alerts with high sensitivity and specificity (e.g. drug interactions or special efficacy ethnic groups). In addition, it would include pharmacy systems to improve the execution of drug prescribing and reduce medical errors and adverse drug events' (16)
	Lack of integrated information	Evidence-based medicine	'Speeding the development of evidence-based medicine through analyzing drug treatments and therapies' (20)
Patients/Public	Lack of access to information	Transparency	'Patients and the public are increasingly demanding more information and support to help them navigate the system and, in many cases, to more proactively manage their own care. They expect more personalized care, better access to specialists and GPs, and more transparency on the status of their health
		Better access to care and timely delivery of care	

			and treatment plans- all of which would be facilitated by an information infostructure' (2) 'Empowering patients to manage their own care' (16)
	Lack of information	Self-care	'Enable patient self-care and personal health promotion. This would address the increasing need for patients to proactively manage their own health. Patients would move from passive care recipients to drivers of care provision. They would have access to advanced self-monitoring and self-treatments, including advanced telehealth applications, and would be able to track their own progress and educate themselves' (17)
	Having to repeat medical history at every visit and doing duplicate tests	Health information and test results are available to any caregiver the patient decides to see	'Enabling seamless communication across the continuum of care and into community-based settings. This would include integrating primary care physicians, specialists and community care facilities' (16)
	Errors from misinformation or lack of information	Better quality information	'Continued enhancement of patient safety by eliminating errors caused by misinformation or delayed information' (16)

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