Connecting Classrooms for 21st Century Learning: A Study of Alignment, Innovation and Change in a BC School district

by

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Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

In the School of Communication
Faculty of Communication, Art, and Technology

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Abstract

Aligning information technology (IT) with an organization’s strategy has presented an enduring problem for organizations wishing to exploit the strategic potential of technology. For some time the concept of IT alignment has been closely associated with increases in organizational performance, agility and the capacity of organizations to transform and change themselves. This has motivated researchers and practitioners alike to search for increasingly effective means through which they can understand, shape and integrate information technologies to support strategic goals.

The idea of alignment has been especially problematic in educational organizations and school districts that have long been struggling to effectively integrate technology into classrooms. In education, information and communication technologies have an historical legacy of being viewed as not much more than a way to reduce labour costs. This is beginning to change as administrators increasingly reflect on the failures of the past and the demands they must meet in the future.

This dissertation develops an analysis of IT alignment in an educational organization by presenting an examination of the design, development and deployment of a social computing innovation called a Collaborative Learning Platform (CLP) in a greater Vancouver school district.

The dissertation aims to make several contributions to theoretical and empirical work on the subject of alignment, and attempts to challenge existing conceptions and approaches to the problem. It suggests that in spite of the volumes of research on IT alignment, much of this work has failed to pay attention to the complexity of the phenomenon and has instead continued to provide prescriptive advice of limited utility. Much of this research has also lacked theoretical substance, which has made it difficult to discern any cohesive explanation about what alignment actually means or how it works.

The dissertation addresses these problems in the context of an educational reform initiative in British Columbia. By using ideas from actor-network theory, structuration
theory and critical sociology, this research provides a theoretically informed and empirically grounded description of IT alignment that reveals a complex and contingent process. The contributions developed in this work suggest that IT alignment is not a state, but an ongoing and iterative process involving the strategic design and deployment of what actor-network theory calls technological mediators. An mediator is a information technology that simply transports meaning between actors and coordinates their interactions. mediators have communicative significance because they work to represent and translate organizational strategies through contexts of everyday practice. In so doing, these mediators enact and simultaneously structure the activities involved in alignment. The process of alignment is essentially recursive and historical, involving the ability of actors to pragmatically incorporate these mediators into their practices.

**Keywords**: alignment; innovation; design thinking; agile development; educational technology; educational change.
Dedication

For Mom, Dad and Sis.

And of course, for my wife, Amy.
Acknowledgements

I want to acknowledge the support of my wife, my pup, and my family. I owe them a debt that I fear I'll never be able to repay.

Many people played a role in helping me write this dissertation. I wanted to thank my participants, the teachers and staff in the West Vancouver School district. I wanted to thank Gary Kern for his support and guidance. I must also thank Stephanie Hayes, Steve Hart and Khalid Ansari for their generosity and support. I will always be grateful to Scott Timcke for his encouragement and suggestions. I also want to thank my dissertation committee, Andrew, Richard and Peter.
# Table of Contents

Approval ............................................................................................................................... ii
Partial Copyright Licence ...................................................................................................... iii
Ethics Statement .................................................................................................................... iv
Abstract .................................................................................................................................. v
Dedication ............................................................................................................................... vii
Acknowledgements ............................................................................................................... viii
Table of Contents ................................................................................................................... ix
List of Tables .......................................................................................................................... xii
List of Figures ........................................................................................................................ xiii
List of Acronyms .................................................................................................................... xiii

## Chapter 1. The Vision for BC Schools ................................................................. 1

Introduction ............................................................................................................................ 3
Meeting with the Superintendent .......................................................................................... 6
The BC Education Plan: A Presentation of The Research Focus ........................................ 7
The Influence of the 21st Century Learning Initiative .......................................................... 10
The Already Changing Landscape of Public Education: Three Sources of
    Uncertainty (Context and Justification of the Dissertation) .............................................. 12
    Increased Pluralism ........................................................................................................... 12
    Increased demand for Productivity .................................................................................. 13
    Technological Empowerment .......................................................................................... 13
The Major Themes of the Work ............................................................................................ 14
    Social Constructivism ....................................................................................................... 14
    History and Institutional Power ....................................................................................... 16
Statement of the Problem ...................................................................................................... 17
Contributions of the Work and a Brief Note on Reflective Practice ..................................... 18
Structure of the Dissertation ................................................................................................. 19
Making Sense of Alignment in Education ............................................................................. 20

## Chapter 2. Literature Review ............................................................................ 22

The Birth of the Concept ....................................................................................................... 23
Definitions and Analogous Terms ......................................................................................... 24
Aligning Models of Alignment within the Positivist Tradition ............................................ 25
    The Strategic Alignment Model (SAM) ............................................................................. 26
    The Social Dimension of Alignment and the Limits of Deduction ................................. 31
A Brief Look Back and Another Look Forward ................................................................... 36
    The Need for Conceptual Precision ................................................................................. 36
    The Need to Reframe the Problem .................................................................................... 38
    The Need for Theoretical Sensitivity .............................................................................. 42
Aligning What Exactly? ....................................................................................................... 44
<table>
<thead>
<tr>
<th>Chapter 3. Theoretical Framework</th>
<th>..............................................................</th>
<th>47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actors, Networks, and Actor-Networks</td>
<td>........................................................................</td>
<td>49</td>
</tr>
<tr>
<td>From Deliberative to Situated Action</td>
<td>.........................................................................</td>
<td>50</td>
</tr>
<tr>
<td>Networks</td>
<td>........................................................................</td>
<td>51</td>
</tr>
<tr>
<td>Inscription and Translation</td>
<td>...............................................................................</td>
<td>53</td>
</tr>
<tr>
<td>Some Criticisms of ANT</td>
<td>..................................................................................</td>
<td>56</td>
</tr>
<tr>
<td>Is ANT amoral?</td>
<td>...............................................................................</td>
<td>56</td>
</tr>
<tr>
<td>Problems of Structure and Scale</td>
<td>...............................................................................</td>
<td>58</td>
</tr>
<tr>
<td>Structuration Theory</td>
<td>..................................................................................</td>
<td>59</td>
</tr>
<tr>
<td>The Idea of Structure</td>
<td>...............................................................................</td>
<td>60</td>
</tr>
<tr>
<td>Modalities</td>
<td>..................................................................................</td>
<td>62</td>
</tr>
<tr>
<td>What do we mean by an Education “System”?</td>
<td>........................................................................</td>
<td>64</td>
</tr>
<tr>
<td>Theoretical Sensitivity and the Duality of Structure</td>
<td>................................................................</td>
<td>65</td>
</tr>
<tr>
<td>Habitus and the Explication of the Duality of Structure</td>
<td>................................................................</td>
<td>67</td>
</tr>
<tr>
<td>Conclusion</td>
<td>..................................................................................</td>
<td>68</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4. Research Methods and Design</th>
<th>..............................................................</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>...............................................................................</td>
<td>70</td>
</tr>
<tr>
<td>Epistemological Orientation: From Positivism to Constructivism</td>
<td>................................................................</td>
<td>71</td>
</tr>
<tr>
<td>Positivism</td>
<td>...............................................................................</td>
<td>71</td>
</tr>
<tr>
<td>Constructivism</td>
<td>...............................................................................</td>
<td>73</td>
</tr>
<tr>
<td>Research Design and Justification</td>
<td>...............................................................................</td>
<td>74</td>
</tr>
<tr>
<td>Selecting the Research Site: Why a School district?</td>
<td>................................................................</td>
<td>77</td>
</tr>
<tr>
<td>My Own Experience: As Researcher and as Professional</td>
<td>................................................................</td>
<td>79</td>
</tr>
<tr>
<td>Data Collection</td>
<td>...............................................................................</td>
<td>80</td>
</tr>
<tr>
<td>Textual Analysis</td>
<td>...............................................................................</td>
<td>80</td>
</tr>
<tr>
<td>Participant Observation</td>
<td>...............................................................................</td>
<td>81</td>
</tr>
<tr>
<td>Semi-Structured Interviews</td>
<td>...........................................................................</td>
<td>82</td>
</tr>
<tr>
<td>Coding and Analysis</td>
<td>...............................................................................</td>
<td>83</td>
</tr>
<tr>
<td>Writing it Up</td>
<td>...............................................................................</td>
<td>85</td>
</tr>
<tr>
<td>Validity and Acceptance Criteria</td>
<td>...............................................................................</td>
<td>86</td>
</tr>
<tr>
<td>Triangulation</td>
<td>...............................................................................</td>
<td>86</td>
</tr>
<tr>
<td>Thick Description</td>
<td>...............................................................................</td>
<td>86</td>
</tr>
<tr>
<td>Prolonged Engagement</td>
<td>...............................................................................</td>
<td>87</td>
</tr>
<tr>
<td>What about Bias?</td>
<td>...............................................................................</td>
<td>88</td>
</tr>
<tr>
<td>Embeddedness and Problems of Reflexivity</td>
<td>.........................................................................</td>
<td>89</td>
</tr>
<tr>
<td>Conclusion</td>
<td>...............................................................................</td>
<td>90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 5. Inscribing the Vision</th>
<th>..............................................................</th>
<th>92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aligning Design Thinking with Agile Development</td>
<td>................................................................</td>
<td>92</td>
</tr>
<tr>
<td>Inscription</td>
<td>...............................................................................</td>
<td>94</td>
</tr>
<tr>
<td>Thinking about Design in an Agile Way</td>
<td>........................................................................</td>
<td>97</td>
</tr>
<tr>
<td>What is Design Thinking?</td>
<td>...............................................................................</td>
<td>98</td>
</tr>
<tr>
<td>What is Agile Development?</td>
<td>...............................................................................</td>
<td>102</td>
</tr>
<tr>
<td>Aligning Design Thinking With Agile Development</td>
<td>................................................................</td>
<td>107</td>
</tr>
<tr>
<td>Phase 1: Discovering and Envisioning</td>
<td>.........................................................................</td>
<td>109</td>
</tr>
<tr>
<td>Phase 2: Ideating and Planning</td>
<td>...............................................................................</td>
<td>111</td>
</tr>
</tbody>
</table>
Appendix

Appendix

References

Digital Natives and their Discontents: Some Concluding Remarks on Teaching

Why is Alignment so Difficult? Some Implications of this Research

Chapter 6. The Pragmatics of Alignment

Introduction ........................................................................................................... 128
The Pragmatics of Alignment .............................................................................. 130
Mediators and Intermediaries ............................................................................. 132
Translating the CLP ............................................................................................. 134
Problematization ................................................................................................. 135
Interessement and Enrolment .............................................................................. 139
Mobilization ......................................................................................................... 143
The Recursive Logic of Alignment ...................................................................... 148
The CLP's Information Architecture .................................................................. 149
Workflows ............................................................................................................ 153
Conclusion: The Pragmatic Dimension of Alignment ........................................ 165

Chapter 7. Conclusion

Introduction ........................................................................................................... 169
A Summary of the Research Problem, Objectives and Purpose .......................... 170
Charting a New Course ........................................................................................ 173
What is "alignment" anyway? ................................................................................ 177
What exactly is being aligned? ............................................................................. 177
How to Bring Theory In? ..................................................................................... 178
Approach .............................................................................................................. 178
Contributions ....................................................................................................... 183
It presents a study of alignment in an unconventional domain ......................... 184
Provides an unconventional approach ................................................................ 184
Offers a study of alignment that is focused on examining the implementation of strategy ................................................................. 184
Depicts alignment as an ongoing pragmatic activity, involving the strategic creation and deployment of technological mediators .............................................. 185
Mediators have agentive and structural properties ............................................ 185
Mediators have functional and social dimensions ............................................. 186
Why is Alignment so Difficult? Some Implications of this Research .................. 189
Digital Natives and their Discontents: Some Concluding Remarks on Teaching and Learning with Technology .......................... 192

References ........................................................................................................ 197
Appendix A. Sample Research Instrument ........................................................ 209
Appendix B. Interview Schedule ........................................................................ 210
List of Tables

Table 1.1. The Structure of the dissertation ................................................................. 19
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>The Strategic Alignment Model (Henderson &amp; Venkatraman, 1993)</td>
<td>28</td>
</tr>
<tr>
<td>2.2</td>
<td>Timeline of Alignment Models</td>
<td>30</td>
</tr>
<tr>
<td>2.3</td>
<td>Research model for social dimension of alignment (Reich &amp; Benbasat, 2000)</td>
<td>32</td>
</tr>
<tr>
<td>3.1</td>
<td>The relationship between structures, modalities and interactions.</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Reproduced from Giddens (1986, p. 29)</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>General trajectory of innovation and the relationship between design thinking and agile development</td>
<td>95</td>
</tr>
<tr>
<td>5.2</td>
<td>Design thinking general process model</td>
<td>100</td>
</tr>
<tr>
<td>5.3</td>
<td>Agile development process model</td>
<td>104</td>
</tr>
<tr>
<td>5.4</td>
<td>A synthesis of the design thinking and ADM process models</td>
<td>108</td>
</tr>
<tr>
<td>5.5</td>
<td>SharePoint Features</td>
<td>113</td>
</tr>
<tr>
<td>5.6</td>
<td>Figure 5.6. “White boarding” a technical schematic of the CLP in the breakout room.</td>
<td>114</td>
</tr>
<tr>
<td>5.7</td>
<td>Figure 5.7. User Story Example 1</td>
<td>115</td>
</tr>
<tr>
<td>5.8</td>
<td>Figure 5.8. User Story Example 2</td>
<td>115</td>
</tr>
<tr>
<td>5.9</td>
<td>User Story Example 3 (acceptance criteria)</td>
<td>116</td>
</tr>
<tr>
<td>5.10</td>
<td>General agile project tempo</td>
<td>120</td>
</tr>
<tr>
<td>6.1</td>
<td>Problematization</td>
<td>137</td>
</tr>
<tr>
<td>6.2</td>
<td>A typical student MySite</td>
<td>141</td>
</tr>
<tr>
<td>6.3</td>
<td>A typical student dashboard (the primary touch-point for the CLP)</td>
<td>142</td>
</tr>
<tr>
<td>6.4</td>
<td>Working in pairs to explore the CLP during a roll-out session</td>
<td>145</td>
</tr>
<tr>
<td>6.5</td>
<td>Translating the CLP</td>
<td>147</td>
</tr>
<tr>
<td>6.6</td>
<td>A picture of a basic classroom information architecture in material form.</td>
<td>150</td>
</tr>
<tr>
<td>6.7</td>
<td>Figure 6.8. The user experience of the CLP’s information architecture in a typical virtual classroom</td>
<td>152</td>
</tr>
</tbody>
</table>
Figure 6.8  A checklist for revising student writing used as a basis for creating a writing workflow. .......................................................... 156

Figure 7.1 The Strategic Alignment Model (SAM) .......................................................... 174
## List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>21C</td>
<td>Twenty-first Century Learning</td>
</tr>
<tr>
<td>AD</td>
<td>Agile Development</td>
</tr>
<tr>
<td>ANT</td>
<td>Actor-Network Theory</td>
</tr>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BPM</td>
<td>Business process management</td>
</tr>
<tr>
<td>DT</td>
<td>Design Thinking</td>
</tr>
<tr>
<td>GVRD</td>
<td>Greater Vancouver Regional district</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IS</td>
<td>Information Systems</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicators</td>
</tr>
<tr>
<td>LMS</td>
<td>Learning Management System</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PO</td>
<td>Product Owner</td>
</tr>
<tr>
<td>POC</td>
<td>Proof of Concept</td>
</tr>
<tr>
<td>SAM</td>
<td>Strategic Alignment Model</td>
</tr>
<tr>
<td>SDM</td>
<td>Social Dimension Model</td>
</tr>
<tr>
<td>SOA</td>
<td>Service Oriented Architecture</td>
</tr>
<tr>
<td>SQL</td>
<td>Structured Query Language (database)</td>
</tr>
<tr>
<td>STS</td>
<td>Science and Technology Studies</td>
</tr>
<tr>
<td>WVSD</td>
<td>West Vancouver School district</td>
</tr>
</tbody>
</table>
Chapter 1. The Vision for BC Schools

Of the 14 school districts scattered across Vancouver, Canada, the West Vancouver School district (WVSD) is among the smallest. Its aspirations however, may be the biggest. And it was really only by chance that on March 8, 2011, I found myself in the office of Chris Kennedy, WVSD’s Superintendent. Our impromptu meeting was set up by Gary Kern, WVSD's Director of Instruction, Innovation and Technology.

Gary's job is to manage the district’s information technology (IT) function and to buy, build or otherwise develop technologies and applications to support the district’s strategy and vision. Gary's management style is largely collaborative and his sense of humor combined with his straightforward demeanor seems to have earned him the respect and admiration of his colleagues. The scope of his responsibility is large although his immediate team is quite small. Christopher, James and Grace each have their own cubicles across the hall from Gary. Their office space is littered with open books, manuals, optical disks, stacks of loose paper, Ethernet cables, laptops, desktops, tablets and pictures of family.

"You can work here if you want" said Grace, pointing to a rectangular meeting table next to her office. "You should be able to get on the wireless, no problem."

As I unpacked and sat down, I remember thinking that I couldn't believe that such a small team was tasked with such a big assignment. The team was three months into the development of what they were calling the "Collaborative Learning Platform" or "CLP" for short. The CLP is an instructional and social computing platform designed to deliver a personalized learning experience to each of the district’s 7,210 students across fourteen primary and elementary schools and three high schools. The CLP is only one part in a larger transformation agenda. Nevertheless this technology would become a key actor in advancing the district’s strategic agenda, and translating this agenda through to the everyday practices of the teachers and students who would come to use it.
To gain access to the research site, I chose to embed myself with a consulting team tasked with delivering the project. The team was small (7 people), and included IT professionals, designers and developers. Although I was attached to the team, I was not under contract with the consulting firm nor was I financially compensated. I was operating solely as a researcher in this domain.

"I'm hesitant to say 'transformation' because I think that has a bit of a lofty connotation" said Gary. "What we want to do is use technology to, first of all, bring ourselves into alignment with Ministry requirements, and second, to close the gap in our district" (G. Kern, personal communication, March 8, 2011).

"What do you mean 'gap'?" I asked.

Gary pointed to an already drawn diagram on his nearly wall-length white board which was covered with writing. The diagram was of a graph with two different slopes.

"For a long time, we've been here" he said pointing to the lower slope. "Now, our district is doing fine. Our kids are achieving. But we want to explore how technology can get us from here to here. That's the gap" (Ibid).

Gary's explanation was sincere, but it was obvious that he had explained this more than once before. His passion and thoughtfulness were clear. He had been thinking about this for some time.

"You're aware that integrating technology in the classroom has always been pretty problematic. So why now?" I asked.

Gary looked at me and grinned.

"I'm aware it's been a problem. It's always been a problem. But we think that given the Ministry's requirements and intention to move forward with 21C and the fact that we have a really active Superintendent within the district, I think now is the time. It's really about time" (Ibid).

Gary's iPhone chirped and he was interrupted. He tapped out a response to a text message he had just received: "talking with Brad King from SFU. He's doing
research on ‘alignment in education’, so I’m telling him about what we’ve been doing ... he’s playing hardball."

He sent his message and turned back to me. "Sorry, I was just confirming something with Chris. Actually, do you want to meet him?

Introduction

Discussions of "alignment" within the context of public education are becoming increasingly visible and important. There is a common belief among educators and politicians that education systems around the world are currently experiencing unprecedented social and economic changes, and that they now find themselves at the threshold of a new period of development that is radically different from the past. The education system of the twentieth century, so the arguments go, has exhausted itself and must now be realigned if it is to meet the challenges of the twenty-first century. This sentiment is obviously hyperbolic. Yet it illustrates very well the understanding that the institution of public education (like all organizations) is an evolving system that must continually reproduce itself while adapting to meet new social and economic changes.

The idea of "alignment" comes from the world of business. It involves an examination of how multiple actors and resources are mobilized toward a specific objective or set of objectives, and in the process, how organizations reproduce or change their social and technical structure (Ciborra, Braa, & Cordella, 2001, p. 5). Studies of alignment generally look at the variety of ways in which organizational strategies or plans become strongly or loosely connected to operations and technical controls. Perhaps the most striking attribute of the idea of alignment is its association with increased performance, competitive advantage and the ability of the organization to adapt to new demands. The majority of work on the topic maintains the view that organizations that can successfully align their operations are able to attain a higher level of performance and adaptive capacity (ability to change) than those that cannot (Chan, 2002; Chan & Reich, 2007; Reich & Benbasat, 1996; 2000). Performance and change have been perhaps the most prized capabilities in the business world for some time and so the interest and emphasis on alignment in academic and professional work is understandable. But what is the precise connection between alignment, performance
and organizational change? What's more, how is technology implicated here? If alignment, as conventional wisdom has it, is simply a matter of creating a shared understanding of an organization's strategy and then achieving consensus of how information technology can support this strategy, then why does this appear to be such a difficult and enduring problem for so many business organizations (Chan, 2002; Ciborra, 1997; Ciborra et al., 2001)?

Educational organizations are quite different from businesses. In Canada they are public, social institutions. Yet they appear to suffer from this problem as well. Business administration and public school administration are not as far apart as one may think. In fact, the history of educational reform in North America is full of accounts of business professionals who have attempted to leverage business logic to change the system (Tyack and Cuban, 1995). These attempts to align the education system may have been well intentioned but they were often not entirely successful. Larry Cuban's *Oversold and Underused* (2001) documents the diffusion of computers and technology in American schools since the 1980s, noting that the promised benefits of such technologies have largely been unrealized. These conclusions are echoed by Russell’s longitudinal study (2001), which concludes that despite technologizing the delivery of instruction, there has been “no significant difference” in learning outcomes. Perhaps the most recent high-profile business leader-turned-education-reformer is Microsoft founder and former CEO Bill Gates who, after cumulatively donating some 5 billion dollars to educational change initiatives in the US, admitted in an interview with the Wall Street Journal that "It's hard to improve public education -that's clear. As Warren Buffett would say, if you're picking stocks, you wouldn't pick this one" (Riley, 2011).

This chapter comprises two parts. The first part establishes the starting point from which this dissertation departs. It sets up the relevance and importance of alignment in educational organizations and positions the concept in the context of a currently unfolding education reform initiative in the province of British Columbia (BC). What exactly are BC schools aligning themselves to or with? Answering this question is a necessary first step toward exploring the relationship between strategy and technology.

Drawing inspiration from the *21st Century Learning Initiative* (21st Century Learning Initiative, n.d.), BC's Education Plan (British Columbia Ministry of Education,
is a strategy that represents the culmination of several years of policy debate and
dialogue between politicians, educators, business professionals and social advocates
regarding the vision and future of education in the province. It is perhaps the most
ambitious agenda for reform and systemic change the province has ever conceived.
Nevertheless it is a strategy that contains many uncertainties, which have the potential
to become significant barriers to its success. For example, the strategy must obviously
be interpreted and translated by districts and educators before it can be implemented.
This process of deciding what the BC Education Plan actually means is not entirely
obvious, nor is the idea of “21st Century Learning”, for that matter.

Studying alignment in this context however, entails more than just examining the
meaning of strategic plans and their relationship to organizational functions like IT. It
includes investigating how people make sense of these relationships. How does this
"sense-making" (Weick, 1995) happen in educational organizations and why does it
happen they way it does? The second part of this chapter discusses the approach of the
dissertation toward these foundational questions and underscores the major themes of
the work.

The chapter concludes by offering some thoughts on what can be expected of
this dissertation. Research on alignment has emphasized the observation that alignment
is a process that is characterized by contingency (Chan & Reich, 2007) which is to say
that it happens in one way or another. This observation, unsatisfying as it may be,
should come as no surprise to those with any practical knowledge about the subject.
Another way of expressing this is to say that it is a variable process that is symptomatic
of complexity. And if this is the case then contingency is not a conclusion but rather a
starting point for research.

Accepting contingency has both practical and theoretical implications. Generating
adequate descriptions of the alignment process requires the researcher to be immersed
in the world of the organization they are studying. This does not negate the fact that the
researcher is only one observer among many. It follows that any empirical research on
alignment is not just an exercise in observing alignment and then building a model. It is
an exercise in observing observers who are, like the researcher, also observing each
other's involvement in the process but doing so in their own way. This creates special
problems in terms of the adequacy not just of alignment research, but all administratively
motivated research that aims to produce technical prescriptions to cope with organizational problems.

Meeting with the Superintendent

By the time I walked into Chris Kennedy’s office a few hours after my meeting with Gary ended, I had already done my homework. According to his website, Kennedy was a former high school teacher turned principal. He had worked in a number of school districts around Greater Vancouver over the span of twelve years. He had just been installed as the Superintendent and CEO of the WVSD a few months prior. He is a frequent blogger whose star, judging from his bio, seemed to be on the rise. As we sat down in his office he asked, “What can I do for you?”

I told him about my research project and informed him that I was pursuing this interest not as a consultant but as a researcher. I told him that I was not interested in evaluating the operations of the district because I was not sure exactly what I was looking for or looking at. Nor was I exclusively interested in how they were attempting to integrate IT into their organization. My interest was in how the district’s strategy mapped onto their operational processes and the role that IT was playing (or was expected to play) in this larger change initiative.

“That’s interesting” he said, “most of the people I meet always want to know about what we’re doing with technology.”

I had enough experience with large IT implementations to know that the technology is the relatively easy part. The harder part was the “people part”, the “social” part. I briefly recounted the history of failed technology integration attempts in education, the perceived inflexibility of educators and their resistance to change.

“I think part of the reason why change has been challenging is that our efforts need to be focused on changing the system [rather than just teachers or students]. When we’re talking about change, it needs to be in the context of a whole system change. Everybody needs to be involved from parents, to teachers to students” (C. Kennedy, personal communication, March 8, 2011).
This was nothing I had not heard before and I delicately told him so.

“I agree, this is not a new idea. But what is new is the world our kids are growing up in. We don’t know much about the future but we do know that it’s digital. And I think it’s our obligation to make sure our students are able to understand this world and interact with it. So... you said you're studying ‘alignment’ right? The challenge for our district is to ‘align’ ourselves with this changing world that we have had to adapt to, but our students have been born into” (Ibid).

It was hard not to notice the passion in Chris’s voice. Like Gary, he had also been thinking about this for a long time. During the 2010 Vancouver winter Olympic and Paralympic Games, Chris was heavily involved in an officially sponsored pilot project called “Students-Live” where students from school districts all over Vancouver became citizen-journalists for the duration of the games. Students organized themselves into teams and produced short blog and video segments which they would then share through social media websites and channels.

“It was an exercise in community building. We wanted to see how difficult it was to build a learning community with social media tools and we wanted to do it outside the classroom, in a real-world setting. It was a great experience and was really an indication that we are ready to do this” (Ibid).

As our time was coming to an end I asked him if he would be interested in participating in my research to which he quickly said “sure!” As I was leaving, Chris asked “what is your PhD in again?”

“Communication.” I said.

The BC Education Plan: A Presentation of The Research Focus

What exactly do schools and their boards want to align themselves to or with? What is the future state they are seeking? In the province of BC, the Ministry of Education and the 60 school districts which it oversees are largely in agreement. The vision is to redesign the education system for students (now called "learners") such that
it can provide them with a 21\textsuperscript{st} century education rather than an old and outmoded 20\textsuperscript{th} century one. This answer however, only leads to another question: what does education look like in the 21\textsuperscript{st} century?

For BC, the story begins in September 2007, when the Premier's Technology Council issued its tenth report identifying the need for a transformation within the BC public school system (Council & Premier, 2007). The report cited this transformation initiative as a top priority and central to maintaining the province's competitive economic standing. The document also identified a severe skill shortage that has the potential to degrade the innovative capacity of BC's workforce. This report led to a subsequent document that outlined in greater detail the province's Vision for 21\textsuperscript{st} Century Education (Premier, 2010). This vision, to be implemented within the K-12 education system over the next decade, is ambitious in its scope. Although the document did not specifically address the issues associated with the implementation of a specific strategy or program, it provided a political starting point for BC's vision. While observing the continued importance of traditional literacy skills, the document emphasized the centrality of digital literacy and other factors related to student achievement and success such as critical thinking, creativity, collaboration and innovation.

Almost a year later in 2011, BC's Ministry of Education finally released its BC Education Plan (British Columbia Ministry of Education, 2011) which distills the vision into five "elements" or goals each with "action steps" intended to demonstrate how they will be achieved. The Plan begins by acknowledging the "strong position" that BC's education system is in, but then asserts that "our education system is based on a model of learning from an earlier century" (Ibid, p. 2). It acknowledges the effective yet seemingly disconnected state of BC's public education system: "while we enjoy a strong stable system we need a more nimble and flexible one that can adapt more quickly to better meet the needs of 21\textsuperscript{st} century learners" (Ibid, p.3). As mentioned, there are five key elements that comprise the Plan:

1. **Personalized Learning**: also described as "student-centered learning", places emphasis on the needs of each student as an individual rather than treating them as simply one part of a larger class. To this extent students are envisioned as playing an "active role" in "designing their own education."
2. *Quality Teaching and Learning*: whereas personalized learning supports students, this element aims to provide support for teachers by maintaining and increasing professional standards through professional development programs. There are also considerations aimed at increasing "transparency and accountability to ensure the interests of children are protected" (Ibid, p. 6). In aid of this, the Plan alludes to the intention to create a "teacher regulation system" to "raise the stature of the teaching profession and increase public confidence in the profession's disciplinary processes" (Ibid, p. 6). Along with the teacher regulation system, the Plan also references the importance of regular performance reviews and evaluations of teachers to be conducted by principals.

3. *Flexibility and Choice*: The third element of the Plan signals the Ministry's commitment to increasing flexibility and choice for parents in terms of their ability to decide where their child will attend school, the type of school they attend and the conditions under which their child receives instruction. For example, parents can decide if they want their child to attend a public or independent school, and to some extent, the times at which their child will receive instruction throughout the calendar year.

4. *High Standards*: in a similar vein to the second element, "high standards" emphasizes the importance of student assessment and the enforcement of core curriculum standards to ensure that they are "robust and relevant" to student success.

5. *Learning Empowered by Technology*: This element is aimed at encouraging the "smart use of technology in schools ... [to] ... prepare students to thrive in an increasingly digital world" (Ibid, p. 7). This element not only involves the provision of access to digital equipment, computers and the Internet, but also effectively integrating these things into instructional and learning activities. In one way technology may be the most significant element within the Plan because it will likely link the previous elements together in some way. Personalized learning for instance does not seem feasible without support
from ICTs. Likewise technology is likely to be implicated in ensuring "quality teaching and learning" as well as "high standards."

The Plan concludes by declaring that: "The way to get from good to great is through personalized learning, supporting teachers, creating more flexibility and choice for families, maintaining high standards and embracing technology" (Ibid, p.8 -emphasis mine).

What can be taken away from these five action steps within the plan? BC's vision for 21st century learning incorporates (at least) three emerging trends in education. First, there is a desire for increased pluralism of instructional methods and service delivery. The emphasis on "personalizing" the learning experience along with offering increased "flexibility" and institutional "choice" suggest a vision of a system that is oriented toward addressing students and their families in a very individualistic way.

Second, there is an obvious wish for increased productivity and efficiency. "Quality teaching" and "high standards" are the key indicators here, although the criteria for both remain unspecified.

Finally, there is the theme of technological empowerment but again, it remains, unclear what role technology plays in this vision beyond helping students "thrive." What is interesting about the Plan is that it not only paints a picture of education in the 21st century, it reflects changes that are already in the process of becoming normalized. I will return to this in a moment.

**The Influence of the 21st Century Learning Initiative**

The repeated references in these documents to the "21st century" are directly attributable to the influence of the 21st Century Learning Initiative (often called "21C" by education professionals or simply here as “the Initiative”.) Established in 1996 in Washington DC, the 21st Century Learning Initiative is composed of an international group of loosely organized researchers, teachers, politicians and education activists who are attempting to redefine the meaning of education and its significance to the social and economic health of society. John Abbott, the director of the Initiative and one of its most
prolific spokespeople, describes the central problem education systems face today, saying that: "Despite radical changes in economics, politics, and technology, education ... at the beginning of the 21st century would be familiar to anyone who attended school before World War II" (Abbott, 2010, p. 23).

The mission of the Initiative is to research, publicize and promote approaches to teaching and learning that incorporate “a range of insights into the human brain, the functioning of human societies and learning as a community wide activity” (21st Century Learning Initiative, n.d.). The pedagogical philosophy of the Initiative begins with a distinction between schooling and learning; the former refers to a specific type of systematic administration of education and the latter refers to an intrinsic capacity within human beings. According to the Initiative, the “crisis in education” is attributable to a lack of sensitivity to the learning demands of children and youth. This crisis has only been inflamed by a narrow, materialistic and programmatic understanding of the purpose of education itself. Education has, since its infancy, been subordinated to economic and business interests while teaching and learning have been subjected to the demands for efficiency and productivity. These facts have become hallmarks of a distinctively modern education system where children are “over-schooled but under-educated” (Abbott, 2010).

The Initiative goes beyond criticizing education policy. It articulates a radical reform agenda with a rhetorical force that is fueled by several dystopian observations about the progress of society and its future. The future, it seems, has been mortgaged by a society that in many ways has already defaulted. Growing income inequality, stagnating and even declining rates of productivity, excessive materialism and a disregard for the protection and conservation of the environment are just a few troubling realities; indicators of a society that has found itself, in a manner of speaking, on a path that is unsustainable at best and self-destructive at worst. From this perspective, denial is no longer a luxury politicians and citizens, families and communities can afford. Education has become (and to some extent always has been) a primary site where discussions of social and economic change are welcomed and tend to have their greatest impact.
The Already Changing Landscape of Public Education: Three Sources of Uncertainty (Context and Justification of the Dissertation)

The premise that the education system has not changed over the past sixty years is a bit of an exaggeration. As alluded to a moment ago, in Canada and the US at least, there have been significant changes in culture and in education policy that have caused striking shifts in how schools and educational services are funded, structured, delivered and evaluated. The emphasis on increased institutional pluralism; productivity and technology integration are perhaps the most striking.

*Increased Pluralism*

Charter schools, for example, appear to be gaining greater acceptance and represent a movement toward an increasingly pluralistic system of education that encompasses multiple organizational forms and service models. In the Canadian education system, charter schools describe institutions that have an increased degree of autonomy when compared to a regular public school, yet continue to receive some degree of public (provincial) funding. Often these charter schools offer special programs that regular public schools do not, thereby allowing them to serve specific segments of students and families who demand these programs. The introduction of charter schools in Canada has been controversial for a number of reasons. Much of this controversy stems from the fact that such schools generate revenue mostly from public funds yet are not subject to the same constraints and accountability protocols that public schools are, leaving them with a quasi public/private status. From one perspective, this development could bring incredible benefits to students because it would offer them and their parents more choice over what educational services they will receive and how they will be delivered. From another perspective, this increasing pluralism could mean an increasingly fragmented system where schools are forced to compete against each other for students and their parents, both of whom are increasingly encouraged to see themselves as nothing more than consumers within an educational marketplace that has already internalized the catechisms of the free-market: more choice is always better, and the consumer must always be free to choose.
**Increased demand for Productivity**

There has also been an increasing demand for greater productivity and value at all levels within the education system: from the way students learn to the instructional methods teachers employ, to the way both are evaluated and assessed. This demand has manifested itself through a number of ways. Standardized testing policies are implemented to ensure students learn "the basics" and that teachers are made to be "accountable" for their own performance in the classroom. Productivity demands also often undergird debates over the perceived relevance of curriculum and often work to shape the criteria of "progress" in education. As with the previous points, these developments have advantages and disadvantages. Standardized testing for instance helps educators develop rudimentary benchmarks for assessing performance across the system. Likewise, making teachers "accountable" for their performance ensures that teaching standards are maintained. But of course, standardized testing remains a crude and arbitrary way to evaluate something as variable as learning. As for the calls for teacher accountability, more often than not they are motivated by public and parental suspicions that teachers are the reason their children are not smart enough.

**Technological Empowerment**

The desire for enhanced productivity has also facilitated massive investments in and deployments of information and communication technologies within the classroom. For some time it has been known that the connection between technology and business productivity is tenuous (Brynjolfsson, 1993). It is a connection that develops through different conceptions about what "productivity" means in the context of an education system. While information and communication technologies have undoubtedly increased administrative efficiency and have influenced the path of development for many school districts, it remains an open question whether the increased integration of technology within all aspects of educational life will actually bring about enhanced learning outcomes. The latter, at least at this moment, is largely a matter of faith.

So, to accept the premise that education has not changed in sixty years one would have to treat these developments as trivial or dismiss them altogether. And yet the Initiative’s statements convey what is undoubtedly a popular perception of education. There is still a widespread dissatisfaction with the state of education and an insatiable
appetite for change. The argument that the education system of the twentieth century has exhausted itself is intuitive and many within public policy and education have apparently bought into this idea.

The Major Themes of the Work

Social Constructivism

This dissertation explores the phenomenon of alignment in education through the lens of Actor-Network Theory (ANT) (Callon, 1986; 1991; 1998; Callon, Lascoumes, & Barthe, 2009; Callon, Law, & Rip, 1986; Latour, 1987; 1993; 1996; 1999; 2005) and structuration theory (Giddens, 1979; 1986; 1993). Often described as a "material semiotic" approach, ANT is concerned primarily with the relationship between things (material) and ideas, signs and concepts that refer to them (semiotics). From the standpoint of ANT studying the materiality of alignment or ideas about alignment in isolation from each other totally ignores the most interesting question: how do these things and concepts influence each other? For instance how does the adoption of one theory of software development (concept) influence the build quality and stability of the technical platform (technology), or how does the choice of the specific technology "stack" impact the context of learning and the meanings teachers ascribe to their work?

Actor-Network Theory focuses on tracing these chains of relations (called "assemblages") between social and technical elements within an organizational context. The concept of assemblage in itself describes a thing but also a process through which that thing has come into being, in other words, the way it is constructed.

The concept of assemblage is particularly relevant here because a central theme of this dissertation involves examining not only the materiality of alignment, but its epistemological construction as well. More specifically, it departs from the assumption that alignment is, to a large extent, a socially constructed process. This entails describing the ways in which members of an organization interpret the idea of alignment and its significance, and correlate these interpretations with the interpretations of others.

I have supplemented the ANT approach with ideas from structuration theory. The principle reason for this is that the dissertation contends that in order to understand
alignment, one needs to be able to account for the interplay between organizational structures and localized interactions. Another way of saying this is that the problem of alignment, I argue, has its sociological analogue in the problem of social (technical) “reproduction”. Structuration theory represents an attempt to work out a plausible theory of social reproduction in such a way that it avoids the dichotomy of structure and action. What structuration theory provides the dissertation is a meta-theoretical framework that improves ANT’s approach and renders its central contentions in a more convincing way. Structuration theory moderates the radicalism of ANT constructivist epistemology and plays an important role in sensitizing the work, and bringing it into contact with broader issues in sociology and the social scientific study of information technology.

Based on my theoretical approach, it may already be obvious that the dissertation operates within a social constructivist paradigm. As an epistemological paradigm, social constructivism is difficult to explain because there are so many conflicting accounts of its origin and intellectual development. Selecting one account may upset those that subscribe to another. Generally social constructivism can be traced back to the work of Dewey (2003) and Mead (2009) and the sociological tradition of social symbolic interactionism (Blumer, 1969). The foundational premise is that individuals make sense of their world through processes of symbolically mediated interaction with others. As the interactionist approach was being refined a different yet intellectually and historically parallel approach can be found in the work of Schutz (1967). Schutz’s interpretive sociology attempted to provide a phenomenological and experiential basis for explaining processes of social interaction and, in turn, became the basis for the seminal and oft-cited work of Berger and Luckmann (1966).

How is the theme and intellectual tradition of social constructivism relevant? The history of research into alignment (and organizations in general) is replete with studies that view alignment and organizations as objective and concrete things. It is almost as if alignment exists independently of human observation and cognition. There is an problem with this premise. Before alignment can exist as an "objective" event, state or (more likely) process, it must be observed and experienced by individuals. What's more, individuals must be able to connect or otherwise “align” their observations with those of others, so that both parties can coordinate their action. It is through this process that organizations, their processes and technologies acquire meaning and legitimate status.
Organizations and the processes they contain are, on this basis, "socially constructed"; they are observed by perceiving subjects, cognitively processed and imbued with meaning which then becomes the basis upon which subjects intentionally act toward others and objects.

Discussions of social constructivism hold special relevance in education and one would be remiss not to address this. Social constructivism can be seen especially in the work of Piaget (2001) and Vygotsky (2012) both of which appropriated the paradigm into their work on childhood development and learning theory. While these thinkers are definitely part of the sociological and philosophical tradition above, the dissertation focuses on a small area of constructivist work in order to control the scope of this project.

**History and Institutional Power**

A second theme, just as important as the first, involves framing the phenomenon of alignment as a historical and developmental process that is deeply connected to power relationships. From this perspective, it is important to examine the ways in which actors (past and present) have been instrumental in guiding the development of the institution of public education as well as providing and championing more general ideas, concepts and theories that have provided the context in which specific decisions have been made and actions legitimated. This always involves keeping track of the multitude of interests that are involved in the process of education and its administration and how these interests converge or clash with each other.

If there is any desire to move research on alignment beyond reductive and functionalist accounts of the relationship between strategy and technology, one might as well start with the acknowledgement that there is a political element to this relationship. Alignment research would do well to look at the way in which leaders, groups, coalitions and cliques engage each other on a political basis, and that such engagements, whether consensual or conflictual, can and often do have decisive consequences for an organization’s path of development, the strategies it pursues and the technologies and configurations it adopts.
These themes are largely absent in alignment research (Ciborra, 1997). While studies have offered descriptions, models, and representations of alignment, they remain largely insensitive to what many would suggest are the actual decisive elements of alignment.

**Statement of the Problem**

School districts, like commercial organizations, are constantly tested by the economic environment. If nothing else, exploring the relationship and development of technological capabilities within public education and the impact of investments in information technology in the education system, is important not only in determining the return on this investment but also shedding light on the ways in which such deployments are reconfiguring teaching and learning activities, as well as ways in which educational services are being delivered.

The dissertation begins with two basic questions: one empirical and the other theoretical. The empirical question is focused on examining the uncertain and tenuous relationship between performance, technology and change and can be expressed as follows:

- How are school boards and districts, educators and administrators involved in mediating the relationship between performance outcomes, technology and larger patterns of organizational change?

While understanding the process of alignment is a critical factor in enacting meaningful change, the theoretical resources available to understand alignment are limited (Chan & Reich, 2007). Because of this, the dissertation starts with a basic theoretical question, which concerns:

- What conceptual approach to alignment captures the complexities of organizational activities and functions related to the above question, can describe their interconnections, and situate or "ground" them within the empirical context of an educational organization?

These questions are fairly localized in their scope but they are clearly rooted in larger questions that are of peripheral relevance. While the primary focus of this dissertation is on alignment in a single school district, it opens up avenues for further
research on alignment at a broader and more comprehensive scale. For instance, it is one thing to explore alignment in a school district, but what can be said about several school districts, a region or country? Or the education system itself? It has been fairly common to view the education system as a distinct entity, insulated from other types of organizations, institutions, and market forces. This sentiment is clearly present in the literature on 21st Century Learning and other critiques of the education system that are well known to most anyone with a passing interest in education reform. While there remains lots of talk about just how estranged, cut-off and misaligned the education system is from the demands of students, communities and society, there is less talk about why this is, and (presumably at least) why this continues to be.

**Contributions of the Work and a Brief Note on Reflective Practice**

What can be expected from this research project? The task of building theories within the social sciences is undertaken for a variety of reasons. In many ways theories can be thought of as tools that can be used to pry apart sociotechnical relationships and in some instances, reassemble them (Latour, 2005). The contribution of this dissertation addresses this dynamic between deconstruction and reconstruction by:

1. Providing a sociotechnical perspective on alignment that is based on the analysis of empirical data.

2. Highlighting the specific modes of practice that contribute to processes of alignment and innovation in public education.

3. Incorporating the technologies themselves and considering them as key actors in the alignment process.

The usefulness of this dissertation can be assessed in reference to any of these contributions. From a theoretical standpoint these contributions can be tied together by emphasizing the distinction between concepts and the things to which these concepts refer. In some ways, this relationship can be understood as the theoretical description of reality and reality itself. The correspondence between the theoretical domain (where concepts live) and the practical domain (where people and things live) has been a point
of contention since the incorporation of social science, but perhaps especially so today in management science. While organizations are intrinsically interesting, much administrative research on and within them is often motivated by a desire to solve "real" problems, and it is promoted as having an ability to shape practical activities. This dissertation does not aim to present itself as a piece of technical knowledge of this type.

The point of this dissertation is to tell a story of a high profile alignment initiative in public education, its genesis and development, and the way in which it unfolded. It does not offer prescriptive technical knowledge any more than it claims to offer a definitive theory of alignment. It aims to occupy the middle ground between theory and practice - the scholarly world and the professional world. Thus, a big risk here is that its contributions will be of limited value to both.

**Structure of the Dissertation**

The structure of this dissertation has been divided into seven chapters, which are organized into three phases or parts in accordance with the table below:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Focus</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to the Research Problem</td>
<td>Part 1: Establish the Problem</td>
</tr>
<tr>
<td>2</td>
<td>Literature Review</td>
<td>Part 1: Establish the Problem</td>
</tr>
<tr>
<td>3</td>
<td>Theoretical Framework</td>
<td>Part 2: Establish Approach and Research Design</td>
</tr>
<tr>
<td>4</td>
<td>Research Methods and Data Collection</td>
<td>Part 2: Establish Approach and Research Design</td>
</tr>
<tr>
<td>5</td>
<td>Creation of the Collaborative Learning Platform (CLP)</td>
<td>Part 3: Findings and Conclusion</td>
</tr>
<tr>
<td>6</td>
<td>Implementation of the CLP</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Summary of Contributions and Concluding Remarks</td>
<td></td>
</tr>
</tbody>
</table>

The first two chapters are focused on establishing the research problem and situating it within a larger research context. Chapters three and four discuss the dissertation’s theoretical approach and methodology that was deployed to engage the research problem. The third part is composed of two chapters that present detailed case
studies of critical instances in the larger alignment process. Each chapter feeds into and substantiates the dissertations major contributions, which are summarized in chapter 7.

**Making Sense of Alignment in Education**

This dissertation will contribute several valuable insights into the social and technical dynamics of alignment in public education. Education is a field that is seemingly obsessed with technological empowerment and organizational change. While there has been much scholarship on educational technology, there has been comparatively little work on the implementation and alignment of such technology. These activities are obviously critical to understanding larger systemic processes of change. This work aims to contribute to the latter area of scholarship and supplies a “thick description” of the alignment process within this context. It is imperative to understand that technology is not simply a black box that accelerates or automates specific interactions. It is a medium of power that mobilizes interests and affects their realization.

With this as its starting point, this dissertation suggests that technology acts as a mediator that mediates and translates organizational strategies, and works to structure social practices in accordance with them. It explores the process of aligning information technology with greater depth and theoretical sensitivity than is usually on display in alignment research. It depicts alignment as a relational process that takes place between social and material structures, and the interactions and processes that animate such structures. It shows how “inscription” and “translation” operate as critical activities in the larger process of alignment and are at the center of technological innovation in education.

Through its implementation, the CLP (the main technological actor I alluded to at the beginning of this chapter) worked to transform and align the interactions in the classroom in accordance with the province’s and the district’s vision for “21st century learning” and “technological empowerment”. It should be stated that although the CLP can be considered a dynamic actor in this work. It had significant effects on educational processes and learning activities, but these results were modest indications of its full potential. As this dissertation will show, the structuring capabilities of the CLP, which were so important in creating and bringing about alignment, did not have totalizing or
deterministic effects. Rather, these effects were much more uncertain and to some extent underdetermined. Teachers for instance, clearly believed that the CLP had a positive impact on student engagement, personalized learning and collaboration in the classroom. But these teachers were more uncertain about how these changes would contribute to creating more capable or “empowered” students. The scope of this research focuses on the CLP’s inscription, and the initial stages of its translation and implementation. To fully understand the CLP’s impact on the district will require further time and study. In this sense, this dissertation sets the stage for further study and questioning of what alignment means, and what it looks like in educational organizations.
Chapter 2. Literature Review

While there has not been a significant volume of research on alignment in educational organizations, researchers who are interested in studying alignment generally concern themselves with the way in which people, processes and technologies come to be arranged together into a cohesive whole. Work on alignment is often motivated by a desire to increase organizational performance, control and adaptability. What is unique about the idea of alignment and why does it deserve to be its own topic of inquiry? The most obvious reason is that alignment has been, and continues to be, a pervasive problem for many organizations that invest in and implement information technology (IT). Educational organizations are no exception. A simple Google search will easily return numerous academic and industry articles, blogs and forum discussions that will testify to this fact. In spite of almost twenty years of research on the subject, it continues to be a complex and wicked problem (Buchanan, 1992; Rittel & Webber, 1973). This chapter assembles a literature review that describes the conceptual development of alignment and explores the question of why it continues to be such a difficult problem. I continue with the basic assumption: that alignment refers to a contingent process involving the integration of an organization's strategy with its information technology infrastructure. By this, I mean that alignment involves orchestrating an interdependent assemblage of tasks or operations that are undertaken to reach some goal or objective, and that these operations are often dependent on context; they can be happen in one way or another. This very general description is intended as a starting point and is unlikely to find much objection by alignment researchers.

The literature makes two basic arguments gleaned from a close reading of the available research on the topic:

1. The concept of alignment is unclear and imprecise. This is a critical problem because it complicates what I understand to be the general research agenda for alignment. This agenda includes the goals of
theoretical elaboration and technical operationalization, both of which, to this point have not been consistently achieved.

2. Regarding the above, an aggravating factor concerns the research approach that dominates the literature. This approach is positivistic and deductive in its orientation. Research within this tradition has generally not encouraged a sustained engagement with complexity.

Along with these two arguments, the review concludes by drawing attention to three points of focus, articulated as “needs” that research on alignment ought to address to move forward in a productive way.

The Birth of the Concept

The idea of alignment can be traced back to an MIT research initiative called “The Corporation of the 1990s” (Morton & S, 1991). The goal of this initiative was to demonstrate precisely how IT could be leveraged to transform an organization and increase its competitive advantage. This interdisciplinary effort between business and computer science scholars produced the "MIT90s model" as it would later be known, which appears to be the conceptual progenitor to the idea of alignment as it is known today. To understand the motivation behind this and other early modeling attempts, consider the historical context for a moment. The 1990s saw the rapid and widespread transformation of the workplace enabled by networked technologies and new communication media. IT was becoming a professionalized practice in its own right. And the arrival of the World Wide Web should also not be understated. The rhetorical force with which new information technologies were promoted was instrumental in creating a new vision of business and all workplaces -for added context see (Barney, 2004; Beniger, 1986; Castells, 1996; Dijk, 1999). The controversial assertion of the transformative potential of IT was certainly understandable even if overstated. To this day, twenty years later, it remains the foundational premise upon which all alignment research sits (Lynne, 2004). The transformative potential of information technology, its ability to reconfigure organizational structures and processes through which people work is undeniable. However it is not as clear what this capability means, how it is set in motion, and how it can be productively controlled.
At first glance, the idea of alignment and its central ideas may not appear to be relevant to educational organizations. This assumption often stems from the belief that educational organizations are somehow immune from competitive forces or from pressures to leverage value from their technology assets. Although the business context for educational organizations is certainly different, the administrative challenges for educational organizations are similar to those of commercial ones. Adapting these ideas within the context of educational organizations is largely a matter of terminology. I will return to this in a moment.

Definitions and Analogous Terms

Perhaps a surprising and ironic aspect of early work on alignment was that much of it failed to define the meaning of the term precisely. Since MIT’s research program in the 1990s, researchers have defined the subject in slightly different ways. Some researchers prefer to study alignment in terms of “fit” or “integration” (Chan & Huff, 1993; Henderson & Venkatraman, 1993). Reich and Benbasat (2000) define alignment as the degree to which an organization’s mission, objectives and strategy is shared and supported by the IT strategy. Sauer and Yetton (1997) understand alignment by pointing to the degree to which IT strategy mirrors the business strategy. Other researchers have characterized alignment as congruence between business and IT strategy (Luftman & Brier, 1999). Others still have substituted “congruence” for “harmony” (Luftman, 2003; McKeen, Smith, & NetLibrary, 2003).

There are also several banners under which alignment research is conducted. Regardless of whether one opts to study strategic alignment, business-IT alignment, IT alignment or simply alignment, all converge on similar understandings. The consensus among this research (and perhaps the professional) community is that alignment is a function of the way in which strategic plans (the planning function) come to be connected or synchronized with technology (the IT function). And so, alignment in its most basic sense is generally a function of the way in which these two functions, function together.
In spite of the volume of work on alignment, and after some twenty years of research, there exists no widely cited theory of alignment. Researchers have instead, often opted to conduct empirical studies that generate models and frameworks that have been incredibly detailed but have not offered definitive answers. What is notable about the answers that are often provided is that the determinants of alignment are generally attributed to social factors within organizations -not technical ones. This is an important point that is sometimes lost. Alignment is deeply rooted in social circumstances that make the technical challenges of integrating information technology systems appear trivial. It’s also notable that the answers, after all, are usually all the same. Aligning organizations requires a shared vision, a common strategy, sharing of knowledge, sharing of responsibility and, of course, a shared culture (Chan & Reich, 2007). Yet in spite of these “answers” they appear to be of little help with answering the question of why alignment continues to be a problem for so many organizations (Chan, 2002).

**Aligning Models of Alignment within the Positivist Tradition**

Alignment research is often contained within the larger field of information systems (IS) research. What is striking about this body of knowledge is that it remains isolated from theoretical developments that have had an impact on the social sciences in general. Although it is arguable whether alignment research has a dominant paradigm that informs inquiry, clearly the dominant tradition within the research community is informed by a form of positivism (A. S. Lee, 1999; Orlikowski & Baroudi, 2001). While it is difficult to offer a definitive description of what the positivist tradition is, suffice to say that it is characterized by a preference for deductive approaches that draw hypotheses that can be tested against an empirical reality. The epistemology on display is largely objectivistic, where things, structures, actions, and relations have intrinsic meaning that is external to the researcher. Its ontology is realist in its orientation (Crotty, 2007). Adherents to the approach generally see and reason about the world as it is, in a straightforward way, as it is revealed through their chosen research methods and instruments.

The reasons for this insulated approach are also complicated but generally have to do with the long history of the Western scientific tradition and the controversial attempts to import the methodology of the natural sciences into the social sciences.
Perhaps a more succinct reason why this approach dominates (especially in many forms of administrative research) has to do with the way in which scholars are trained and conditioned by the dominant perspectives that are used within their departments and institutions. While the positivistic approach to studying alignment may reveal important insights, it is ill-suited to capturing the social complexity many researchers have, by their own admission, met with.

What does such an approach look like? The following sections answer this question by offering a presentation to two influential models that are widely cited within the literature: the Strategic Alignment Model (SAM), and the Social Dimension Model (SDM).

**The Strategic Alignment Model (SAM)**

Although most alignment scholars attribute the genesis of the concept to the MIT Initiative’s model, the most widely cited model of alignment is the “Strategic Alignment Model” (SAM) which comes from the work of Henderson and Venkatraman (1993) who, inspired by the MIT90s model, described alignment in unspecific terms, as the bridge between two foundational elements: “strategic fit” (also referred to as strategic integration) and “functional integration” sometimes referred to as operational integration. The following paragraphs explain the concepts within the SAM model and their relationships in a stepwise fashion.

The Strategic Alignment Model (SAM) proposed by Henderson and Venkatraman, begins by making and sharp distinction between business and IT domains both of which have external and internal components. The external component of the business domain (Figure 1, top left) is described as “the arena in which a firm competes” and is made up of all the items that pertain to the business strategy (p. 474). The model identifies these items as business scope, competencies and governance policies. These are just some of the items that are encapsulated within the organization’s business model. The corresponding external IT domain is envisaged in the same way.

If we take the example of a school district or an educational organization, its external business domain refers to all the elements that are involved in executing its strategy and delivering its core service, which is of course, education. In the case of an
educational organization, its external domain is composed of political institutions, markets and competing school districts, all of which play a role in the organization’s strategic orientation and development. An educational organization’s business strategy is concerned with the factors and decisions that differentiate the school or district from competing districts, regions, school systems, etc. Such strategies could be concerned with the partnerships district creates or seeks, to the programs or initiatives it seeks to implement.

The internal domain (Figure 1, bottom left), on the other hand, refers to the organization’s administrative infrastructure and is specifically concerned with the decisions that affect the organization’s administration, its design and its processes and skills. The vertical relationship between external and internal domains is termed “strategic integration” or "fit". This relationship between the external positioning of the organization and the internal arrangement of its operations has long been believed to be critical to organizational performance and has a long history within strategic management literature (see for instance (Chandler, 1962)). What the SAM model did was extend this relationship to encompass the IT domain, which was aggressively asserting itself during the early 1990s.

The corresponding external component of the IT domain (Figure 1, top right) is specifically concerned with the IT strategy that, according to the model, should compliment the business strategy. Again returning to the example of a school district, it follows that its IT strategy should work to effectively position the district in the educational marketplace (its external domain) by addressing the scope of its IT operations, its competencies and governance. Like its business domain counterpart, the IT domain also has an internal context that encapsulates items such as its IT architecture, its processes and distinctive IT competence and skill.
As information technology increases in its scope, an organization’s operations are increasingly affected by the decisions that IT departments make. This reality calls for a second type of integration described as "functional integration" which is represented with the horizontal relationship between the organization’s business and IT domains.

When it comes to the distinction between external and internal domains, Henderson and Venkatraman argued that this is especially important because historically the IT function has been thought only to play a supporting role to the operations of an organization. Those charged with managing IT have tended to focus only on those internal elements within their scope of responsibility. This is understandable since IT departments have long struggled to gain acceptance as an integral part of the organization. Often the perception of IT departments was that their responsibility consisted of nothing more than keeping computers running and systems
online. As alluded to above, this perception began to change with the arrival of the so-called information society where IT became viewed as not only a support unit but a central driver of almost all operations within organizations. Returning to Henderson and Venkatraman’s model, it was significant in that it was among the first wave of research that understood this fact and attempted to demonstrate that business and IT domains must be integrated both *strategically* and *functionally* to reflect the external elements to which the organization must respond and also the way in which IT can support and shape this response. Although the SAM model appears to be the most widely cited, it is only one amongst many. There have been many subsequent models that have extended it and have built upon its premises (Figure 2.2).
Figure 2.2.  Timeline of Alignment Models
The Social Dimension of Alignment and the Limits of Deduction

If one wishes to gain a deeper understanding of why alignment continues to be such an enduring problem for so many organizations, they are usually advised to examine social factors such as those mentioned above. Although the answers alluded to a moment ago may be general, they are also a reaction to a common theme among the criticism of the literature: that research into alignment is too mechanistic and functionalist in its orientation and that it engenders a view of organizations as being not much more than complicated machines. This is a problem because most alignment research is motivated (at least implicitly) by the larger problem of controlling the process of organizational change and transformation. This fact inevitably brings alignment researchers into a confrontation with the social dimension of alignment (Avgerou, Ciborra, & Land, 2004; Chan & Huff, 1993; Reich & Benbasat, 2000; Tallon, 2003). This stream of research has only intensified with the widespread diffusion and adoption of social computing platforms, applications and services (Dasgupta, 2010; Memon, Alhajj, & Online service, 2010; Papadopoulou, Kanellis, & Martakos, 2011; Schuler, 1994).

Reich and Benbasat (2000) were among the first team of researchers to bring together the disparate array of social factors that influence alignment. Not having any commonly accepted model that explores this social dimension, they synthesized one based on empirical research. Their model rests upon five constructs that exist across three levels. Their constructs describe distinctly social phenomena while their levels appear to rest upon some linear causality. There are four premises that are advanced through their research model. This section quickly summarizes these premises and uses them as a starting point for developing a deeper understanding of the epistemological problems that, I would argue, remain latent within alignment research programs.
Figure 2.3. Research model for social dimension of alignment (Reich & Benbasat, 2000)

The first premise of their model is that “the level of communication between IT executives will positively influence the level of alignment” (Ibid, 85). This appears to be a common assertion within the literature (Boynton, Zmud, & Jacobs, 1994; Rogers, 1986). Here the “level” of communication refers to the frequency of communicative interactions between IT and non-IT managers.

The second premise is that the level of connection between business and IT planning processes will positively influence the level of alignment. This is also a common assumption within the alignment literature: that planning the IT strategy is a critical point which influences the alignment process and that during the planning process, the more business executives share responsibility for process, the more likely they are to understand and communicate with IT executives involved in these activities. This is deemed crucial to maintaining alignment.
The third premise is that the level of shared domain knowledge within a business unit will positively influence communication between business and IT executives, and the connections between business and IT planning processes. “Shared domain knowledge” refers to the degree to which business and IT executives participate in the critical decision processes of the other.

Their fourth premise is that the level of IT implementation success will positively influence the level of communication between business and IT planning processes. Support for this is evidenced by research indicating that previous failures unsurprisingly harm the credibility of IT departments and result in a reduction of trust and cooperation (Lucas, 1975). A history of successful implementations also, unsurprisingly, lead to increased trust and cooperation (Teo & King, 1996).

Besides the fact that their model is entirely focused on the actions of managers (which is not unusual in the literature) there is an obvious problem that concerns the precision of the conceptual framework that is deployed. But perhaps the biggest limitation with their model is the irreducibility of their social constructs. For example, it is likely that trust and communication are involved here but how can these elements be adequately measured? How can the “levels” of the relationships between these constructs be determined? They conclude by noting that “perhaps the most important predictor of alignment ... was a high level of communication between business and IT executives” (Reich & Benbasat, 2000, p. 107). Communication, they hypothesize, is correlated with “shared domain knowledge” which involves leveraging “common sense” gained through interaction between business units. The idea of “common sense” sticks out and is likely to quickly arouse interest and inquiry for many social scientists.

Another fascinating point about the model is that "communication", appears to occupy a central focus in the model. Yet the concept of communication appears to be contained within the framework of "action" (premise 1). The repeated references to "levels of communication" actually refers to observed interactions that, depending on perspective, can yield "positive" or "negative" results. This conflation between communication and action is a problem because it makes accounting for the temporality of the interaction very difficult. How do participants, for example, know which interactions will lead to a “positive influence” or that another interaction will be “negative” until after
the interaction has transpired? How do participants reduce, contain or otherwise operate with this uncertainty?

Presumably, this question is addressed by drawing attention to the importance of shared knowledge. To some extent, shared knowledge has always been believed to be important to understanding organizational behavior, communication and innovation processes (Cohen & Levinthal, 1990; Dougherty, 1992; Nonaka & Takeuchi, 1995; Senge, 1994). But without a clearer picture of how participants actually transmit, receive or otherwise share such knowledge it is difficult to make any conceptual linkage to processes of communication (as in premise 3) or planning (premise 2).

As we can see, a critical problem in thinking about the social dimension of alignment involves sifting through the messy interconnections and boundaries that define the foundational concepts that are used. This conceptual mess is compounded when other research is added to the mix. Consider, for a moment, the importance of sharing knowledge, which appears to be a primary motivator of alignment. We could ask, "what compels people to share?" Nelson and Cooprider (1996) drew attention to the centrality of trust that influences the degree to which participants are willing to share knowledge. Shared knowledge is, for them, central to IT performance. But where does trust come from and how is it created? Lewicki’s (1996) study indicated that "positive communication" leads to reinforced relations of trust. This seems commonsensical until we consider that both Reich and Benbasat (2000) and Nelson and Cooprider (1996) indicated that based on their interviews with IT professionals, that there is a common belief that trust is a prerequisite to communication. Bashien and Markus (1997) surveyed numerous IT professionals who indicated their belief that their credibility, that is, the degree to which others in the organization were willing to trust their expertise was dependent of their technical skills whereas business managers responded that an IT manager’s credibility was connected to their trustworthiness, which was in turn based on communication and shared understanding. This is clearly confusing and tiresome.

It is obvious there are substantial challenges to clearly understanding the social dimension of alignment. This is perhaps due to the reliance on a deductive mode of reasoning that proceeds by generating a hypotheses and then testing them, collecting observations and attempting to produce some generalizable model. As for the model itself, Reich and Benbasat note that these relationships are likely recursive (2000, p. 84)
but it’s not clear why they do not pursue this line of inquiry. However, clearly there is a preference for linear causal models to dominate the thinking about alignment. This preference for a deductive approach becomes more difficult to sustain and defend amidst the growing list of variables involved in the process: knowledge, trust, communication, competence, collaboration, planning, implementation and history. Supposing these items could in some way be captured and measured, it seems unlikely that they could be meaningful once they are abstracted from their social context. Juggling these variables has led to anomalies in mapping key conceptual categories and accounting for their meanings. If the goal of alignment research is to make progress and to produce generalizable technical knowledge about the subject, this is a critical problem.

Reich and Benbasat (2000) acknowledge as much in their work. They note that their entire model rests upon work done within the insurance industry where participants, they note, viewed IT as central to competitive strategy. This is not always the case in many organizations. They also note the degree of volatility within the insurance industry itself may be a compelling factor in understanding the social dimension of alignment. How might the alignment process be different in sectors like education where the dynamics of competition are much different?

The inability to maintain some sort of control over the concepts deployed invariably leads their model into a vicious and infinite regress, where communication requires shared domain knowledge, which requires trust, which requires communication. The vicious circle is made more so when we consider the other elements which are clearly involved such as history, leadership, authority power and politics. While the first forays into understanding the social dimension of alignment may have fallen short in producing a precise conceptual mapping of the phenomenon and a general model of the process, there are still important observations researchers can take away. For instance, it appears that alignment is deeply connected to processes of communication, which, in turn, involve several different elements depending on the social and temporal context of interaction. In short, the point is that alignment is a complex phenomenon that is context dependent.
A Brief Look Back and Another Look Forward

So far I have reviewed the available literature to sketch the basic idea of alignment. I’ve also offered some speculative comments on why even after twenty years of research, achieving it (not to mention explaining it) continues to be an enduring challenge. I have suggested that a reason why “solving” the alignment puzzle remains problematic within the literature is twofold. First, it is a concept that is context dependent, and second, the dominant research approach within the literature is positivistic and often deductive, which is ill suited to responding to complex sociological questions. In short, alignment researchers have generally selected an analytic approach that is insufficient to understand the actual problem.

It is laudable, however, that in recent years, the social dimension has increasingly moved from the background to the forefront of research. This is not to say that it was absent from early research, but it was certainly latent. The acknowledgement of this social dimension is very important but it remains under-researched and theoretically immature. Yet it is obvious that studying the social dimension of alignment entails accounting for its constitutive elements like communication, structure, action, knowledge, competence, trust, and power. More specifically, it involves studying how these things are socially and technologically mediated.

This final section discusses three points of focus that have emerged from the review thus far. I articulate these in terms of “needs” that, I argue, demand attention in further studies. Incidentally, these needs will be used to orient the theoretical agenda of this dissertation.

The Need for Conceptual Precision

A first need, perhaps the most visible, concerns the definition of alignment and its conceptual precision. What does “alignment” actually mean? Does it refer to “fit” (Venkatraman & Camillus, 1984), or a “linkage” (Reich & Benbasat, 1996), or “coordination” (Lederer & Mendelow, 1986), or “harmony” (Woolfe, 1993)? Clearly there is much confusion over what alignment actually means. At the very least, we can say that alignment refers to an arrangement between an organization’s strategy and its information technology. Yet even here, these terms should not be taken for granted. The
state of confusion over the basic definition of the term follows a similar trajectory to developments in the strategic management literature (which the alignment literature heavily borrows from.) Mintzberg et al. (Mintzberg, Ahlstrand, & Lampel, 2001) for example identified several “schools” of strategic management, each with their own slightly different definition of what “strategy” means. The term “technology” or even “information technology” does not fare any better; it has been defined in a multitude of ways as well. It could very well be that there are different types of alignment depending on the type of strategy pursued or the type of technology implemented.

The variety of descriptions and definitions of alignment has caused problems in terms of maintaining some consistency and precision in the development of the concept and is, at least, one of the likely reasons why research has largely been replete with models, but has stalled in generating theory.

Addressing this problem involves looking at the precision of the alignment concept, how it is observed, and the variances in its meaning across practical and theoretical contexts. Although the clear lack of precision in the descriptions of alignment could be due to methodological or terminological sloppiness, it is perhaps more likely due to the complexity of the process researchers are trying to describe. Simply speaking, describing a complex process is challenging and in some respects, the acknowledgement of complexity places many approaches under threat.

Nevertheless, in some cases, the complexity of alignment is denied altogether. Some scholars who study alignment insist on its tangibility and measurability. This assumption allows them to produce research that attempts to measure the process, benchmark their findings and use this knowledge as a basis for diagnosing alignment problems in comparable organizations. What's particularly interesting here is that these researchers, have seemingly bypassed these conceptual uncertainties altogether. They often do not bother to address the fact that in the practical contexts they study, alignment, it's associated variables, and the process itself largely remains intangible, subjective and perceptual.

If alignment research is to make good on many of its claims, namely, that there is such a process, that it does contribute to increased performance, and that it can contribute to instances of change and transformation, then its core concepts, their
boundaries and causal relationships must be articulated in a much more concrete and meaningful way. It is obvious to all that alignment is, to varying extents, as much or more of an intersubjective process involving communication and action, as it is an objective observable state. This fact requires a sensitivity to the issues of ontology and epistemology not only within the practical domain, but also across different levels of theoretical work.

**The Need to Reframe the Problem**

One way for alignment research to move forward is to reframe the problem and broaden its context. In this way alignment research can move beyond it’s schemas, fragile models and assumptions, and consider alternative ways to think about the process.

The proposition that alignment research, since it’s beginning, has been concerned with studying the relationship between sociotechnical structures and the actions of those embedded within them is unlikely to provoke any objection. If this proposition is accepted then it is fairly easy to view the alignment problematic as an instance of the long-standing paradox between organizational structure and action. The structure-action paradox remains latent within the literature and is evident when we consider the differences between the strategic alignment and social dimension models. Why not acknowledge it and use it to broaden the scope of the research problem?

While the concept of action is fairly straightforward, the idea of structure must be considered in its widest sense. Structure has both social and material dimensions that can manifest themselves through a variety of items -from strategic plans to IT infrastructures. But where do these structures and actions come from? This question has relevance for deciding where to direct research efforts. In essence, I want to suggest that ultimately the problem of alignment is an extension of the paradox within organizational theory between structure and action, and furthermore, that there is a need for an approach that can facilitate their analytical integration.

Of course at a first pass this question seems silly. It is after all, clear to everyone that the installation, configuration and sustainment of IT infrastructure are attributable to the actions of individuals within the service of the given organization. Obviously such
infrastructures are the outcome of the decisions and actions of IT professionals. But if we push one step further it is prudent to ask what compels individuals to install, configure and sustain a specific form of IT infrastructure? More simply, what causes individuals to act in one way or another? What causes people to adopt one platform over another? Or implement this or that standard? When we are done shuffling and transferring the responsibility for these decisions to different people and groups, we are still left with the same question: what compels action?

The vast majority of alignment research is structural in its orientation. The methodological preference for structure has a long history that goes back to the first MIT 1990s model. Early contributions to alignment research tended to emphasize the formal and functional structure of the organizations being studied. While most researchers will acknowledge the obvious importance that individual actions have in the process, typically the research strategy has been to pursue the concept of alignment through an examination of the formal structural dimensions of organizations, as in the SAM model and its variants. Approaches that build off the SAM model tend to inherit this approach and its assumptions; that alignment is a function of structure. From this perspective, all action is in some way determined or at least conditioned by structure. After all, ask any IT manager why they adopted one computing platform over another and eventually you will likely discover that they are victims of "lock-in"; that is to say they've already invested a substantial amount of capital in their existing systems and infrastructure and the cost to switch them is too expensive. This is not necessarily a bad thing. After all, these systems have been configured to reproduce the organizations formal structure, business rules, and policies – all-important components of making the organization work. From this standpoint these structural components are logically prior to any action much less the coordination of action within teams and among individuals.

Yet if alignment is really about anything it is about understanding the relationship between organizational structures and the individuals who act to shape and change them. The emphasis on change and transformation, key parts of the alignment discourse, requires researchers to pay attention to the intentional i.e., purposive actions of those involved in the alignment process. Often alignment research tends to present alignment as a result of individual actions or social interactions (Chan, 2002; Luftman & Brier, 1999; Reich & Benbasat, 2000). Viewed from this standpoint alignment is a
function of the interactions between members within an organization. But there is still the question of what compels them to pursue certain actions, approaches or pathways over others?

Insofar as alignment scholars are interested in studying the actions of those individuals involved in the process, they are almost exclusively concerned with the actions of managers who are always portrayed as highly rational, purposive, goal directed people. Typically at this point, the explanation of action continues according to some abstract principles of managerial rationality. Managers are instrumentally and economically rational actors who make decisions based on advancing their interests and those of the organization. To accept this explanation one would have to commit to some form of methodological individualism. But this option is not tenable because it necessitates making a series reductive assumptions that essentially atomize the alignment process to the point where it becomes impossible to connect individual actions to larger organizational configurations. Furthermore, this explanation only shifts the focus to a specific group of people and to make matters worse, it does so in accordance with a formal authority structure that specifies decision-making rights—not interactions.

Of course clearly even management cannot escape the constraints imposed on them by the system in which they work. Their interactions with others as well as their decisions are always structured by a variety of ordering mechanisms from policies to technologies. IT is, of course, a critical ordering mechanism because of it’s ability to channel, coordinate and otherwise shape the range of action that can be taken by actors. So, eventually, we arrive back at the concept of structure.

While alignment research has been quick to point to the importance of structure, it cannot deny the role of individual actors and transforming, changing or otherwise influencing the alignment process and the larger path of organizational development. The growing interest in the social dimension of alignment can be taken as an indication of the realization of researchers that if alignment is really about transforming organizations through technology, then attention must be paid to the problem of action as well. Those who opt to study the social dimension of alignment imbue organizational actors with the degree of agency. Actors are seen to be in control of their actions, the choices they make, strategies they pursue, and so on. If this is the case, the question then becomes how to identify specific types of action and interactions that lead to
successful alignment. On the other hand, alignment research is also replete with studies examining the way in which structural configurations work to constrain individual action and shape interactive behavior of the organization's members specific ways, and in accordance with other ordering devices such as strategic plans, policies, rules, scripts, and technology. So far, attempts to integrate these opposing assumptions have not been entirely successful.

A corollary to the structure-action paradox that is also relevant here concerns the relationship between macro and micro levels of analysis. While structure is commonly understood at a macro analytical level, action frequently remains contained at the micro level. Connecting these two analytical levels has long been considered to be very important in organizational analysis because it effectively integrates individuals with the organization's of which they are a part, and forms the basis for explaining the larger phenomenon of organizational change and transformation.

To date, alignment research has struggled to develop an adequate analytical approach that can demonstrate the linkage between micro processes of interaction and the broader macro structural patterns of development. So we are left at an impasse of sorts. While alignment is a function of localized micro processes of interaction (as in the social dimension model), such interactions are always embedded within organizational macro structures, which determine the alignment process with symbolic and material force (as with the strategic alignment model). The commonsensical response to the problem is to bridge action and structure. Some researchers have already attempted to take this approach. Sabherwah, Hirschheim and Goles (2001) for example, proposed a “punctuated equilibrium model” of alignment that draws attention to structure-action relationships and understands them in terms of their temporal dynamics. The basic idea of the model is that the alignment process is such that it evolves by modifying its own pattern, a continual process of punctuated disruption after which a new pattern emerges. Actions and structures each reconfigure the other in a recursive relationship. Likewise Chung et al. (2003) have also proposed a recursive model of alignment. This stream of research draws explicit inspirations from evolutionary models of organizational development (Tushman, 1986) where behavior is framed by structures, some action then disrupts structure after which such changes and transformations are slowly stabilized and re-institutionalized. However, even if the controversial importation of
evolutionary theory is granted, these approaches continue to struggle in elaborating the temporal boundaries that mark successive stages in the alignment process.

**The Need for Theoretical Sensitivity**

As mentioned earlier, the notion of alignment can be conceived through the metaphor of the “bridge” (Ciborra, 1997) that connects an organization’s strategy and their technology. Also recall that pursuing alignment is motivated by the desire to enhance organizational performance, agility, and its ability to respond and change. Understanding, and in some cases shaping this connection between strategy and IT, has always been the goal of the research program I’ve been describing. As I have also noted, the idea of alignment is not new. Strategic planning along with the effective installation, configuration, and deployment of technology has always been a part of organization, from factories to schools. The cycle of hype and interest generated by new models, and that of disappointment due to their eventual collapse has continued since the 1990s. This has prompted the honest question: “why haven’t we mastered alignment?” (Chan, 2002).

One response is to suggest that the approaches or models researchers have been using and developing have not reached a sufficient level of maturity and require refinement. Another response would be to suggest that in its most basic sense “alignment” and its core concepts “strategy” and “technology” are far more complex than they appear to be, and the fact that they appear to be taken for granted, unquestioned or problematized, leads researchers to build models upon a fragile conceptual ground. As their conceptual integrity begins to break down, the various models of alignment begin to collapse like buildings built on a constantly shifting terrain. This is indicative of perhaps the biggest problem in the literature. There’s a fundamental misalignment between the explanatory concepts and models deployed, and the messy uncertain and unpredictable world of everyday work (Ciborra, 1997; Ciborra et al., 2001).

To what extent does the motivation to produce technical (instrumental) knowledge combined with the reality of the division of labor between those engaged in practical work of aligning and those engaged in the academic observation of it, create more confusion and clarity? After all, the formal model of the process is not the process itself. It is merely a representation. Is it possible that alignment research has mistaken
their concepts and models for the “real thing”? And if this is the case, how might researchers come to understand the messy world of everyday organizations, a world that does not seem to conform to the models?

It is important to remember that although alignment models and concepts may grow in their sophistication and gain greater acceptance among academics, they are still simply concepts, models, and abstractions from the everyday world. This, in itself, is not controversial. The point at which researchers claim that such abstractions have a practical application is precisely where the controversy begins. This is because it is relatively easy to abstract knowledge from the social world but it is much harder to do the reverse, to demand that such a complex world conform to such abstractions.

To some extent this has already been acknowledged. A seemingly continual topic of debate within the IS and management literature is the relevance of the knowledge being produced and its applicability in practice (Ghoshal, 2005; A. S. Lee, 1999; Orlikowski & Baroudi, 2001). This concern is reflected in other critiques of alignment that suggest that its models have little impact on those making everyday decisions and that while those decision-makers may be aware of the notion of alignment and its discourse, their awareness of it has little impact on their behavior.

This is not at all to suggest that such academic knowledge has no affect. It often does have a real impact, but not necessarily in the way its creators intended. In the case of alignment, we find managers discussing it frequently, but then we find that strategy is unclear or constantly changing, or the technological systems are frequently failing or refusing to integrate with other systems, which in turn leads to the creation of small ad-hoc strategies (“work-arounds”) by all kinds of people in the organization -not simply managers. Maybe this is what alignment actually looks like?

These possibilities signal a need for a degree of theoretical sensitivity. By this I mean not the introduction or the production of theory for the sake of theory, but a deeper reflection on “alignment”, its core concepts and a more modest reporting of how these concepts are appropriated in everyday practice. A theoretical sensitivity would also entail the inclusion and account of the strategies, methods, and theories of those actually engaged in the work of aligning strategy with technology and making sense of their connection.
I use the term “theoretical sensitivity” as it is used in grounded theory approaches (Bryant & Charmaz, 2010; Charmaz, 2006; Corbin & Strauss, 2007; Glaser, 1978a; O'Reilly, Paper, & Marx, 2012). The notion of theoretical sensitivity describes a specific way in which the researcher positions his/her self in relation to their subject. Rather than strive to produce an “objective” account of their subject the researcher recognizes the fact that their participation in the research no matter how limited or invasive, precludes such a goal. Instead the researcher immerses themselves in their subject’s world and attempts to see this world from the position of the participants.

Developing a theoretical sensitivity toward the phenomenon of alignment seems to be impossible if research continues its quest to emulate the natural sciences and produce positivistic accounts of social processes. I agree with Lee (1999), when he suggests that

If we wish our research to be relevant to practitioners, then we ought to consider doing our research in a way that emulates inquiry in the professions, whether in addition to or instead of doing research in a way that emulates the natural sciences (A. S. Lee, 1999, p. 29).

Theoretical sensitivity can be enhanced with professional and or background knowledge and experience which enables the researcher to make sense of what they are seeing and it’s degree of significance (Corbin & Strauss, 2007, p. 34). It enables the researcher to “grasp the meaning and respond intellectually (and emotionally) to what is being said in the data in order to arrive at concepts that are grounded in the data. Later, when it comes to write the findings, the same sensitivity enables researchers to present participants stories with an equal mix of abstraction, detailed description, and just as important, feeling” (Ibid, 41).

**Aligning What Exactly?**

This chapter provides a review of the research literature on alignment. It has drawn attention to the variety of perspectives and approaches commonly seen in the literature and places them with their historical context.
It began by providing an overview of the current state of alignment research and its conceptual development. One thing that is clear from this review is that the concept of alignment is anything but clear. The attempt to operationalize such an imprecise concept appears to have inspired a succession of models that have, to varying degrees, attempted to reduce and simplify a complex process.

The review then elaborated the concept through a presentation of two of the most widely cited models of alignment: the Strategic Alignment Model (SAM) and the Social Dimension Model. While the Strategic Alignment Model (SAM) has been perhaps the most influential within the field, researchers have widely acknowledged that it fails to capture the social factors that appear to be decisive in determining the process. Yet both approaches are emblematic of a positivistic approach to the phenomenon, an approach that dominates within the IS literature. Despite their sophistication such approaches are ill equipped to understand the messy and complex world of organizations.

Finally, the review suggested three thematic points of focus or “needs” that I have suggested should be considered for future research. First, there is a need for conceptual precision, which is not only good research practice, but also a logical precondition of any attempt at measurement or quantification. Second, there is a need to reframe the problem such that its scope can be broadened and so that researchers can incorporate insights that may be relevant to the alignment problem. Third, there is a need for a degree of theoretical sensitivity or a change of attitude and position on behalf of the researcher. This would entail a willingness to immerse themselves in the real world context of the people and things they are studying, to observe how people align strategy and technology together in practical contexts, the problems they come across and the solutions and practical theories they use to confront these problems. All of these needs urge a deeper reflection on the nature of the phenomenon and the epistemological problems that have plagued previous research.

If the research on alignment indicates anything, it is that alignment is not just a contingent process; it is a process that is full of complexity. This complexity has not been adequately addressed within the research literature and requires innovative epistemologies that are able to contain the relational, the variable, the ephemeral and the contextual. A great discovery of social sciences has been to demonstrate precisely how complex systems can emerge from simple relationships. What this means is that
there is always simplicity within complexity and thus the opposite of complexity is not simplicity but rather complication could be that this is what alignment research has been doing all along! In the next chapter I will address these issues and propose a theoretical framework that is better suited to tackle the needs I have identified.
Chapter 3. Theoretical Framework

The selection of a theoretical approach should be motivated by the research problem one is trying to understand. As the previous chapter demonstrated the problem of IT alignment involves complexity, contingency, and context. Any theoretical approach aimed at investigating alignment should endeavor to address these themes in some detail. Yet prior research approaches have generally not bothered to take up these aspects of the problem in any sustained way. In fact, despite the volume of work on alignment there remains no generally accepted theory at all! Nor is there much consensus on the key variables that are involved, the evaluative criteria (“indicators”) of alignment, nor much agreement on how alignment is achieved much less sustained. These observations point to some basic research questions I have identified:

1. If alignment is about the relationship between organizational performance, IT, and change, how are various groups of social and material elements involved in mediating this arrangement?

2. How can we build a substantive conceptual approach to alignment that can capture the complexities and the heterogeneity of these elements and their interconnections?

Both of these questions came from even simpler questions. What does it mean to talk about IT alignment? When actors speak about “alignment” what exactly are they referring to? What does it look like? How does it happen? What’s going on? I also made the point that as a social scientific topic of inquiry, early research on alignment may have drawn attention to new and interesting questions about the transformative potential of IT in organizations. But to some extent these questions lure researchers into classical sociological problems, which as the literature review also suggested, are tricky to navigate. IS theorists are well aware of the problem of accounting for the interface between social and technical aspects of alignment, as well as the structural and agentive dimensions of the problem. For the concept of alignment to have any substance, researchers must be able to show more precisely how intentional human action
connects to, and in some cases changes broader organizational structures in which these actors are situated, and how IT is involved. There is an obvious demand for a more sophisticated theoretical approach. This chapter lays out one such approach.

Actor-network theory (ANT) represents a theoretical approach that emphasizes the empirical description of sociotechnical (actor) networks, their formation, diffusion, and mutability. The approach has been widely adopted in sociology of technology and science and technology studies (STS) (Hackett, Amsterdamska, Lynch, & Wajcman, 2008). It has also had an impact on organizational sociology (Alcadipani & Hassard, 2010; N. Lee & Hassard, 1999; Whittle & Spicer, 2008) and information systems research (Doolin & Lowe, 2002; Hanseth, Aanestad, & Berg, 2004; Arthur Tatnall, 2011; Arthur D Tatnall, 2010). Despite its usage in these fields, ANT has not had significant traction among those studying education or its administration (Fenwick & Edwards, 2010).

ANT’s theoretical approach is grounded in the empirical observation of sociotechnical (and sociomaterial) relationships. This gives it the ability to render the concept of alignment with a higher degree of detail and conceptual resolution compared to deductive approaches that begin with formal concepts and then try to extract general principles (see chapter 2). ANT has garnered a bit of an iconoclastic status within sociology and has been criticized on several fronts. One that deserves particular attention is the suggestion that while ANT may be useful in describing localized sociotechnical interactions, it completely ignores the role of structures in regulating patterns of interaction. Because ANT lacks a suitable category through which the idea of structure can even be conceived, it is unclear how it can work to explain organizational change, which is a foundational piece of the alignment puzzle and a major interest for educational researchers and professionals (Hargreaves, Lieberman, & Fullan, 2010). Because of this, I have incorporated ideas from structuration theory (Giddens, 1979; 1986; 1993) in order to improve the approach and acknowledge the importance of structure in accounting for the complex relationships between education, IT, and systemic change. Structuration theory improves this approach by providing concepts that operate as "sensitizing devices". It provides ideas that operate in the background (and at a higher level of abstraction) to orient the approach, and provide a lens through which to
view the relationship between sociotechnical structures and situated actors. The purpose of this chapter is to explain this theoretical approach, and its foundational ideas.

**Actors, Networks, and Actor-Networks**

Bruno Latour cemented ANT’s controversial status when he made a puzzling statement: that “we have never been modern” (Latour, 1993). For Latour, the “modern constitution” that is, the idea and project of modernity has been predicated on a continuous attempt to divide, separate, split and slice reality into neat analytically differentiated categories and domains. This process of analytical division is at the core of modern thought. It has been so influential in crafting the epistemological lenses through which we view the world. Our modern experience of reality is distinctive in that so much of it has already been decomposed into these neat divisions for us: Internal/external, meaning/function, business/IT, teacher/student, and perhaps the most troubling one, social/technical. Latour’s statement, that “we have never been modern” is a reminder that these distinctions upon which so much of our knowledge rests, are artificial. To be clear the contention is not that these distinctions are phony, but that they are artificial. They are products of modern thought that appear to be so obvious that they are not worth questioning.

ANT tries to explore these commonsensical distinctions by adopting a peculiar methodological principle referred to as *generalized symmetry* (Latour, 1993). Generalized symmetry is an analytical strategy based on the assumption that human and nonhuman entities each have an equal claim to agency. ANT extends the category of “actor” to include material things (such as technologies) in an equal way, alongside humans. At first glance, of course this is absurd! Surely, to claim that both humans and things have equal claim to agency is, to some extent, fashionable nonsense (Sokal & Bricmont, 1999). But it is this absurd contention that has made ANT famous and infamous at the same time. I will address some of the criticisms of ANT in a moment. For now, we should view the idea of generalized symmetry simply as an analytical strategy to account for the complexity of the relationship between the material and social aspects of alignment.
From Deliberative to Situated Action

If the thesis of generalized symmetry is accepted, then what one also gets is an increase in the quantity and quality of variables that must be accounted for in the inquiry. Any alignment inquiry must also incorporate things into the analysis and treat them not simply as objects that people manipulate, but agents that effectively make others act. To reflect this unusual disposition toward actors, sometimes ANT scholars will use the term “actants” as a way to acknowledge the amalgamation of human and nonhuman within one conceptual term. The second step in ANT’s approach is to move from a deliberative conception of actors and action to a situated understanding. From the standpoint of situated action theory (Agre, 1997; Clancey, 1997; Hutchins, 1996; Lave & Wenger, 1991; Nardi, 1996; Suchman, 1987), the idea that nonhuman entities can be actors is easier to accept.

We can start with the premise that all human actors possess intentionality. They have the capacity to act in accordance with a purpose or a goal. People act to seek the realization of goals, and they can do this in several different ways. The important point with intentional action is that this intentionality is a quality that is ascribed or attributed to one actor by another. In an organizational setting, the purpose or goal of an actor’s actions is, therefore, something that is always interpreted and mediated within a social context or environment, by another actor or actors.

There is more than one way to view intentional action. One common understanding is to view it as deliberative. This view of action, developed out of early cognitive sciences (Dupuy, 2009), remains (implicitly or explicitly) influential in work on organizational strategy and IT alignment to this day. Deliberative action theory suggests that actors learn about and construct their social environment by interacting with its symbols and objects and formulating relations between them. As they do so, they are essentially constructing an abstract mental model of how this environment works such that they can consider the best course of action.

The problem with this understanding of action is that it can only produce static explanations of action that are very abstract. Subscribing to a deliberative view of action commits one to the realist assumptions that the organization, and its social environment, appears as an objective entity. The actor apprehends this objective world in a
straightforward and unambiguous way. A strategy is a strategy. A technology is a technology. The organization is aligned or it is not. These things are clear to everyone involved. Whichever element of organization one is discussing, the mental model of the organization that the actors work to create is relatively fixed and ideal. These abstract models are then formalized in a strategy or plan which is used to realize an intended goal.

While this view could be true, there are many reasons to believe that the elements that comprise an organization’s social environment are often not completely static. They are dynamic. There are also reasons to believe that the relationship between cognition and action, thinking and doing, are not that abstract. In contrast to deliberative action theory, to view action as “socially situated” is to assume that actors do not act in accordance with some abstract mental model, but that they act based on their embodied perception of the social environment around them, the events that they can see, and the other actors they interact with. Here, the social environment of the organization is not static at all. It is composed of other elements that are constantly changing, presenting new opportunities and challenges that must be confronted. It is, in a sense, comprised not only of human, but also nonhuman actors that are constantly making demands upon each other to act.

In ANT’s jargon, a nonhuman as the name implies, is any thing or entity that is not human. Such entities are relevant insofar as they have the ability to “act”. They possess an ability to make others do things; they can affect action and therefore satisfy the requirements for the category of “actor” if only in a minimal way. If this premise is accepted then the idea of an actor can be radically expanded to include all the objects as well as people that can be found in an organizational setting. Anything that is capable of producing an effect becomes an actor: humans, computers, buildings, pens and pencils, books, curriculum guidelines, and so on.

**Networks**

What makes these “actors” actors is the fact that they are all interrelated to each other through a network. For an actor to act, they rely on other actors within the network. For example, before a pencil can act it needs to be transported to the school and delivered to a classroom by a courier. Before this can happen it needs to be purchased
by someone who is charged with tracking the stationary needs of the school. Before this can happen, funding needs to be secured to place the order, and so on. These are only a few of the many actions that need to happen simply to get a pencil into a child’s hands before any teacher can act, whether its showing them how to write the alphabet or sketch a picture. Each of these actors acts in their own way to mediate and intermediate the complex but essentially technological practice called “education”. In fact, actors are inseparable from their networks - hence the name of the theory.

How does ANT understand the concept of network? We can answer by dispelling some common misunderstandings of the term. In ANT, the concept of the network is not confined to a technical definition. While the term is often used in the context of a computer network for instance, this is not what is meant in the theory. Another misunderstanding is that “network” refers to a social network. Social network analysis for example, concerns itself with social interactions between individuals and attempts to discern patterns in their proximity, distribution and frequency. This usage of the term “network” is also inadequate because it is exclusively concerned with individual human actors. As mentioned earlier, humans are not privileged in an ANT analysis.

In ANT the idea of the network has been conceptualized slightly differently depending on the author. Callon (1991) for example, defined “network” as a noun, a thing that contains relationships between smaller entities. Latour has spoken of networks being comprised of processes of “net-work” (Latour, 2005, p. 131). Latour’s definition emphasizes the essentially productive and processural aspect of networks and networking. Both understandings are nevertheless united in their insistence that any network is always composed of human and nonhuman actors. Networks are fundamentally sociomaterial constructions (things) that tie people and technologies together (processural) into a larger whole. Each actor that is part of the network has the possibility of influencing the network’s development and dynamics in some way. It is important to note that each actor within a network, regardless of whether it is human or not, is context dependent. Actors and networks dynamically build each other. While ANT analyses may draw some descriptive distinction between the categories of human and nonhuman, it makes it explicitly clear that social and technological actors are deeply woven together. Changes in one group can affect changes in the other.
Inscription and Translation

If we wish to gain a deeper understanding of the interactions involved in enacting alignment, there is more to be gained than lost when we expand the scope of analysis to consider how technologies and other nonhuman entities can have (at least a degree of) agency. While human and nonhuman actors can each affect changes in the other, how does this happen? In exploring this question, this dissertation is especially interested in two foundational concepts taken from ANT: inscription and translation (Akrich, 1992; Callon, 1986; 1991; Latour, 1987; 1999; 2005).

Inscription generally refers to a process of creating a pattern of relationships, scripting or programming a series of actions into a technological device, with the expectation that these relations and actions will be realized through the object's use. In studying this process, the analyst typically focuses on the activities of designers, engineers or developers. The focus is on the actors who are tasked with creating the technical device where actors are making decisions regarding the object's features, functionality, the roles the technology is designed to support, its governance and controls that set out what actors can and cannot do with it. Through the process of inscription designers, developers, architects and so on are engaged in a process of embedding their interests into the technical object itself (Callon, 1991, p. 143). The concept of inscription is more abstract than that of design or programming. It emphasizes the fact that technologies have functional qualities, but also have socially meaningful qualities that are important in organizational and institutional contexts. Inscription describes the way designers and developers bring these qualities together and embed them into the device.

It is not so much that inscriptions are "hardwired" or coded into a technological object (although sometimes this clearly happens) but rather that such inscriptions operate to limit the range of functionality and meaningful interactions that can take place between users and technology. They are expressions of human intention and as such represent a program of action. The strength of this program is also design consideration and is usually part of the design process. In some scenarios inscriptions are inflexible and thus devices exert a strong program of action on their users. Users have no choice but to accept the design and comply with the program. This design choice can prove extremely prudent, for example, in scenarios where technical systems govern
emergency responses and human beings are under duress. Bad technological design in these types of scenarios can have catastrophic consequences. In other instances inscriptions that comprise a program of action are weak; users are afforded a range of possibilities of how they proceed with an interaction. An example of a technical system with weak inscriptions may be an operating system that allows users to perform thousands of interactions in several different ways depending on how they wish to use the software. In some cases, technologies that demand strict compliance can be subverted by users who “work-around” these limits. In ANT, this phenomenon is described as an “anti-program” (Latour, 1992).

Translation is the second foundational concept in this dissertation. Translation refers to a multistage process through which actors (human and non) qualify, negotiate and align their interests, connect to each other and change the configuration of the actor-network. Translation does not mean simply converting or transmitting meanings from one form or context to another, but actively shaping these meanings through the process itself. As Callon notes “to translate is to displace... to translate is also to express in one’s own language what others say and want, why they act in the way they do and how they associate with each other” (Callon, 1986, p. 223). Like the translator of any text, users of technology are actively creating and shaping the meaning of technology as they interact with it. The same goes for social interaction as well. In translation, actors are interpreting each other’s communications, statements, proposals, and so on, and reconstructing them so that they make the most sense to them. Translation is a process that is largely emergent where actors are negotiating meanings within the context of the interaction itself. It is by no means a determined process. It can happen quickly or slowly, completely or partially. Translation is often non-linear, it flows backward and forward. Translation can lead to increased understanding or increased confusion. Its success or failure depends on the perspective and focal point that the analyst adopts.

Consider for example a meeting between district level school administrators, where they draft a school district vision and strategy document. This, in itself, involves significant work on behalf of the participants to translate their interests with each other and build some degree of consensus. Once completed, this vision and strategy is then inscribed in the form of a document typed by a staff member who is also involved in the translation process. This staff member then uses their computer to email it to other
district administrators and staff. At this point, these actors interpret or “translate” the
document and then refine this translation through meetings with their own team.
Members on the team decompose the document into a series of tasks and enlist the
help of others to work on and complete these tasks. Although this description is too
simplistic, the point is that through each stage, the process of translation is at work. It
involves multiple actors, human and non, separated by space and time.

It is through translation that actor-networks become more robust. Yet at the same
time, no network regardless of how stable it may be, can be completely stabilized.
Because the process of translation is perpetual and ongoing some translations reinforce
network stability while others may work to destabilize the network and change it. This
also does not eliminate the possibility of new networks forming within existing networks.
For example, a school district may invest heavily in a learning management system
(LMS), installing and configuring it, promoting it, training users and so on. What is
happening here from an ANT perspective is that demands are being translated through
various human and nonhuman actors and a network is beginning to take shape. At the
same time a small group of teachers may opt to deploy their own LMS system (easy
enough today with software-as-a-service) and convince others of its superiority. They
might represent a smaller network within the network and a potentially destabilizing
force. According to Callon (1986) translation involves four stages:

1. **Problematization:** this initial stage refers to an instance, challenge,
problem or demand to which an actor can offer a solution.

2. **Interessment:** the second stage describes a refers to the degree to
which other actors begin to take notice, see the value in a proposed
solution and support the solution.

3. **Enrollment:** in this stage actors begin to negotiate with other actors,
demonstrate how the proposed solution is aligned with their interests,
and attempt to convince other actors of this value.

4. **Mobilization:** in this final stage the actor-network begins to emerge,
actors leverage their mutual interests through this network and
marshal other actors to become a part of it.
The concept of translation is complex because it involves numerous interactions and points at which meanings are communicated. It is also contingent because while it may be obvious that actors are exchanging meanings with each other, it says nothing about how such meanings are understood and acted upon. At each point, the actors are not simply sharing or passing along information or meanings, they are actively adjusting and shaping this information, in order to persuade or even manipulate each other into adopting their interpretation of the solution over other possible interpretations.

Some Criticisms of ANT

The previous sections laid out the core components of the theory at a basic level of detail. These details are meant to orient the reader and prepare the foundation for the chapters that follow. ANT provides a provocative approach and methodological strategy to study the alignment of sociotechnical systems. But like all provocative theories, ANT has drawn considerable criticism. I want to take a moment to address the two that are most applicable to this dissertation.

Is ANT amoral?

One of the most common criticisms of ANT is the charge that its principle of generalized symmetry invariably leads to an unethical and amoral representation of the subject matter (Collins & Yearley, 1992; Pels, 1995). A similar criticism is that ANT is politically vacuous and it represents a brand of social theory that is flippantly indifferent to the social and political consequences of technical decisions (Walsham, 1997). In some cases, these consequences can be very important because they reproduce dominant political power structures, and privilege the interests and biases that operate to condition such decisions (Grint & Woolgar, 1997; Winner, 1993). These critiques often assume that through the systematic blurring between humans and nonhumans, people are somehow robbed of their sacred status as moral actors and that there is insufficient attention paid to the positions they occupy and the power they wield (Knights & Murray, 1994). Not all actors are, or can be, equal.

While it is true that humans do not have any privileged position within ANT, neither do nonhuman objects or technologies. Defenders of the ANT approach would
suggest that ANT maintains its analytical radicalism by refusing to carry the baggage of modern social theory. ANT does not suggest that morals, ethics and ontological politics are unimportant, but only insists on refraining from judgments that are formulated outside of their immediate site of inquiry (Latour, 1991.130). Critical sociological perspectives approach the research area with an a priori sensitivity to political conflicts, themes of power, and domination. While these themes are important, ANT instead focuses on getting the description down first before it makes any judgment about morality or ethics.

Furthermore, strong adherents to ANT typically attribute asymmetries of power or the notion of social or technical domination to being effects of the configuration of the network rather than the results of decisions made by specific individuals. Because network configurations are always contingent, any semblance of domination or power is always unstable and vulnerable to contestation and change. Actors do not derive power based on their place within an organization chart. Nor are they powerful because of their functional role within the organization. The power of an actor is attributed to their position within the actor-network and their ability to mobilize the network toward their goals.

For example, ANT scholars might argue that the power relationship between a teacher and student is an effect that is produced and sustained by the network that creates them as actors. Imagine what would happen if we modified or removed a teacher’s competence, their textbooks, instructional technology, desks, the classroom in which they work, the curriculum they teach and so on. A teacher would eventually no longer be in a position of power, much less a teacher. What makes a teacher a teacher or a student a student, is not something that is essentially inherent within them. What makes them what they are is all the items and materials that act to produce a person and a role that is recognized and accepted as a teacher or a student. Their identity, designation and power as far as ANT is concerned, is an outcome of the network within which they are embedded.

Any teacher has likely experienced an episode where their students have attempted to undermine their authority or power. What is happening here? What teachers may understand as an instance of “insubordination,” ANT would view as an attempt by a student (or group of students) to destabilize the actor-network of a classroom or school, by enrolling other students into a localized or micro level resistance
movement or anti-program. The goal of this anti-program may be self-expression or meaningless disruption, but the point is that power circulates between these actors and groups and is difficult to monopolize or confine.

**Problems of Structure and Scale**

Perhaps the most challenging criticism of ANT is that while it is adept at describing localized micro interactions between humans and technologies, it ignores the larger macro organizational and institutional structures that house, shape and reproduce such interactions (Harbers, 1995; Reed, 1997; Walsham, 1997).

Part of ANTs intellectual lineage can be traced back through ethnomethodology (Garfinkel, 1991; Garfinkel & Rawls, 2006). ANT carries this ethnomethodological lineage forward considerably in its insistence that it is these localized, contingent interactions that are the source of organizational order (Callon & Latour, 1981). Like power relations, ANT views the structuring capabilities of organizations or institutions as effects of the actor-network. As Latour has stated, macrostructures and microstructures are composed of the same thing, namely interactions between actors (Latour, 1991, p. 118). Structure is seen as a “relational effect” (Law, 1992, p. 386). Structure is something that is left behind, the residue of interaction. As Reed (1997, p. 26) notes “the world of the actor-network theorist…seems to consist almost totally of verbs and hardly any nouns: there is only process and structure is regarded as a passing effect.” Ignoring the idea of structure is a huge limitation in studying alignment because it becomes difficult to explain how organizations and institutions maintain any degree of continuity and integration across space and time. If we were to believe ANT, it is almost as if organizations would fall apart as soon as actors stopped acting! There is little appreciation for how structures enable the actors to act in the first place. ANT pays little attention to the ability of structures to compel action across space and through time, and their ability to do so in a way that is independent of the actors, their attitudes or behaviors.

This is an important point of different between ANT and other sociologies. In ANT, the analyst is lead to believe that what is often called a “social system” or an “organization” is composed of an incredibly large collection of micro-interactions, which are constantly shifting and acting to hold the entity together. ANT implies that these
relationships are fragile and precarious. What is often called an “education system” for example, is simply “shorthand” for a collection of localized micro-processes of interaction. The point is that ANT systematically underestimates the stability of organizations. While it can be said that nonhuman actors do play a role in reproducing organizations and that these actors can be dynamic, this role is limited and complemented by “the social”, that is, structures and systems that are immaterial and resilient in a sociological sense.

To summarize, taken to the extreme, any organizational analysis as far as ANT is concerned would be difficult because anything resembling an organization is merely a temporary and precarious social and material achievement, and difficult to qualify as a unit of analysis. One can disagree with ANTs stubborn refusal to acknowledge structure on theoretical grounds, but more to the point, one can disagree on purely empirical grounds. The education system as well as the districts and schools that comprise it is a given. It has a socially defined and experientially taken for granted structure that allows it to behave the way it does. Denying this reality or attributing it to some kind of “network effect” amounts to a self-denial at best and delusion at worst.

**Structuration Theory**

The limitations of ANT (especially its refusal to offer a clear concept of structure) make it difficult to meet the theoretical “demands” I have set out in the previous chapter. This is why I have supplemented the dissertation’s theoretical approach by integrating ideas from Giddens’s structuration theory (Giddens, 1979; 1986; 1993). Structuration theory improves the dissertation’s theoretical approach by providing an explanation of how structural and interactional elements of alignment are linked together through the duality of structure. The idea of a duality of structure can be considered as a sensitizing theorem. It is useful in drawing attention to the recursive logic of alignment, and it’s relationship to organizational transformations.

Incorporating structuration theory with ANT is not without difficulty. Yet these approaches complement each other nicely. Structuration theory is an approach that is ultimately about human action and the fundamental necessity of structures in the reproduction of social organization. As I’ve already pointed out, ANT’s unconventional
treatment of concepts leaves the nature of this relationship between structure and action vague. At the same time, structuration theory has little to say about the materiality of this relationship and the role of technologies reproducing organizational configurations. So while structuration theory and ANT are different in their orientations and style, there is a measure of complementarity that can be exploited here.

**The Idea of Structure**

Giddens’s work on structuration theory represents an attempt to solve the structure-action dichotomy within social science. The idea of structuration refers to the way in which both structural and interactional elements recursively implicate each other in the production of everyday social reality. Giddens’s work is notable in that it represents perhaps the most elaborate attempt to rethink structure as a central concept in social science. Structure remains an indispensable metaphor because it provides us with a way to describe the continuity of relations, interactions and behaviors that form the basis of institutions and organizations. While the idea of a material structure is straightforward, the concept of a social structure deserves some elaboration.

In a nutshell, structuration is an ongoing process whereby the structural properties of social systems are constantly shaping and being shaped by the actors working within them. In the theory of structuration, structure signifies a “virtual order ... that exists, as time-space presence, only in its instantiations in practices as memory traces orienting the conduct of knowledgeable human agents” (Giddens, 1986, p. 17). It is important to remember that Giddens uses the term “structure” in a strictly sociological sense. In the theory, structure is not a concrete thing. Nor can it be conceived of as a kind of pattern that is inscribed into technologies or other material items. Of course, buildings or software have a definite structure to them, but Giddens’s interest is only in social structures insofar as they are relevant to sociological theorizing. Social structures are only perceptible in relation to time, and more directly, the perception of time that is given only to human actors in the form of “memory traces”. As for material structures such as facilities or technologies, in structuration theory, they are only relevant insofar as they can be used by human agents to do something, or to affect action in some way. They are “modalities”, that is, ways or methods of expressing social power. I will come back to this in a moment.
Social structures incorporate many elements such as power, communication, permissions and penalties in the form of sanctions. These features of social structure are largely apprehended through practice, as actors move through their daily activities. These activities are determined partly by structural (i.e., nonhuman) elements, and partly by the situated actions of other (human) actors. It’s difficult not to notice the correspondence here to ANT’s proposal for generalized symmetry, although structuration theory’s treatment of the relationship between nonhuman and human elements is much more conservative. As I said a moment ago, human actors are the focal point in structuration theory. Nonhuman elements are subordinate to the intentions of actors.

According to the theory, social structures are composed of two integral elements: rules and resources. Giddens’ discussion of rules is indebted to structuralist linguistics and can be easily understood by drawing on an elementary linguistic distinctions (Sewell, 1992, p. 6). Take for instance, the linguistic distinction between langue (the abstract rules that constitute grammar) and parole (the act of speech). One cannot exist without the other. One cannot talk about the rules of grammar without actually talking about them. This point is important. According to the theory, structures are composed of abstract (“virtual”) rules that are enacted by people through social practices. Rules can be viewed as “generalized procedures” that actors draw upon in the course of their daily activities (Giddens, 1986, p. 21).

How do people acquire this competence though? Structuration theory acknowledges that situated actors are knowledgeable but does not really explain how they become knowledgeable or how it is that such knowledgeability can vary greatly depending on the actor. One explanation is that such knowledge acquisition can be understood anthropomorphically through various cultural mechanisms (Sewell, 1992). Educational organizations are distinctive in that their “culture” is, to a great extent, highly professionalized and controlled. It is through the process of professionalization that teachers come to understand the general procedures of teaching (the rules of the game/the rules of the classroom) and how to enact them. These rules specify the conventions of teaching, from the roles of teachers and students, to the types of assignments handed out, to the types of assessment protocols that are deployed at the classroom and district levels. These rules are generalizable. Educators carry them from
class to class, school to school. And so in this sense, they are abstract and virtual, yet are essential in conducting and structuring the business of education. It makes no sense to talk about structures without talking about the practices that enact such structures. Social structures cannot be separated from the practices, which enact them. The social structure of the education system, for example, cannot exist apart from the practices of education itself. From school districts down to classrooms, it’s possible to observe the business rules of the institution, even though educators often do not see them or refer to them as such.

The second component of structure is “resources.” We can understand resources simply as “anything that can serve as a source of power in social interactions” (Sewell, 1992, p. 9). Resources can be of two types: nonhuman and human. Nonhuman resources obviously refer to objects used to wield power, to do things and to make things happen. Naturally, human resources are simply that. They contain embodied knowledge and skills and can also be deployed to an act in specific arrangements and to get things done. Regardless of whether one is interested in human or nonhuman resources, both mediate power relationships between actors within organizations. The extent of their mediating power depends largely upon their ability to connect to and access other resources, human and nonhuman.

While rules are virtual in the sense that they are abstractions, resources cannot be considered “virtual” in this sense. Human or not, resources are material entities regardless of whether they are embodied in human bodies or technological ones. This presents a problem for structuration theory in the sense that structures are said to exist only as virtual constructs. Structures clearly have virtual (i.e., “social”) elements. But they are also material. This is something that is understated in structuration theory, but that ANT picks up on from the start. What is interesting and crucial in understanding the idea of structure, is accounting for how human and nonhuman resources (ANT would simply say “actors”) connect and communicate with each other in order to establish and enforce rules and other governing mechanisms, and to mobilize resources in a strategic way.

**Modalities**

Structures must, at some point, connect actors and their interactions in some way if they are to be useful at all. But at the same time such interactions must also be
capable of modifying such structures. Any theory of organizational change must be able to show how this connection works (Quinn & Cameron, 1988). One cannot attribute organizational change solely to social interactions any more than social (and material) structures. In structuration theory the connection between structural and interaction levels of analysis is explained by the idea of “modalities.” Giddens explains that modalities mediate this structure-action relationship and while they are analytically distinct, actors draw upon them all at once. These modalities are separated into the following categories:

*Interpretive schemes:* refer to all the formal/explicit and informal/tacit knowledge that actors bring to their everyday practices, as well as their embodied experiences that inform their actions.

*Facilities:* are resources that actors may mobilize in order to effect their intentions or agendas. For example a facility could be a building that organizes people in specific ways. A facility could also be a technology or technological system that achieves the same effect.

*Norms:* are ideas, attitudes, habits that work to guide and influence action and guide it in everyday routines.

![Diagram of modalities and interactions](image)

**Figure 3.1. The relationship between structures, modalities and interactions. Reproduced from Giddens (1986, p. 29)**

These modalities operate to recursively construct and enact the structural properties of social systems For example, interactions (comprised of communication, informed by power relations, and capable of bringing about sanctions) draw upon their
corresponding modalities to enact and change specific properties of social structures. The process works in reverse as well. These properties of social structures are expressed through modalities that shape and constrain interactions.

What do we mean by an Education "System"?

When these ideas are combined we finally arrive at the idea of a social system. The idea of conceiving change at a system level has become pervasive in education yet the explanation of what “the system” actually is (what it is made of) is almost always underspecified (see for example Fullan, 2010). It is difficult to change the system when one has only a basic conceptual understanding of what the system is, and how it works.

Generally a system refers to a collection of interdependent parts that each function to reproduce a functioning whole. This description of a system is indebted to generalized systems theory (Bertalanffy, 1969) and has been a common starting point for systems thinkers in organizational theory (Deming, 1994; 2000; Seddon, 2008; Senge, 1994) and social systems theory (Luhmann, 1995; Parsons, 1951; 1960). However in structuration theory the concept of system is a elaborated in a slightly different way.

In structuration theory, social systems are comprised of a multitude of practices that are empirically observable and purposively interconnected. Systems, for Giddens, are what link actors together across space and through time. It remains difficult to clearly associate systems with analytical levels like “macro” or “micro” because this determination depends on the perspective of the researcher and the unit of analysis they select. Nevertheless systems have boundaries, which in many cases, push against each other and overlap. The school classroom can be thought of as a social system, as can the school itself. Likewise, the district be treated as a social system, which exists as one part of what we call the education system. And so there is a layered quality to systems, where each layer is interconnected to others.

One final note regarding systems. Systems and practices are inseparable. Without specific practices systems would be unintelligible. What is an education system after all without the practice of teaching and learning? For systems to reproduce
themselves, for a system to “work” the practices it houses must also be reproduced with some regularity, and as the previous comments have indicated, structures are essential to recursively animating this process.

**Theoretical Sensitivity and the Duality of Structure**

The addition of structuration theory to ANT adds an explanatory depth to the dissertation’s largely descriptive approach. I have already made the point that ANT can be extremely useful and, in fact, was designed to be used extensively in empirical work. Structuration theory, in contrast, was not. It operates at a much higher level of abstraction. Talk of social structures, systems and modalities may be interesting to theoretical sociology but how are these ideas relevant to empirical work? The question is more complicated than it seems. There has been no shortage of empirical IS work that has used structuration theory (Barley & Tolbert, 1997; DeSanctis & Poole, 1994; Jones & Karsten, 2008; Orlikowski & Baroudi, 2001; Pozzebon & Pinsonneault, 2005; Walsham, 2002). This would make it appear as though it was a suitable vehicle to explore empirical problems. But the usage of structuration theory in this way is not without risks. Recall from the previous chapter that a recurring problem for IS research that much of it remains theoretically abstract and as such, it is argued that it has little relevance to the empirical problems that inspire it. IS researchers have been criticized for barricading themselves behind theories that have little relevance or impact beyond the academic domain (A. S. Lee, 1999).

Giddens has commented on this (Giddens, 1989, p. 249) suggesting that structuration theory is not meant to be applied as a singular theoretical system. Rather, structuration theory is likely more useful if researchers can selectively use its concepts as “sensitizing devices” in their empirical work. What is meant by a sensitizing device?

The idea of a sensitizing device or concept is often used in grounded theory in order to bring theoretical sensitivity to the researchers approach. “Sensitivity” here refers to an awareness on behalf of the researcher, of more abstract concepts or ideas that may help to organize and bring some coherence to what they are observing. The notion of sensitivity can be attributed to Blumer, who suggested that most sociological concepts might best be thought of as “sensitizing concepts” (Blumer, 1954, p. 7). A sensitizing
concept can be understood in opposition to a “definitive concept”. The latter groups objects of study together in a class of objects that share common attributes. These attributes can then be clearly defined. Sensitizing concepts differ in the sense that they lack a tight specification. Because of this relative under-specification a sensitizing concept can only operate at a general level. This generality may lack empirical precision, but it can nevertheless be useful in orienting and guiding research that has a stricter empirical focus. Sensitizing concepts give researchers on the ground an aerial view of their research field.

Structuration theory adds this “aerial view” to my fieldwork and improves ANT by theoretically sensitizing its concepts, as well as my own observations. Descriptions of actors, networks, inscription and translation are grounded in empirical data and their reference to people, processes and things is fairly straightforward. However, the meaning of these concepts, their significance, is not entirely clear.

The most prominent and useful idea that I’ve taken from structuration is the duality of structure. By the duality of structure, Giddens is alluding to the essentially recursive logic of social life that is enacted by situated actors through their use of structures. Here structures are seen as “both a medium and the outcome of the reproduction of practices” (Giddens, 1986, p. 69). The idea is simple enough. Structures (rules and resources) work to shape situated activities in everyday life. Yet at the same time, these activities work to reproduce and change the same structures. For structuration theorists, like ANT theorists, it makes no sense to position action or agency in opposition to structure because each involves and implicates the other. Structures enable actors to act and this enabling capability brings with it the assumption that actors are knowledgeable enough to know how to alter or change a given structure if they desire. And so for structuration theory and ANT, the bifurcation between structure and action is simply a conceptual error. Likewise, the opposition between structure as a state or condition and structuring as a process is meaningless. Structure is a state that must be continually produced through practice.
Habitus and the Explication of the Duality of Structure

In order to further explicate the relationship between structure, agency and practice, I have drawn upon Bourdieu’s concept of habitus (Bourdieu, 1977). Like actor-network theory, Bourdieu’s work offers a relational sociology that is less interested in preserving distinctions between social and technical, structure and agency, macro and micro, and so on, and is more interested in how these categories are mutually constitutive. Even if we are inclined to take ANT’s suggestion and “follow the actors”, we can only do so for so long. Sooner or later the actors run into walls, barriers, boundaries and bureaucracy. But they also run into habits (but more than simply habits), ways of doing things, general dispositions and tendencies that contribute to a general attitude or mentality that is deeply ingrained in their practices. Whether these things are “network effects”, as ANT suggests, is not even the point. The point is that they do exist, they can be powerful, and they play an important role in shaping social behaviour. By incorporating Bourdieu’s concept of habitus, the dissertation further supplements the ideas gained from actor-network theory and structuration.

Although the concept of habitus has been defined slightly differently at different points in Bourdieu’s work (Calhoun, LiPuma, & Postone, 1993; King, 2000; Sullivan, 2002), it seeks to describe the ways in which structure and agency are mediated through practice. Like structuration, Bourdieu’s habitus suggests that the agency of actors in an organization or institution is always limited by social and culturally determined structures that embody the values, dispositions, and principles of organizational cultures (Emirbayer & Johnson, 2008). These cultures or groups inscribe these items into the social structure of the organization itself through their practices, a structure that in turn, serves to regulate social practices. It is through the idea of habitus that we can explain how the principles and dispositions of an organizational culture (as well as their specific practices) are made durable. For Bourdieu, habitus is the:

“durably installed generative principle of regulated improvisation, produces practices which tend to reproduce the regularities imminent in the objective conditions of the production of their generative principle, while adjusting to the demands inscribed as objective potentialities in the situation, as defined by the cognitive and motivating structures making up the habitus” (Bourdieu, 1977, p. 78).
Habitus does not specifically refer to structure nor action but the way both are brought into relation with each other, in accordance with “generative principles” that regulate improvisational interactions. Habitus is a way to understand how objective social and cultural structures contain and shape social processes of production, that have inscribed these generative principles into these social structures in the first place. In Bourdieu’s theory, social practices are to some extent always conditioned by structures, but structures are always the outcome of intersubjective improvisation which generally happens in accordance with a larger institutional program.

The main side effect of habitus is the reproduction of an objectively shared world with a consensual understanding of the practices that animate this world. The institutional tendency toward the homogenization of the habitus renders these practices intelligible and commonsensical within a given culture. To speak of a habitus is to refer to an “orchestration” (ibid), a “harmonization”, a mutual adjustment between actors, that happens without any direction, management, “intentional calculation”, or “explicit coordination” between or among actors (ibid). In this respect habitus goes even deeper and further than structuration in portraying the mediation between structure and agency. This mediation can be likened to a dance performed by many people, which comes to display regularity and a pattern despite the fact that the dancers are not deliberately or consciously trying to achieve this pattern. The purpose of incorporating it in this dissertation is to flush out the details of the structure-action mediation (the “structuration”) in further detail. Its helps explain social behaviours that enable or inhibit alignment, by focussing on structural characteristics of a slightly different type.

**Conclusion**

This chapter outlined the dissertation’s theoretical approach and foundational ideas. In order for the concept of alignment to be made meaningful, those studying it should be able to account for, in some detail, how intentional human action shapes and is shaped by organizational structures, of which IT is a critical element. To study this interplay I have adopted a hybrid theoretical approach that incorporates ANT and structuration theory. This approach addresses the demands I have articulated in the previous chapter: the need for conceptual precision, the need reframe the problem in
terms of the dichotomy between structure and action, and the need for theoretical sensitivity.

ANT provides a descriptive approach that remains grounded in the empirical observation of localized sociotechnical interactions. Its value proposition is its “material-semiotic” method, which demands that equal attention be paid to the human and technological aspects of alignment. This provocative analytical strategy, to extend a measure of agency to technologies, moves the analysis away from an exclusive focus on either the structural or social dimensions of the problem. What’s more, its emphasis on empirical description forces any study to moderate its abstraction, and to keep its focus on what alignment is in an educational organization, and how the actors work to achieve it or block its realization.

The addition of structuration theory improves ANT by expanding upon this sociotechnical interplay. This combination presents an improved approach because it links conceptual descriptions to a more general mode of theoretical analysis. Despite having little to say about the importance of technologies themselves, structuration theory captures the interplay between structure and action in a way that ANT cannot. It draws out the “duality of structure”, that is, the essentially recursive logic of alignment and how technological mediators are implicated in the task of “reproduction”. In other words, it gives insight into how organizational systems transform themselves across space and over time. The use of structurational and Bourdieusian concepts adds a degree of theoretical sensitivity to my empirical data, that would otherwise be missing in the work.

In my view, despite differences in theoretical abstraction, combining ANT, structuration theory and Bourdieu’s reflexive sociology creates a balanced conceptual framework that is able to deliver a "middle range" theoretical approach. This approach is well suited to study alignment because it is precise enough with respect to the relationship between empirical details and theoretical concepts, and yet abstract enough to make a meaningful theoretical contribution that is relevant to researchers across disciplines.
Chapter 4. Research Methods and Design

Introduction

This chapter provides an account of the epistemological approach and research methods I have drawn upon to explore the research questions I identified in the first chapter. I noted in chapter two that the dominant epistemological paradigm in IS research is a form of positivism, and I made a point that positivist approaches may have serious limitations when it comes viewing alignment as a complex and contingent sociotechnical process. My constructivist approach is distinctive in that it departs from the common positivist paradigm and rejects its epistemological assumptions. Instead of trying to follow the methodological preferences of the natural sciences (what appears to be happening in orthodox IS research), constructivism represents an approach indebted to interpretivism, but carries forward its assumptions in a more radical way. Yet, my theoretical approach and methodological orientation is not unprecedented in IS research. Several studies have drawn upon ANT (Hanseth & Monteiro, 1997; Timmermans & Berg, 1997; Walsham, 1997) and structuration theory (Barley, 1986; Barley & Tolbert, 1997; Hussenot, n.d.; Orlikowski, 1993; n.d.; Orlikowski & Baroudi, 2001; Orlikowski & Robey, 1991) within a constructivist paradigm.

This chapter describes my epistemological approach and how it informs my research design, the choice of methods and data collection techniques used in my research. I also acknowledge my own experience as a researcher and IT professional and discuss how these experiences were brought together through the course of my research. Finally, I provide some commentary on the validity of my work and the general acceptance criteria that I have worked toward satisfying.
Epistemological Orientation: From Positivism to Constructivism

I want to begin by addressing the epistemological orientation that has informed my research design. All epistemologies carry with them a set of philosophical commitments and assumptions that influence the kinds of questions researchers ask, the way in which they are framed and posed, and the approach used to address them. These commitments and assumptions can substantially shape the research project, yet are often buried beneath the actual content of the research. They are nevertheless important in understanding how theories and methodologies hang together through the course of any research endeavor. A brief explanation of my epistemological orientation is also indispensable in clarifying where my research is situated within the disciplinary domain.

**Positivism**

As I touched on in a previous chapter much of the research in IS theory falls within the paradigm of positivism (A. S. Lee, 1999; Orlikowski & Baroudi, 2001). The term “positivism” is complicated in that it connotes different interpretations from discipline to discipline. Nevertheless, positivism as it has been adopted in IS research (and social science research) generally attempts to imitate the epistemological orientation of the natural (empirical) sciences. Here, empirical observation is understood to be the most reliable source of knowledge about the world. Social science methods that are associated within this paradigm are often used to build models that can describe and predict the empirical phenomenon in question, and serve as a basis for extracting general laws, dynamics and features of their research object.

Positivists justify the above because they are committed to the assumption that reality is separate from the perceiving human subject. In other words positivism carries forward the long-standing philosophical division between perceiving subjects and the objectivity of objects within the world. As for such objects, they are discernible through their unique qualities that they inherently possess. And so for positivists, it is not uncommon to see their research stress objectivity, scientific control and neutrality, as researchers try to offer causal explanations that can be used as a basis for future
prediction and control over social phenomenon. For positivists, these features are what defines rigorous and valid research contributions.

While positivism often informs the epistemology of the natural sciences, it is widely regarded as being problematic when applied to the social sciences. The fact that positivism has been so widely adopted within IS research may be due to a number of reasons ranging from a latent desire or belief that doing so will enhance the credibility of IS research, or perhaps the dominance of the positivist paradigm has more to do with the institutionalized conventions that shape knowledge production and IS research.

Nevertheless for positivism to hold, at least within social science research, one has to believe that the observer (along with their attitudes and values) can be separated from what it is they are observing. In fact these items must be removed from the research process altogether because they risk obscuring what is being observed. Values are generally not seen as being relevant to the collection of scientific facts. And while they may be a point of discussion after the research has been conducted and facts collected, they become distracting if not controlled during the research process. One also has to believe that what we understand as a social reality can be reduced to a series of variables and studied independently of the social context in which they are found.

The implicit goal of a positivist research program is to promote a methodology and logic of scientific inquiry that avoids the psychologistic or philosophical interpretation of empirical reality, and instead emphasizes empirical observation of the research phenomena as the basis of offering truth claims. This research trajectory, that is, the pursuance of formally logical descriptions of the social world creates an affinity between positivism and quantitative methods. Such methods deliver results, which can be reproduced and verified, and thus validated as true.

These accounts tend to drastically underestimate the complexity and variability of social phenomenon, and in the case of administrative and IS research, organizational reality (Stacey, 2009). They downplay the fact that the social world is made of fundamentally different elements, such as language, meanings, and signs that do not and cannot exist independently of the community of actors (of whom the researcher is a part) who use and reproduce this social world.
**Constructivism**

Social constructivism attributes the source of knowledge to an active process through which actors engage with the world, rather than a passive process of representing what is in the world. The process of knowledge creation, is not so much a process of discovery but a process of building. From a constructivist standpoint human beings are constantly creating models, concepts and schemas that help them to process their own experiences and understand them in a more satisfying way. These schemas, concepts, or models are constantly being formed and reformed in light of new experiences. Often constructivism is preceded by the noun “social” to indicate that this process of knowledge creation happens within a social context, i.e., with others who are also experiencing this world (Doolin, 1998). The means of knowledge creation can be attributed to a community of active perceiving subjects who share, at minimum, a common language to describe their experience.

Social constructivism implies a nominalist ontology. As a metaphysical position, nominalism asserts that reality does not exist independently of human thought and cognition. The social experience of the world demands that human actors structure their action with the help of concepts and mental models about the world that they construct. Constructivism suggests that there can never be any perfect representation of reality, but that this representation is always mediated. Where constructivism begins to get into trouble is when it drifts into making totalizing ontological claims. Strong constructivist programs, exemplified by work in actor-network theory, have made gestures that suggest that there is no “reality” at least as is commonly understood (Latour, 1999; Law, 1992; 2004). Reality, some constructivists argue, is a “relational effect” of social and material interaction. In other words, some constructivists tend to deny or the very least downplay any semblance of a concrete ontology. The “real” is constantly shifting. It is a precarious achievement of social interaction that is constantly being remade as the participants move through this reality. Nothing is stable. Nothing is fixed. What this amounts to, critics have often argued, is a form of relativism that treats truth claims as a matter of perspective, which makes them impossible to adjudicate.

Although this dissertation makes use of ANT and its epistemology, I am reluctant to subscribe to its radical ontological positions. Instead this dissertation adheres to a nominalist ontology and a more moderate understanding of constructivism. In this
respect, my approach is falls in between constructivism and interpretivism (Klein & Myers, 1999; Walsham, 1995). Interpretivism is similar to constructivism in the sense that it also suggests that human beings are active participants in the construction of their reality and interpretations of this reality, and that to a large extent this process is achieved through a shared language and a shared world (Schwandt, 2000). From a interpretivist standpoint, language and dialogue are tools that operate to secure shared meanings and experiences, which in turn, allow participants to have access to truth claims. The truth is an outcome of interpretation, and sound interpretations are secured through adherence to the procedures of method.

The difference between radical constructivism and interpretivism can perhaps best be understood in terms of the ontological commitments. Interpretivists generally subscribe to a nominalist ontology whereas constructivists often implicitly adhere to nominalism but are frequently more vague about their ontological commitments. Nevertheless, the variation in types and degrees of constructivism and interpretivism has generated a range of opinion on their relationship and their differentiating factors. The dissertation’s approach is rooted in a constructivist epistemology, while at the same time, draws upon a nominalist ontology that some may consider to be located within an interpretivist paradigm.

Research Design and Justification

Perhaps the most basic way to think about research design is by categorizing the approach into either qualitative, quantitative or a combination of both categories. The common understanding of these approaches is that quantitative research is concerned with numbers and calculation. Quantitative research designs are concerned with counting things, in order to discover statistical patterns from which the research can draw general conclusions. If quantitative research is concerned with counting things, qualitative research is concerned with the things themselves, their meanings and qualities. The research design of this dissertation is qualitative, which is to say that it operationalizes a “process of examining and interpreting data in order to elicit meaning, gain understanding and develop empirical knowledge” (Corbin & Strauss, 2007, p. 1).
The goal of my research was to arrive at a more satisfactory understanding of the social and technical dimensions of alignment, their articulation and mediation. Recall that my research questions were concerned with how actors mediate the relationship between performance, technology, and change. This is an empirical question that was formulated as:

- How are school boards and districts, educators and administrators involved in mediating the relationship between performance outcomes, technology and larger patterns of organizational change?

I approached this question knowing very well that the answer(s) were likely to be varied and complex. The acknowledgment of this complexity led me to my second question, which was how to develop a conceptual approach that captures the complexity of alignment within a school district. This was a theoretical question that was formulated as:

- How can I build a conceptual approach to alignment that can capture the complexities of organizational functions and activities related to this mediation, describe their interconnections and situate or ground them within the empirical context of an educational organization.

The literature review identified at some length previous approaches to alignment, and their shortcomings. As I mentioned in a previous chapter, alignment has appeared to be an ongoing problem across numerous kinds of organizations (Chan, 2002) and this generalization made me interested in exploring some of the barriers that might explain why this is the case.

My reliance on constructivist approach indicated that my research questions were best addressed if I relied on qualitative methods. Relying upon qualitative data collection techniques allowed me to construct a rich and detailed account of alignment within the school district, capture interactions between social and technical actors, and allow research participants to articulate their own understandings of what was happening around them.

Through the course of designing this research project I also tried to mitigate potential shortcomings in my own research approach. For example in conducting qualitative research questions, arise as to how to feasibly scope such an endeavor and manage the process of theoretical sampling. Theoretical sampling encompasses the
selection of a research site, specific events within that site, the processes the researcher wishes to observe, and the people involved. These selections have a direct impact on how the research will be received and what claims it can reasonably make. Having never scoped a qualitative inquiry of this size, I relied on the experience and the advice of my supervisory committee to settle upon a single site of analysis rather than my original plan, which was to conduct a broader study that spanned multiple sites and types of organization. With the help of my committee I was able to narrow this scope with the following informal criteria. The site had to be:

1. A service-based organization
2. Provide an opportunity to study the entire life cycle of a significant IT project
3. Provide access to a range of participants and stakeholders
4. Be dynamic and complex (nice to have)
5. Have a focus on innovation and innovation management (nice to have)

When it came time to conduct the literature review, the available research was very helpful in mapping the different approaches to alignment that previous researchers had pursued. However, the value of the literature’s ability to inform my project was limited because:

1. The majority of alignment research is conducted in business organizations and so it is situated within a different empirical domain. This could be an important difference in determining my findings.

2. Much of the research is positivist in its paradigmatic orientation, which made it difficult to compare previous work to my own.

After consulting with my committee, it was evident that there was a need for alignment research that departed from the business domain. In addition, there was an opportunity for me to approach the topic with a constructivist epistemology. Within the context of existing research on alignment, this work is unusual and unique in that it explores alignment in an educational organization, and does so with an unconventional and under-represented approach.
Another unusual aspect of this dissertation is that my supervisory committee was selected on the basis of their interdisciplinary expertise across several related domains. While the conventional supervisor-student relationship tends to group the two together in a master-apprentice like relationship, my supervisors’ interests and expertise were not directly related to the topic of alignment. This arrangement had advantages and disadvantages. The biggest disadvantage was that the development of the dissertation was much slower. I constantly found myself translating concepts across domains and with varying degrees of abstraction. The primary advantage of this arrangement was that each of my committee members could offer different perspectives on my work and increase the range of my ideas. For example, my work by conventional disciplinary standards appears quite undisciplined in the way it incorporates ideas from educational sociology, business research, sociology of technology, communication and design research, computer science, information systems theory and social theory.

Selecting the Research Site: Why a School district?

With the above criteria in mind, I considered several organizations as research sites. The WVSD was selected in consultation with my committee because it met all of these criteria, but also because it was an unusual place to explore the topic of alignment.

The WVSD has an annual operating budget of 62 million dollars and provides services to 7000 students and 655 employees. 97% of its high school students graduate. It is one of the smaller school districts in BC in almost every major category. The district represents a moderately complex organizational service system in which a number of groups routinely interact in order to deliver educational services:

- **Administrative Employees**: includes staff across district and school levels. This group also includes the information services group, whom I was embedded with.

- **Teachers and Faculty**: responsible for engaging students and delivering instructional services and content.

- **Students**: often considered “clients” from the perspective of teachers. However, more precisely, they are the beneficiaries of district services.
• *Parents:* this group, while important, was considered incidental in my research. Including parents in the work would have increased my project’s scope and their opinions were not considered to be especially relevant to my research questions.

Selecting the district as a research site also afforded practical advantages. There were hardly any restrictions placed on my research activities in the district. I was not assigned a liaison or handler, I signed no confidentiality agreement, and I could talk to whomever I wanted within the scope of my ethics agreement. These considerations may sound insignificant, but are anything but, in light of the difficulties commonly encountered with conducting independent research in a business organization. The WVSD was a site which satisfied my selection criteria and offered a unique setting in which I could have (almost) free reign to explore the problem.

The decisions regarding what to focus on were conditioned by the research questions I originally posed. Because these questions were open ended, I did not feel necessary or useful to place strict parameters on what to focus on in my sample, based on my previous professional experience, I had some expectations regarding what processes and actors (groups of actors more specifically) I wanted to focus on:

• *Actors:* Teachers, Faculty, students, consultants, technologies (nonhuman actors)

• *Events:* Meetings, requirements elicitations, daily standups, testing sessions, implementations, etc.

• *Places:* district offices, classrooms, common meeting areas/rooms etc. in which participants congregated.

In addition to these groups of actors, it is also important to acknowledge that I was professionally connected to, but did not represent, a team of consultants who were contracted to build the collaborative learning platform (CLP) and support its implementation. Officially I was considered part of this team and through the course of my project I introduced myself as being part of this group, but was conducting research as a PhD student.
My Own Experience: As Researcher and as Professional

My research design and methods, while fairly generic, were influenced by grounded theory (Charmaz, 2006; Corbin & Strauss, 2007; Glaser, 1978). They were also influenced by my experience as an IT professional. The difference between my experience as a researcher and as a professional presented a confusing dilemma. Do I take the theoretical turn, or the practical turn? Are my interests theoretically driven or practically driven? Who is my research meant to serve? Who is the audience? These questions are significant in considering the relevance of the research and how I would deploy my theoretical approach.

As per the conventions of PhD level study, I was required to demonstrate the relevance and suitability of my research topic. This required me to draw upon existing academic literature. However, if one of the primary goals of the literature review is to establish the research problem situate it within the research domain, this process began long before I started my PhD research.

Alignment is not a theoretical puzzle. It is a very practical problem and one I had to confront through the course my own experience as an IT professional prior to beginning my PhD study. In the two years prior to starting my PhD I worked as a business analyst, a well-established professional role in the IT sector. My job was to act as the liaison between internal business clients and the organization’s IT department. Through the course of this work, my day-to-day activities included requirements creation and management, facilitation and communication management between stakeholders. This included helping developers to understand the project goals and solution requirements that they would need to meet, supporting project management tasks, testing and implementation.

On the one hand, this previous practical experience could be seen as a liability. Some proponents of interpretive research, especially within grounded theory, have argued that any a priori ideas about the subject matter will likely obstruct the researcher’s ability to gain and maintain a critical distance. As a result, they run the risk of forcing preconceived theories or concepts into the data rather than extracting genuinely new insights from it (Glaser, 1978; O'Reilly et al., 2012). While the thought of approaching my topic with a “clean slate” was amusing to me, it was also clear that it
would be impossible given my circumstances. A more pressing question for me was, why would I want to “bracket out” this knowledge and experience? And how would this experience influence my use of theory?

My position is that this professional domain knowledge helped to enhance the theoretical sensitivity of my work. I was determined to explore the problem as best I could from a practical standpoint. My goal was to “study up” (Latour, 2005), “follow the actors” and also follow their thinking as best I could. I endeavored to add subsequent layers of theoretical abstraction only when they appeared necessary. And so in this regard, my theoretical approach is only as complicated as it needs to be. I wanted to make this research accessible to academic and professional audiences.

The “switching costs” of moving between academic and professional domains, as well as jumping across disciplines were substantial. But the main benefit is that I was able to move the discussion alignment beyond the confines of IS research and position it in a more meaningful way to those who may not be familiar with the problem. My research participants, for instance, had little interest in discussing models of strategic alignment. But when I explained that I was interested in studying how educators might use IT to steer the education system toward the ideals of the Twenty-First Century Learning Initiative (21C), they were immediately enthusiastic and wanted to know more about my topic.

**Data Collection**

The design of the project was divided into a series of two phases through which the research scope was increasingly narrowed and the proximity of contact with participants gradually increased.

**Textual Analysis**

The initial phase consisted mainly of textual analysis and participant observation. I began by collecting documents starting with the BC Education Plan (British Columbia Ministry of Education, 2011) and working backwards, examining Ministry of Education policies and reports that informed the plan. The goal of this phase was to familiarize
myself with the historical development of BC’s Education Plan, the ideas that informed its discourse and the reasoning behind them. I wanted to understand how plans and strategies at the Ministry level were being translated through to the district level, which concepts were readily adopted and which ideas were not. This is the point at which I discovered the significance of 21C. It had been a recurring theme of my initial conversations with participants, and it was a focal point within many of these documents.

This discovery served as a discursive “rallying point” for my research. My objective was not to “deconstruct” the 21C discourse that was already highly influential to my participants. Nor was it my goal to do any kind of discursive analysis on how 21C ideas were appropriated in the district’s strategy. My primary objective was to figure out which aspects of the Twenty-first Century Learning Initiative were particularly influential, which aspects were incorporated in the district’s strategy, and which elements of the discourse were “sticking”. These extant texts were key pieces of data that helped supplement my understanding of the motives and strategies aspirations of the district. The BC Education Plan (2011) for example, was a foundational document that the district used to form their district level strategy. These plans and reports informed my subsequent research by:

- Defining the actors/entities involved in enacting BC’s vision
- Helping define the parameters/scope of the changes the Ministry and school districts were seeking
- Giving me an indication of how these changes and this strategy was developed

These texts provided the backdrop for the story I was going to have to tell and added much in the way of context to what I was seeing in the field.

**Participant Observation**

Through this initial phase, I was also relying heavily on participant observation. I did not have any clearly defined outcomes that I wanted to achieve here. I simply wanted to “follow the actors” (Latour, 2005) watch what they were doing, and remain open to any new themes or issues that I could hone in on, in further study. In order to understand how strategies directives translated into everyday activities, I needed to familiarize myself with the “cadence” of my participants working environment. I attempted to keep my level of involvement with participants to a minimum. This strategy worked for a few
days. My level of participation was quickly increased as I established relationships with my participants. It was exceedingly difficult to remain a passive observer after a week on site. Nevertheless, in the first few weeks, after the project started, I endeavored to remain as passive as I possibly could. I responded to participants and engaged them, but only after they engaged me.

*Semi-Structured Interviews*

The second phase of research consisted of one-on-one interviews with selected participants. The goal here was to narrow the focus even further and drill down to specific areas and questions I was interested in. I largely relied on snowball sampling to find and recruit participants and add depth to my observations. This technique was appropriate given the ANT imperative to follow the actors and trace the networks within which they operated. For these interviews, I relied on a research instrument (see Appendix A) to add some structure to the interaction. Interviews generally lasted one hour and were conducted within and beyond the research site. I recorded these interviews with permission and used transcription software to capture the data in a digital form.

All of the 21 interviews I conducted with individuals were semi structured. This gave me the flexibility to capture data that corresponded and was relevant to the conceptual categories I was interested in exploring. I was careful to try not to impose my own understanding of or attitudes about the topic. I wanted these interviews to be conversational. The goal was to encourage participants to relate their own experience. Digressions from my research instrument were quite common and while I did not encourage them, I often did not stop them. Interviews are highly contextual and involved an interplay between participants and myself. My ability to quickly establish rapport, build trust and keep participants talking was a skill that I had developed from my business analyst training. I often had to reframe questions in the context of the interaction to get my participants to respond thoughtfully. The research instrument provided an extremely loose guideline, but if I had followed it precisely, posing the questions as they were written, my interviews would have been of limited use.

The semi-structured interviews and ad-hoc focus groups were valuable in allowing me to remain “agile” and respond to the data that was emerging through the
course of interaction. I recorded these sessions when appropriate and when participants agreed to it. I also relied extensively on a variety of tools to capture these sessions, from whiteboards to mind mapping software. Again, many of these techniques were already part of my skill set as a business analyst. It was simply a matter of repointing them toward a different goal.

**Coding and Analysis**

My analysis began when I started coding my data. To perform this coding, I relied on techniques commonly associated with grounded theory (Bryant & Charmaz, 2010; Charmaz, 2006; Corbin & Strauss, 2007; O'Reilly et al., 2012). The initial coding stage, “open coding”, had me reviewing my documents and interview transcripts, sentence by sentence in order to identify recurring terms and common themes. The goal of this initial open coding was simply to determine what participants were saying, and learn about what they understood to be problematic, while resisting the urge to read these statements through my own theoretical lens. This initial coding stage was merely provisional and designed to attach “handles” to my data so that I could move it around and reorganize it as I moved forward. It was also helpful in identifying unforeseen areas of inquiry as well as gaps in the data I collected.

I also made use of in vivo coding techniques. In vivo coding is where the researcher identifies key terms that participants invoke. These terms are often used as shorthand for a larger more complicated idea or collection of ideas. These terms are also usually invoked as a part of a participant’s membership within a specific group, community or organization. The first in vivo code I encountered was “21st Century learning”, a term that had analytic significance, and was very similar to “21st century skills”. Both of these were often abbreviated in conversation to “21C”. Other in vivo codes included:

- Personalized learning
- Agile
- Design
- Ed-tech
- Innovation
- Engagement
• Alignment
• Devops
• Student-centered
• Assessment-for-learning

Some of these in vivo codes were analytically vacuous. “innovation” for instance appeared quite frequently yet many participants really could not define what they meant by the term. “innovation” appeared to mean everything, from simply creating something, to a specific piece of technology. Other terms proved to be very significant, for example “design” and “design thinking” and “agile” (see Ch. 5) These codes were important in “grounding” my research. They worked to anchor my analysis in the world of my participants (Charmaz, 2006, p. 56).

Based on my open and in vivo coding, I was able to select the codes that held the most analytical significance. This focused coding stage allowed me to zoom in on areas of interest and exclude data that was largely irrelevant to the research problem. This was also the stage at which I compared my data to the concepts provided by ANT and structuration theory. So this process of focused coding was to some extent a theoretical coding at the same time.

The conceptual framework provided by ANT and structuration theory were useful in integrating my data and lifting it from a substantive but disorganized collection of statements, to a coherent picture of what was happening and why it was significant. I have already given an account of these theoretical codes in the previous chapter: inscription, translation, structure, etc. which are foundational to the concepts introduced in the rest of the dissertation.

This type of theoretical coding also represents a departure from grounded theory methods that specify theoretical coding families into which data might be placed (Glaser, 1978). Yet, I see no reason why concepts from my theoretical approach cannot be used in this way. There is no generally accepted criteria as to what constitutes valid theoretical codes in grounded theory (Charmaz, 2006, p. 65) nor are there many reasons given as to why theoretical codes cannot be derived in this way. The argument that drawing upon ANT on structuration theory in this way somehow obscures what is
really happening is no more believable than the statement that refraining from pursuing a pre-conceived conceptual inventory allowed us to actually see what is going on.

Writing it Up

Throughout my research I maintained several digital notebooks for collecting and organizing my notes. These notes served as the basis for memo writing. In grounded theory memo writing is a continuous activity that is located somewhere in between data collection and writing drafts of papers (Ibid, 72). As a technique, memo writing involves continuous iteration of notes and required me to frequently return to my codes and refine their meanings and relationships in light of new discoveries. Through each iteration, I was able to reach a high level of theoretical abstraction while at the same time “checking” this abstraction against the data. Throughout my research, memo writing was crucial because I could often only think through writing. The technique of memo writing was a kind of kinesthetic thinking experience, and made my thoughts more concrete and tangible.

Once my memos were complete the next step was to cluster these memos (Charmaz, 2006, p. 86; Rico, 2000). Clustering involved combining memos with similar or related themes or codes, and drawing out the connections between them. I relied heavily on mind-mapping techniques to present this information in a nonlinear and flexible way (Buzan, 2006). The mind-mapping technique allowed me to quickly and easily manipulate my memos, and experiment with their arrangement. It was only at this stage that the chapters of the dissertation came into focus. I used several pieces of software to assist in this workflow, which I was constantly improving with each new chapter. In addition to the above, one of the key technological factors that made the research process much simpler, was the use of mobile computing technologies. Smart phones and tablets were indispensible tools of my fieldwork allowing me to capture interviews, sketches, pictures and notes quickly and easily. I cannot understate the importance of these tools for capturing data of all kinds, and sustaining my research workflow wherever I was located.
Validity and Acceptance Criteria

Having discussed the process through which I produced this dissertation, I want to address the question of validity and discuss the acceptance criteria against which the work can be fairly considered. The discussion of the validity of qualitative research and the acceptance criteria for dissertations has long been a subject of debate (Creswell & Miller, 2000; Lincoln & Guba, 1985; Maxwell, 2005; Mullins & Kiley, 2002). Generally these criteria display significant variation depending on the research lens and epistemological paradigm that the researcher adopts. However through the course of my research I was keenly aware necessity to demonstrate the credibility and authenticity of my work. In aid of this goal, I have adopted three procedures suggested by Creswell (2000) that are intended to demonstrate that this dissertation makes a valid contribution to scholarly research.

**Triangulation**

As a general validity procedure, triangulation is an approach that seeks to find commonalities and convergences across several different sources of information (Creswell & Miller, 2000; Denzin, 1978). These commonalities could be related to conceptual categories that the researcher adopts or the central themes in which the researcher works. Triangulation involves a process of sifting through the available data and discovering the common themes and patterns within this data. For example, readers of this dissertation will notice that the work draws on several different data sources: from interviews with participants, to documents/textual analysis, to participant observation. My narrative account relies on a synthesis of methods and data sources to reconstruct the events I witnessed during my time in the district.

**Thick Description**

Because I am working within a constructivist epistemological paradigm, I was aware of the importance of context in giving my observations meaning and value. In aid of this, a second validity procedure that I have used to establish the credibility of the dissertation is thick description (Geertz, 1973). The goal of thick description is to saturate the research with lots of description and details surrounding subject under study.
(Denzin & Online service, 2001). In contrast descriptions that are “thin” often amount to something that resembles an exercise in journalistic reporting. I have not tried to hide my position as a researcher within the events I describe, nor does this dissertation make any claims to presenting an “objective” account of alignment. Nevertheless, I am confident that I have provided an account that represents my participants and their views fairly.

I have tried to record and present my observations as thoroughly as I could. For example, chapters five and six offer in depth accounts that capture the contextual elements of my work that made the events I was describing meaningful and significant: from the places I found myself working in, to the technologies actors were using, down to the people themselves.

One of my goals in presenting this research, was to do it in a way that was not only accessible to a variety of readers (from those interested in education to those interested in technology) but I also wanted to present this account in a way that resonated with these readers, and offered them an opportunity to experience an intellectual and emotional involvement in the work. This is why I have chosen to present sections of the research within ongoing narrative that crosscuts between my observations from the field and the theoretical arguments I am trying to make.

**Prolonged Engagement**

A final validity procedure that I wish to draw attention to is my prolonged involvement in the field. Although I do not claim to be an ethnographer, nor would I offer this dissertation as an example of ethnographic research, my research approach resembled ethnography in the sense that I was embedded with my research participants for a significant period of time. This research project took place from March 2011 to April 2012. During this time, I worked consistently alongside my research participants, building a rapport with them and understanding the context in which they work. This allowed me to collect an abundance of data and input from these participants, and to build a credible account that faithfully represents of a variety of perspectives and attitudes on alignment within the district.
What about Bias?

Of course, the suggestion that qualitative and interpretive inquiries are prone to being hijacked by bias is always a risk. To guard against these risks, I opted to diversify my sampling techniques (Becker, 1998; Patton, 2002). This diversification corresponds with my attempt to triangulate my research findings. My decisions regarding the parameters and focus of my sampling effort, including decisions on who to interview and what events to observe were, again, governed by my central research questions and also by the theoretical lenses I adopted. For example, in adopting ANT, I endeavored to “follow the actors” (Latour, 2005) and remain open to unanticipated factors that I could explore as they revealed themselves. There were many instances where I found myself following the actors, not knowing ahead of time who I would meet and what their involvement in the project would be. There were also many “dead ends”, areas of focus which appeared to be initially promising but were ultimately not relevant to the problems I was trying to examine.

At one point in my fieldwork, I wondered if I was being shown only what the district wanted me to see, and if this was the case, how would this impact my findings? Nevertheless, I came to form the opinion that subscribing to such a concern would ascribe more importance to my presence than was due. The district sponsors, appeared to be genuinely interested in my topic and willing to be as open as possible. Recall that I was not required to agree to any confidentiality or non-disclosure agreement (NDA), nor was such an agreement presented to me.

Through the course of collecting my sample, I began by adopting a wide research scope, which narrowed incrementally as I worked through the phases of my project. Through each phase of the research, my observations and data were subjected to increasingly focused coding techniques which were guided by my theoretical approach. So while I cannot completely guard the dissertation against charges of bias on behalf of myself or my participants, such is a limitation of the approach I have adopted. I have taken steps to address potential charges of bias primarily through diversifying my sample and sampling techniques. This was done with the assumption that any bias within my findings can be reduced but likely not eliminated. Furthermore, I have taken steps within this chapter to elaborate by research design in some detail, such that my
findings may be sufficiently triangulated through studies that attempt to reproduce my research design and approach.

**Embeddedness and Problems of Reflexivity**

Reflexivity in social research is a difficult problem. The size of this difficulty is proportional to the researcher’s degree of embeddedness within the research site. In this research there was a trade-off between my desire to be embedded, and the reflexive problems that this choice would create. I will attempt to mitigate these problems by addressing them as directly as I can here.

“Reflexivity” generally refers to the relationship between the researcher and that which they are studying. The term draws attention to ways in which the researcher may come to influence or otherwise affect the events they are observing. Reflexivity plays a key role in this research due to the fact that I was embedded with a consulting team who had been retained to build the CLP. Yet at the same time, I was also operating as a researcher who was representing my own research interests and agenda. This obviously create a vulnerability in the work, as one might argue that my position as an independent researcher was somewhat compromised by the choices I made.

It is important to point out that the relationship between method and reflexivity has been conceptualized in different ways. For example, research emerging from the some phenomenological traditions demands that researchers “bracket” their own experience of what they are observing, and isolate their preconceptions from the analysis. Ethnomethodologists often attempt to adopt an attitude of indifference toward their object of study. These strategies contain the residue of positivist epistemological orientations (Babbie, 2001). They claim that researchers can in fact plausibly bracket their preconceptions or be indifferent to what they are studying.

My approach to reflexivity was somewhat different. Throughout the research project, I was interrogating my own methodological orientations and decisions in relation to what I was discovering in the data. I was aware of the deeply reciprocal relationship of influence between the research participants and myself. But this relationship does not compromise my findings. From my perspective, this research does not attempt to
provide a “neutral” account of the events I witnessed, because my epistemological commitments to constructivism and the interpretivist tradition forced me to recognize that such a goal would not be feasible. Furthermore, considering my identification of the need for theoretical sensitivity (in chapter 2) in the work, striving for neutrality was neither feasible nor desirable. Conducting this type of social research demanded a degree of professional “background” knowledge about the subject, as well as an understanding of the social context in order to make sense of what I was observing. This stance toward reflexivity is not a problematic position, but rather a principled methodological choice (Charmaz, 2001; Cresswell 2013).

Nevertheless, it is important to acknowledge my explicit connection and professional relationship with the consulting group I was embedded with. I must also explicitly disclose that I was not under contract as a consultant with this group (or independently) on this project and received no financial compensation for this work.

**Conclusion**

The approach of this dissertation synthesizes a range of grounded and grand theories to tackle my research questions, with the assumption that the motives and ontological commitments of each approach are compatible within the context of examining alignment in educational organizations. This approach leads to a robust theory construction which is premised on the presentation of empirically testable concepts. My approach largely avoids discussions of the "implications" of one approach versus another. Instead the effort is directed toward observing and reviewing the testimony of those involved and translating it into a coherent theoretical presentation.

Aligning grounded and grand theories that span across disciplines requires an adeptness in methodology and the logic of social scientific inquiry. This intellectual ambidexterity did not come easily to me. Through the course of my research, I wanted to avoid elaborate theoretical and methodological jousting matches. While such dialogue may be intrinsically interesting to scholars, it is almost always inconsequential to those engaged in practical work, who somehow manage to get by without such elaborate theoretical knowledge. This is much more fascinating to me.
This research strategy sought to deliberately avoid both positivistic and anti-positivistic orientations. It is not strictly a case study nor is it a conventional exercise in grounded theory construction. This is not to say that this dissertation is a great example of action research (McNiff, 2002; Somekh, 2006; Stringer, 2007) or action science (Argyris, 1995). Such approaches appear to proceed with the assumption that interest of the researcher is entirely different than the interest of the participants with whom they are involved. This was not the case with this project. The interests of my participants mirrored my own, and through the course of the project, they deeply influenced the formation of my questions, the selection of my methods and the conclusions I drew. Their participation in my work was a fair exchange for my participation in theirs.
Chapter 5. Inscribing the Vision

Aligning Design Thinking with Agile Development

As the first chapter explained, the vision for BC’s public education system draws inspiration from the 21st Century Learning Initiative (21C). Part of the reason why 21C has resonated with so many, is that it echoes the common belief, that learning has been fundamentally changed by digital technologies (Burdick & Willis, 2011). The notion of “digital learning” emphasizes the point that today’s students are “digital natives” (Ito, 2010; Palfrey & Gasser, 2008). They have grown up with digital technologies and the internet and because of this, their learning habits, dispositions and practices are very different from earlier generations. While the goals of traditional literacy and numeracy are still important, learning activities must also be expanded to include these new information technologies that have become deeply embedded in student life (J. S. Brown, 1997; J. S. Brown & Duguid, 2002; Thomas & Brown, 2011). A foundational component of the BC Education Plan is “learning empowered by technology” (British Columbia Ministry of Education, 2011, p. 6) which, can be interpreted to mean the strategic deployment and alignment of information technologies to enhance learning outcomes and to qualitatively transform learning interactions. Many politicians and educators agree on the importance of technological empowerment and this vision for change. But there is a problem. This vision is incredibly abstract. As one teacher I spoke to put it:

When we talk about digital learning and 21C, we talk about it almost as if it is a real thing. But nobody knows precisely what it means or what it looks like. I should really only speak for myself, but I know that among teachers there is the sense that this is up to us to figure out. It’s almost as if the Ministry [of Education] is saying: ‘if you’re a good teacher, if you’re a talented teacher, you should be able to do this.’ But for a lot of teachers, it’s unclear what we’re supposed to be doing differently (T3, Personal Communication, April 10, 2012).
The BC Education Plan is not very illuminating in this regard. It is not very instructive in answering the "how" questions. This is a challenging problem for BC school districts. How does an organization (in this case a school district) align information technologies in a strategic way, when the strategy is unclear, largely emergent, or frequently changing? This question can be rephrased in more practical terms: how is a school district supposed to design, build and implement IT solutions when the plan is not sufficiently clear? This problem has been reverberating through the professional IT community and organizations of all kinds for some time. It poses a significant challenge to the traditional way of doing technology projects that rely on the articulation of a strategy which is then applied prescriptively from the top down.

It is a problem that has motivated designers and software engineers to develop their own approaches in order to innovate despite strategic uncertainty. “Innovation” is, of course, a slippery term that has been defined in numerous ways. But in its most basic sense, innovation describes a process that is concerned with two things: the generation of ideas and the process of their implementation. How does this relate to my time in the WVSD?

For WVSD, a key component of moving the strategic agenda forward was creating a digital learning infrastructure that staff and students would call the Collaborative Learning Platform. What makes this case interesting is the way in which the development team managed the innovation process. By combining what is commonly referred to in industry as design thinking with agile development methods the development team was able to design and develop a social computing platform, that was instrumental in giving the district’s vision material form and force.

This chapter aims to answer some basic questions. What is the Collaborative Learning Platform and why is it significant? How did design thinking and agile development methods play a key role in its creation? And finally, how do design thinking and agile development fit together in the processes of innovation and alignment?

In answering these questions this chapter accounts for the role and contribution of design thinking and agile development methods and describes them in the theoretical context of what actor-network theory (ANT) refers to as “inscription." Using the
development of the Collaborative Learning Platform as a case study, my argument continues in two parts. First, I argue that design thinking operates as a mode of practical reasoning that is particularly suited to developing solutions to what are often wicked design problems. Second, I want to demonstrate how agile development methods provide a framework within which the insights gained from design thinking can be converted into collective action through the innovation process.

An underlying theme throughout this paper involves observing the reproduction and transposition of habitus (Bourdieu, 1977) throughout the development process. As mentioned in the previous chapter, the concept of habitus provides a way to think about how actors improvise their behavior within the structural parameters of their situated context. From this perspective, design thinking and agile development are different from more traditional approaches to software engineering in that they are thoroughly practical methodologies that secure their efficacy by fostering the reproduction of a habitus within the team. In addition, design thinking and agile development techniques help developers to acquire and reproduce the habitus of those they are designing for, and inscribe technologies in such a way that they invoke this habitus. This is what I call the ethical dimension of alignment, where developers and the mediators they create come to represent and stand-in for other actors. This ethical dimension is constantly reinforced through each stage of development and maintained through constant communication among participants. For the purposes of conceptual clarity, I have presented these insights in the conclusion of the chapter.

Inscription

Design thinking (DT) and agile development methods (AD) are not, strictly speaking, methodologies. They are epistemologies that articulate principles intended to inform technical practices. There are no manuals on how to “do” design thinking or agile development nor any singular authoritative source to which one can appeal. I do not intend to provide either of these things. My goal is much more modest. I want to describe the way each of these epistemologies of practice were enacted and synthesized together in the course of a larger innovation process. It is helpful to have a theoretical concept that can encapsulate this synthesis. In ANT, the most relevant concept to
Figure 5.1. General trajectory of innovation and the relationship between design thinking and agile development.

From the perspective of ANT, technical objects are always composites made up of many component parts. They are often understood as texts. Like the author of a novel, the task of the technologist, programmer, designer or developer is to weave together actors with stories, signs with meanings, and interactions with outcomes. The biggest difference between the writer and the coder is, of course, the materials they work with. Nevertheless, much like the "old" technology of the book, the "new" information technology operates to “simultaneously embody and measure a set of relations between
heterogeneous elements” (Akrich, 1992, p. 205). In ANT the concept of inscription describes the process of setting these relations into technologies themselves. As Bruno Latour has remarked, inscription “refers to all the types of transformations through which an entity becomes materialized into a sign, an archive, a document, a piece of paper, a trace” (Latour, 1999, p. 306).

The connotation with inscription is that there is some content that is encoded or written into the unmarked material of technology in much the same way one would chisel a message into stone. This connotation however is too strong. The idea of inscription is meant to convey a creative process where designers and developers come into real or imaginary contact with each other in order to define a world or environment into which the innovation will be implemented. This world is expressed through the creation of user stories, personas, scenarios and storyboards, which are just some of the techniques designers/developers use to “define actors with specific tastes, competencies, motives, aspirations, political prejudices and the rest... A large part of the work of innovators is that of ‘inscribing’ the vision of (or prediction about) the world in the technical content of the new object” (Akrich, 1992, p. 206). On the one hand, developers are defining the actors for whom they are designing, but it is through this process of definition that they are also acquiring an understanding of the habitus of these actors which they constantly refine. What makes inscription so difficult and interesting at the same time is that frequently throughout the design and development phases of technical projects, users cannot always or completely be present. The development team must therefore presuppose them and this requires a degree of creativity and imagination.

In many situations, it may be beneficial to strictly manage user involvement, especially in early stages of the process. This is because experience has shown that even if users are present throughout the software development lifecycle (SDLC) they are often of limited help in the beginning. Users are strange in that they may demand a solution, but have little clue as to what solution looks like. Even users who are technically savvy often lack the knowledge to articulate their “functional requirements”, or in many cases change their minds about what they want. What’s more, often users only have a vague idea of what they want prior to development. This does not mean that it is wise to exclude users from the process. It merely points to the fact that managing user involvement and expectations is often a critical factor in the success or failure of the
innovation. Unless user involvement is carefully managed, what often results is confusion, frustration, and sometimes failure. This is a point that is often under-emphasized in the ANT and Science and Technology Studies (STS) literature, where the conventions of the genre often position users as innovators who are able to creatively re-appropriate technology in unexpected ways (for example see Bijker et al., 1987).

For sure, users are clever in the sense that they often compensate for poor design and buggy software by creating their own “innovative” work-arounds and fixes. This happens all the time. The aim of DT and AD is to make the cleverness of users unnecessary. From the perspective of a design thinker or an agile developer, the flexible interpretation of technologies by users is not so much an indication a their innovativeness, but rather symptomatic of poor design and disintegrated development. It is a sign that something has gone wrong in the inscription process.

Inscription is not concerned with explaining the results of an innovation process. It is concerned with describing “how” it happens. The idea of inscription says nothing about whether the innovator’s vision will be realized. Like the author of a book, the innovator can never know ahead of time how their creation will be interpreted. Success or failure here, has to do with the way in which users will interact with the technology, the way the technology expresses the innovator’s vision, and the degree to which users translate this vision as intended, through a larger network of actors.

**Thinking about Design in an Agile Way**

It was a week into my involvement in the project when I found myself back in Gary’s office discussing the vision for the *Collaborative Learning Platform* (which was quickly abbreviated to “CLP”) and looking for clues that could shed some light in explaining how the development team planned to pull it off.

The vision of CLP began with an experiment. During the 2010 Olympic Winter Games in Vancouver, WVSD leaders and the Olympic committee organizers created a program where 24 high school students were given the opportunity to become student journalists, tasked with covering and writing about the games. Students were granted full access to the games so that they could interview athletes and other participants, create
short videos and news stories, which would then be shared with other students through social media tools. The program was considered to be wildly successful. The point was not so much to teach students about social media technologies (most students were already familiar with these things) but rather how to use them to learn and create knowledge. There appeared to be a substantial disconnect between how students perceived the benefits of the web and social media in their everyday life, and the potential benefits that these things could bring to their learning activities. As superintendent Chris Kennedy explained:

Many of our students have these tools already - they're all on Facebook - but a lot of these same students have not really thought about how they can use these tools productively, to enhance their learning (A1, Personal Communication, March 8, 2011).

The success of the experimental pilot program paved the way for the vision of a social learning platform that could deliver the kind of learning experience that the student-journalist's enjoyed, to all students and attract the enthusiasm of teachers in the process. In this way, the CLP was like a lightning rod for what one school principal I interviewed described as the "pie in the sky" discourse of digital learning within the WVSD (P3, Personal Communication, March 28, 2011).

As Gary and I began discussing how he planned to make this vision a reality, he shuffled over to his bookshelf, pulled out a book, handed it to me and asked “have you read this?” The book was The Design of Business by Roger Martin (2009). I had read it. In short, the book demonstrates how design thinking can contribute to the development of an organization’s innovative capability. Martin’s observations on design thinking are certainly timely but the practice of design thinking, as he notes, began some time ago.

**What is Design Thinking?**

It is impossible to tell when or where design thinking actually started. Nor is it easy to determine its intellectual lineage. One common place to start is with Herbert Simon’s The Sciences of the Artificial (1970), long considered to be a foundational text in design thinking. In it, Simon proposed the possibility of creating an “artificial science”, a science produced by art as it were. Although often attributed to Simon, the idea of
merging art and science can actually be traced back to the philosophy of Dewey (2003, 2005), who suggested that the bridge that connected the two domains together was an abstract concept of “technology” (Buchanan, 1992; Hickman, 1990; 2001). “Technology” for Dewey need not exclusively refer to an object, artifact or device, but can also refer to a way of thinking. This way or mode of thought is characterized by its intentional and instrumental quality. A technology for Dewey, is simply an idea, concept or theory that someone uses to do something. It may be a bit of a stretch to suggest that design thinking is a technology but it is reasonable to claim that it has a distinctive technological or instrumental character (Buchanan, 1992; Kelley, 2007; Rowe, 1991).
One thing that has contributed to the growing interest in design thinking is that the concept of design itself, has radically expanded its scope of influence (Latour, 2008).
“Design” now encompasses traditional industrial design, software design, web design, service design, organization design, instructional design and many areas. There is no singular definition, discipline or domain that is clearly associated with design. To some extent this has allowed design thinking to penetrate diverse industries and sectors, from business (Lockwood, 2010; Martin, 2009) to health care (Brown, 2009) to education (IDEO, 2012). What is it about design that has facilitated its expansion into so many diverse domains?

The answer to this question can perhaps be attributed to the technological character of design practice. Increasingly design refers to how different items are fitted together. In other words, design is about the technical process of assembly. Design thinking is about contemplating how this assembly can be accomplished such that the result, whether it is a product or service, is economically viable, technologically feasible, and responsive to human needs (Brown, 2009).

If design thinking describes a technical practice of assembling things in an orderly and sensible way, why not simply speak about engineering? What is the difference? For sure, the distinction between design thinking and engineering can be subtle. While both are technical practices that are concerned with the construction of objects, they proceed in different ways. I would suggest that engineering is generally associated with the application of formal scientific knowledge, principles and techniques in the construction of its objects. Such formal knowledge is characterized by the application of technical criteria to the choice of solution for a given a problem. Design is also associated with the application of knowledge, but this knowledge is of a different kind. In many cases the type of knowledge that is associated with design is not purely formal but also substantive. Substantive knowledge differs from formal knowledge in that it incorporates values, ethical positions and non-technical criteria into deciding on the solution to a problem.

The types of problems designers and engineers tackle are often quite different. Engineering is generally concerned with the solution of deterministic problems. Deterministic problems are such that their conditions are sufficiently known and all required information is available to solve them with an appropriate method. Design problems are often much more complex and uncertain. Design problems are, as the mathematician Horst Rittel (Rittel & Webber, 1973) suggested “wicked problems.”
Wicked problems are incredibly complex and confusing, contradictory and conflicting. They are often full of uncertainty because the variables and conditions required to resolve them are often not amenable to formalization, not completely known, or in some cases completely unknown. In a wickedly problematic scenario there is simply not enough information to form a definitive solution because there are no generally accepted or adequate criteria by which a potential solution can be evaluated.

The development and implementation of educational technologies is undoubtedly a wicked problem. The challenge, from the district's standpoint was simply this: how can the district effectively develop, deploy and align IT capabilities to support and enhance personalized and social learning? But the problem is that learning, whether “personalized” or “social”, is itself such a contingent and uncertain process. While some aspects of learning can be easily supported through technology, clearly other aspects cannot be supported very well. From a practical standpoint, design thinking and agile development often depart from a simple question. How does one solve a problem all the while knowing that it is very likely that no solution will ever be adequate to all users in all circumstances?

What is Agile Development?

In the context of creating new software products or services, the benefits gained from DT can be enhanced by incorporating a process framework that can take its contributions and put them into action, rapidly. This is precisely what agile development methodologies deliver. Integrating DT and AD is not difficult. In fact, the conceptual basis for AD extends many of the principles found in DT (Nerur & Balijepally, 2007; 2010). The synthesis between DT and AD is essentially one between reasoning and acting, thinking and doing.

The term “agile” takes it’s meaning from the Latin word “agere” meaning “do”. But the term also implies other important meanings in this context such as “quickness”, “speed” and “ease.” If one were inclined to define agile development, one might say that the term incorporates development methodologies that emphasize doing things quickly and without impediments or barriers. Like DT, AD is also concerned with the practice of assembling things. Also like DT, AD does not refer to a singular methodology. Rather it
describes a set of software development principles that are incorporated in several software development methodologies.

The idea of “agile development” emerged from a meeting of 17 software engineers over a two-day conference held in Snowbird, Utah in 2001 (Williams & Cockburn, 2003). The conference had a clear purpose: to re-think the practice of software engineering, its problems, and how it could be improved. Based on their meeting, the participants drafted the movement’s key document, *The Agile Manifesto* which articulated a new vision for software design and development:

> We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

> Individuals and interactions over processes and tools; Working software over comprehensive documentation; Customer collaboration over contract negotiation; Responding to change over following a plan.

(Beck, Beedle, van Bennekum, Cunningham, & Fowler, 2001).

Traditional software engineering approaches emphasize planning-driven development, in accordance with functional requirements rather than user demands. In contrast, AD approaches are human-centered and stress social interaction. In AD, requirements are not so much “collected” passively from users as they are actively created through collaboration with users. This requires developers to have considerable insight into how users to their jobs, interact with software and achieve their goals. Like design thinking, which emphasizes user participation through the design process, AD carries this principle forward through the software development lifecycle.
Figure 5.3: Agile development process model.
The insistence on maintaining close contact with users has made AD approaches appear to be quite radical and somewhat controversial. Much of this controversy stems from the fact that facilitating such extensive collaboration with users and within the development team requires considerable resources, communicative competence and time. All of these items operate as powerful constraints on the process. The trade-off that typically happens as a result is that documentation in the form of plans, specifications and manuals are usually kept to a minimum. Software projects that follow an AD philosophy often begin with the implicit assumptions: that plans often change faster than they can be written down, specifications have a tendency to change as the solution develops, and users do not read manuals most of the time anyway.

Another radical feature of AD approaches is the emphasis on teamwork. But what sets an agile team apart from more traditional project teams? How are they different? In the case of the CLP, what was notable about the team’s structure was that it was entirely cross functional. Team roles, while clear to everyone in the group, were not rigidly adhered to. Any semblance of hierarchy was extremely relaxed. This stands in sharp contrast to traditional approaches where a business sponsor authorizes a project manager (PM) to complete a project with a team that is often assigned to them. Typically, with a more traditional approach the work is planned and divided into phases and milestones, which are then decomposed into tasks by the PM and handed off to resources who complete the required tasks individually. Once these tasks are completed the solution’s components are integrated together into the final product. “Team work” is much like assembling a puzzle except that each team member is fashioning the pieces with often insufficient knowledge of how their pieces will fit with the others. Each software engineer may have an understanding of what they should be doing, but the overall project vision (the completed puzzle picture) is only clearly visible to the PM.

On an agile team, there is an emphasis placed on self-organization, collective planning, and decision-making. Rigid and formal authority structures are often frowned upon because they are seen to be a barrier to open communication and speedy decision-making. In short hierarchy is believed to degrade the team’s agility and ability to respond to new demands and changes in a speedy way. It is just not fast enough. For Gary, AD is:
A different way of working that I think is much simpler. It’s much easier to address problems. If there’s an issue with something we’re seeing, I just walk over there and we can talk about it. Other than that, I’d have to send hundreds of emails back and forth (A2, Personal Communication, April 18th, 2011).

On agile teams the person with executive decision-making rights is referred to as the “product owner” (PO). Their role is to represent the business stakeholders and to monitor the overall development process. During my time in the district I was embedded with a development team that was composed of seven core contributors - six of them co-located and one of them working remotely. In addition, there were two others from the district who were tasked with providing support to the project on an as needed basis which turned out to be quite frequently. The development team lead also took on the role of solution analyst. Their role was to design the CLP’s solution architecture in consultation with technical subject matter experts. The development team lead was also responsible for providing advice to the PO regarding the key decisions that were required. The team also included a web designer, working remotely, who was responsible for creating the CLP’s visual design. Rounding out the team were two software architects or more simply “developers”, who were responsible for building (coding) the solution and addressing any technical problems that may arise. The two developers worked closely, often side-by-side in order to check, provide feedback, and support the each other’s work. This is common strategy in agile development approaches such as extreme programming (XP) and stands apart from traditional approaches where each developer works often individually on a separate aspect of the software being developed. The team, armed with large and powerful laptops, would work in an open office called a “break-out” room with one central desk in front of a large whiteboard which was constantly covered in writing. The configuration of the space may seem inconsequential, but it is often considered to be an essential part of making agile teams effective, and this instance was no different.

In a more abstract sense, the structure and smooth operation of the team is a function of the habitus that team members have internalized over time. Instead of communicating primarily through documents and other “passive” forms of communication, team members are forced to communicate face-to-face and to be co-present as they work. This can make a big difference. As I mentioned a moment ago, the
inscription process is not simply about developing specifications and coding a solution to meet these specifications. It is about imagining and envisioning an outcome in consultation with others. This is a highly creative and imaginative endeavor requiring countless interactions that are simply easier to manage if actors are co-present. The goal of design thinking and agile development is to create the conditions that enable the team to exchange and synthesize ideas quickly, to rapidly prototype and interact with the ideas of others, and to refine them. Documenting roles, responsibilities, expectations and assumptions are still important, however these forms of explicit coordination create an "overhead" that is viewed as a form of drag that can be reduced if the actors internalize a commitment to the basic principles of the approach. “Agile” development derives its name from its insistence on continuous improvisation through the course of practice.

Aligning design thinking and agile development created an integrated approach to the inscription of the CLP. This approach enabled the team to inscribe the vision of the CLP in a way that responded to conflicting and unclear user demands, made these demands concrete and workable, and did so under financial constraints. Design thinking was valuable in that it brought a practical approach to problem solving that the team used to reason through and make sense of a wicked design problem. Agile development methods provided the framework within which the insights gained from design thinking could be refined, channeled, and realized through collective action and teamwork.

Aligning Design Thinking With Agile Development

Having offered a general description of DT and AD, the following sections describe their incorporation through the inscription of the CLP in greater detail. These sections draw attention to the specific techniques that were used to push the inscription process forward. For the purposes of brevity, I will focus on the most salient points in what was a long project that unfolded over a six-month period. To begin with, the process of inscription, took place through a series of five incremental and overlapping phases.
Figure 5.4. A synthesis of the design thinking and ADM process models.
**Phase 1: Discovering and Envisioning**

The inscription of the CLP progressed through a multistage process beginning with a discovery and envisioning phase. This initial phase provided an opportunity for the team to collect the pieces required to assemble the vision for the CLP. In design thinking, discovery involves research into the social context in which the innovation will be implemented. This research phase aims to collect information about the problem that the team is attempting to solve, the actors involved, their concerns and their expectations. In this instance, discovery involved a series of observation sessions, workshops and interviews with students, teachers and staff. Of all the groups of actors, teachers were the most outspoken.

Many teachers I interviewed began by making sense of the new vision in terms of the old product categories in the educational technology market. For teachers, the idea of a collaborative learning platform was viewed almost exclusively through their historical experiences with learning management systems (LMS). This experience was often unpleasant. As one teacher noted: “when it comes to technology in the classroom, it doesn’t seem as if the administration is really listening or looking at actual concerns” (T6, Personal Communication, March 8, 2011). When I asked this teacher to elaborate, she replied “Our students have lots of technology, now more than ever. So they have the tools. They just don’t know how to use them” (ibid).

One teacher identified what they believed to be a pervasive fear and suspicion among teachers regarding new technologies saying that “many [LMS] systems scare teachers off! On top of that, when they do get around to using them, they’re slow, difficult to use, and the support often isn’t there” (T5, Personal Communication, March 17, 2011). Another teacher expressed similar attitudes saying “I know a lot of my colleagues just don’t have the time to learn how to use them. There are also a lot of teachers -and this is a big one- they just don’t understand how this stuff can help them” (T1, Personal Communication, March 22, 2011). Many teachers echoed these sentiments during the discovery session. It was clear that the initial expectations of teachers were not high. Many viewed the project as an attempt to create another version of an LMS, except this time it would be more expensive and more difficult to use. It was clear that user adoption was likely to be a substantial hurdle. As one teacher said:
Technology introduction is often just window dressing. If the pedagogical value of the technology is unclear—not just unclear, but not immediately or intuitively clear, user adoption becomes a big problem (T2, Personal Communication, April 7, 2011).

While design thinking begins with a discovery phase, agile development begins by expressing the importance of envisioning the outcome. Combining discovery with envisioning was a fact finding and fact-facing venture. It confirmed what the district had implicitly assumed. Building a learning platform that could satisfy the numerous and sometimes conflicting demands of teachers would be extremely challenging. The vision of the platform would need to capture the enthusiasm of students as well as teachers but it clearly could not be everything to everybody. As Gary noted, after one of the sessions “we’re not going to do Facebook for the district. Teachers will hate it and students will think it’s lame” (A2 Personal Communication, March 22, 2011). He was right. As one student would later say during a workshop “give us Facebook, but not Facebook ‘cause then we’ll just waste time” (S1 Personal Communication, April 8, 2011).

The primary objective in the discovery and envisioning phase was to formulate the problem the team was trying to solve. This required drawing together the background knowledge necessary to empathize with the intended users of the CLP, understand their expectations for the solution, define the project’s scope and look for opportunities to unify the actors around the fragile vision. As the development team lead told me:

For us, it's an opportunity to dig deeper into this challenge, get people in a room together and get them talking to each other. Often they haven’t, or don’t have a chance to, discuss these issues. So let's get them all out there, on the table (D1, Personal Communication, March 25, 2011).

The discovery and envisioning phase was essential in formulating the problem. But it also aroused a sense of empathy. Empathizing with the various actors involved was critical to understanding the issues and attitudes that the team would come across in subsequent phases. Empathizing with students, teachers and staff seemed to send a signal that, if nothing else, they were being listened to, and acknowledged. The simple act of inviting their participation had a cathartic effect for students and teachers who were accustomed to technologies being dropped into their classrooms. This period of conversation was also refreshing for administrators who were accustomed to having consultants take their orders, like a waiter at a restaurant, rather than challenging their
ideas. This phase laid the foundation for building a collective trust among the actors which would be critical to the project’s success.

**Phase 2: Ideating and Planning**

After the conclusion of the discovery and envisioning phase, the next step was to develop the vision in a more substantial way. Design thinking refers to this stage as “ideation”. Ideation is where the knowledge gained from the previous stage is refined into a potentially workable concept. This involved a number of brainstorming and workshop sessions where several possible approaches to the solution were suggested and considered. This second stage of the process is intended to build a consensus among the team regarding the solution concept, design and approach. The ideation phase was correlated with what agile development refers to as a planning phase. Plans for the CLP’s construction, including the solution design, functional requirements and solution architecture were a key outputs in this stage.

The ideation and planning phase was focused on refining the solution concept. The solution concept is a prediction about how users will interact with the platform, the features they will want to use, and how they will use them. Like the discovery and envisioning phase, this phase enlisted the input of several groups of actors who collaborated in order to produce the concept.

From the beginning, Chris and Gary envisioned the CLP to be a blended learning solution. It would be built within the district and customized, to some extent, for each school and student. Blended learning is, by definition, a hybrid pedagogical strategy. It seeks to integrate embodied, face-to-face learning approaches with ICT enabled (often web-based), computer-mediated learning approaches (Kitchenham, 2011; Littlejohn, 2007; Tucker, 2012). To make it work, it requires a computing platform that can support and extend classroom-learning interactions between students and teachers. An obvious question here is why take the time to develop a customized solution? Why not just buy one of the many LMS products that are already on the market? As Gary explained:

Lots of districts are faced with this problem, the buy versus build problem. Maybe [buying] would have been the way to go, but I don’t think it was for us. A lot of the products on the market now just won’t do what we’d like them to do. It’s another thing we need to administer and often, they just
won’t integrate the way we want them to without a lot of work. And if we did go with a product, we wouldn’t have as much control over how the platform would develop, the features we’d like, and so on. (A2, March 8, 2011).

The decision to build a solution rather than buy a product is unusual. For administrators, the attraction to LMS platforms has arguably less to do with learning and more to do with reducing costs. The CLP would cost more than a standard LMS, but it would also do more.

Stripped down to its most basic components, the CLP is a highly customized version of Microsoft SharePoint Server (2010). SharePoint is a server based computing platform, designed to augment collaboration and communication capabilities within organizations of all kinds. The product is often considered the de facto enterprise-grade social media platform. It can be a challenging technology to understand for those who are accustomed to “turn-key” solutions, because it can (and often is) configured and customized in ways that are organizationally specific.
Figure 5.5 SharePoint Features
Figure 5.6. "White boarding" a technical schematic of the CLP in the breakout room.

SharePoint is made up of several technologies that are supported through a common platform. As a server solution it provides six integrated capabilities, and several platform services that can be useful in a multitude of ways. Because of this, it requires significant development for it to become a useful solution. Adapting and developing it for
educational purposes presented a formidable challenge to the development team, the majority of whom had no prior experience in creating educational software.

Of the several AD planning techniques that were used, one prominent technique the team relied on during this phase was the creation of user stories. User stories are short narratives that describe the desired function of a system from the user’s perspective. The team would begin creating user stories by sitting down with users informally, and asking them to write down a short narrative that describes an imagined interaction with the system. The narratives are commonly written on index cards. Here is an example from a student:

**SEEING FRIENDS ONLINE**

As a student, I want to see when my friends are online and I want them to be able to see me.

![Figure 5.7. User Story Example 1](image)

Below is another example from a teacher:

**INCLUDING ASSIGNMENT MATERIALS**

As a teacher, I need to be able to include a variety of supporting materials when I create an assignment and upload it to the system.

![Figure 5.8. User Story Example 2](image)

User stories are literal (and literally) inscriptions written by users in collaboration with designers. The description of an interaction from the user’s point of view articulates a specific functional requirement but also gives context to how that requirement can be satisfied from their perspective. User stories draw attention to the ambiguities of interaction that require further clarification. For instance, with the above examples, some questions that came up were why is the communication of a user’s presence important
for students? Who are the student’s “friends” and what security restrictions should be in place when it comes to them connecting with each other? In the second example, questions emerged regarding the types of materials that are important. What would teachers commonly want to upload? What kinds of files would they be and how big would they be? How many assignments would they typically be creating and how could this process be sped up through simple automation?

The collection of user stories allowed two important things to emerge. First, it gave the development team more insight into the personas of users. In traditional development approaches, there is no such thing as a user persona. There are only “actors” who are defined (usually by their functional role) by the software engineers themselves. Personas can add several layers of meaning to an actor. For instance, instead of having an actor defined as “student” or “teacher” a persona adds context. A “student” becomes “a fourth grader” or a “teacher” becomes “a social science teacher.” Personas emerged as a consequence of deep interaction and collaboration with all the “actors” involved.

The second thing that emerged were actual requirements. User stories required the team to translate user demands into functional requirements which included specific acceptance criteria. Returning to first user story example, these acceptance criteria were:

<table>
<thead>
<tr>
<th>Acceptance Criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The student interface will feature a component that shows a colleague’s presence.</td>
</tr>
<tr>
<td>• Students can search via a search field by colleague.</td>
</tr>
<tr>
<td>• Selecting a colleague from the list displays their contact card and a dialogue box for chat.</td>
</tr>
<tr>
<td>• Students cannot add colleagues from other grade levels.</td>
</tr>
</tbody>
</table>

Figure 5.9  User Story Example 3 (acceptance criteria)

The acceptance criteria would later serve as the basis for testing the platform’s functionality. These criteria also represented a key artifact around which the team would
collaborate with users and stakeholders, reduce uncertainty and develop consensus on the CLP’s features along with their priority.

The path of the CLP’s development would also be influenced by other factors beyond its intended users. As the district’s primary learning platform, the CLP would be required to address the BC Education Plan’s demand for a more personalized approach to learning while at the same time, satisfying the demand for increased collaboration, social learning experiences, and communication between students, staff and parents. The CLP Addresses these requirements with two foundational components.

**Personalized Student Dashboards:**

The personalized student dashboard was designed to bring together the most commonly used computing services and present them through a single touch point (i.e., all in one place.) Students (and teachers) would each have a learning dashboard that would show their online status, personal and shared document libraries, assignments, personal blog and wiki. Users would also have the ability to customize the theme of the dashboard, change its colors and presentation.

**Virtual Classrooms**

While student dashboards were intended to support personalized learning, collaborative learning would be supported through a virtual classroom. The virtual classroom component was essentially a customized webpage were students and teachers can post information related to school or classroom events and activities, as well as access other related applications and services such as wikis or forums. Teachers would be able to create assignments through the virtual classroom that could be shared across their other virtual classrooms and pushed out to each student’s dashboard. Students would be able to submit assignments through an automated workflow and teachers would be able to collect, track and respond to these assignments through a customized assignment dashboard.

Student dashboards and virtual classrooms are the foundational components of the platform. They are designed to compliment each other, support, and blend into in-classroom learning activities. The platform would also have the ability to archive and maintain a portfolio of each student’s work as they moved through each grade level.
What was significant in the ideation and planning phase was the sustained engagement and collaboration with stakeholders at all levels. It was during this phase that these stakeholders, often for the first time, brought their interests and ideas into alignment with each other through a series of collaborative planning techniques. It marked the first time where participants were negotiating their interests and resolving their perspectives. The conclusion of this stage signaled a movement toward consensus and agreement on the solution being developed and the synthesis of a strategy through which it would be realized.

**Phase 3: Prototyping and Developing**

Once the concept of the CLP was sufficiently elaborated, the next step was to build a working prototype. While the technique of prototyping has been around for some time, the practice takes on special significance because it forces developers to push what is still only an abstract concept, one step closer to tangibility. Prototyping is simply the initial build of the solution where the goal is to prove or demonstrate the concept’s technical feasibility; to create a “proof of concept” (POC).

Like all prototypes, the CLP’s prototype or POC was far from a complete working model. It was a rough, embryonic representation of the finished product. Whereas the ideation and planning phase was useful in its own way, it was still an exercise in abstraction. Prototyping on the other hand is very much a concrete and practical activity.

Perhaps the most notable aspect of prototyping that design thinking and AD methods both stress is speed. POC’s are developed as rapidly as possible. The reason for this emphasis is that it allows the team to visualize and interact with the solution as it is being built. This often draws out the implications of the design which are often unforeseeable in the previous phases. Another reason for speed is to curb what is commonly called “feature creep.” Feature creep is the tendency for stakeholders to change their minds about the solution being developed, its functionality and capability. While feature creep may sound like a simplistic problem to solve, it is often symptomatic of larger changes among the stakeholders themselves, changes of interest, understanding or purpose.
When the team finished the CLP’s POC it was presented to Gary, the PO. This “show and tell” ritual happens in what is called a “standup” session. It was during the daily standup sessions where the development team could take the opportunity to demonstrate their progress, show off the functionality of the CLP as it is being built, and to inform the PO of any problems or decisions that need to be addressed to maintain the pace of development. As one developer remarked: “this is my favorite part because its really when you get to see this thing come to life” (D2, Personal Interview, May 13, 2011). Once the POC was finished it required approval from the PO. After this, the solution and its features are considered to be under change control. They can only be modified by the PO in consultation with the team.

What is interesting here is that the solution plan and concept is finalized after the concept has been built and proven. The final plan solidifies only after developers start to build the thing. In architecture, this would be analogous to a scenario where the first five floors of a twenty-story building are built before a blueprint is even created!

The interaction with the concept, even if only in its early unpolished state, became invaluable not only in keeping the actors aligned and motivated to achieve the vision, but more practically, it provided a focal point for arguments and choices regarding further development.

In many variants of agile development (most prominently Scrum), after the concept has been proven, development happens in incremental intervals called “iterations” or “sprints”. Projects can have numerous sprints which are commonly organized around a specific theme. Each sprint has a clear objective: to deliver functional, working pieces of the larger solution. For example, a goal for a single sprint may be to complete the student dashboard component of the CLP. The dashboard’s features, as we’ve seen in the second phase, are captured in terms of user stories that detail specific functional requirements. In the case of the dashboard, there may be 12 stories in total. When planning for the sprint, the developers might set a goal of completing all 12 stories in one month. When they are finished the sprint, the team moves on to the next sprint or iteration.

As the team moves through the backlog of stories and completes each one, the piece that the story represents is initially tested and validated by the PO along with other
testers. The PO can either accept that the requirements of each story have been met, in which case, the story is considered completed. If the acceptance criteria are not met, the PO can reject the story in which case its placed back into the backlog for revision and further iteration.

Figure 5.10  General agile project tempo.

As mentioned a moment ago, in design thinking and AD methods, the emphasis on speed is especially important. On many agile teams, “efficiency” in terms of measured as “velocity”, which is the key governing metric. As a performance metric, velocity is measured by taking the number of stories completed within a given sprint, and multiplying them by their estimated difficulty. Velocity is critical in terms of monitoring the project’s progress and determining the team’s working capacity. The purpose of tracking
velocity is not so much to measure a team or developer’s productivity. This is a common misunderstanding in AD methods. Rather it is meant to give the team an indication of their progress and working capacity. In a social sense, velocity engenders a cadence or rhythm for the team and a sense of movement toward a completed product.

Speed and velocity are not only desirable in moving the innovation process forward, they are seen as a requirement. The risks of accepting a slow, sluggish, protracted and bureaucratic innovation process (or worse, no process at all) is that ideas may never make it out of the conceptual stage. Or perhaps the actors may change their minds, demands, commitments or interests. Alignment between stakeholders may breakdown, the synergy between teams may dissolve. Accelerating the pace of work, between abstraction and concretization, ideating and planning, prototyping and developing, is an extremely important aspect of staving off a perpetual entropy and effectively inscribing the vision. The reason why velocity is so important is that, in an abstract sense, it is a measure of the rate at which ideas are transformed into things.

**Phase 4: Testing and Stabilization**

Once development was completed, the next step was to test and stabilize the solution. The terms “testing” and “stabilization” are often used interchangeably but there is a subtle difference between the two. In design thinking, testing is not unlike experimentation. The solution must pass through a series of trials for it to be accepted. Testing took place in small “pilots” within the production environment with the users themselves. Students and teachers were given the opportunity to try out the CLP and provide their feedback on how it could be improved. This is somewhat unusual from a conventional software development perspective where testing takes place in a staging environment which simulates the production environment. Also, testing is often done by professional testers rather than users. So testing in the “real” environment with “real” users is often accompanied by significant risks. Yet this choice was made because it was the fastest and most direct way to observe how the CLP would perform in real world conditions.

The second aspect of this phase, stabilization, carries an important implication. The solution is not stable. It is “buggy” and prone to malfunction. But a more important implication is that it is open to revision. It is changeable. While the CLP and its
foundational pieces such as the dashboards and virtual classrooms were not open for debate or significant revision, aspects of their functionality were. As the team observed students and teachers discovering this new technology, they could note what aspects of the CLP appeared to work well, and which others could be improved.

The testing and stabilization phase is perhaps where design thinking and agile development depart most sharply from traditional approaches. In traditional software engineering, the software development lifecycle proceeds in a linear fashion. As the coding or development phase comes to a close, the solution proceeds into a testing phase where it is validated then released to a production environment. DT and AD, in contrast, adhere to a nonlinear process model. The reason for nonlinearity stems from the recognition that often concepts do not move from idea to implementation in a straightforward way. The practices of design thinking and agile development are premised on an attitude of experimentation and continuous learning rather than brute force operationalization. Learning is understood to be an iterative process for the team.

Iteration, traditionalists often suggest, is not always productive because it is seen to prolong the development phase. However, this charge confuses the meaning of iteration. Iteration appears to have two meanings in software development. The first meaning simply refers to a process of repetition, or doing something over again. This is precisely what traditional development approaches are designed to avoid. Doing something over and over again, from this point of view, is a waste of time and resources. In contrast, within DT and AD iteration is something more akin to “re-design.” It involves a collaboration between developers, users, and other engaged actors, such that the developers are able to translate their own creation and re-inscribe their own work in much the same way an author re-writes a chapter again and again until they achieve the literary effect they are seeking. This technique is central to learning and adaptation, the latter of which are at the core what is meant by “agile”.

The relationship between testing and stabilization, from the developer’s position, is highly reflexive -more so than any other phase. While it is often described superficially as “de-bugging” it is actually the phase where ideas and actions are quickly and constantly refracted off each other. As the team moves through the process they are reflexively incorporating new knowledge and insights into each new iteration of the solution. The solution is repeatedly scrutinized and rapidly tweaked as users and
developers must work together to collectively realize the solution in their everyday environment.

**Phase 5: Implementation and Deployment**

Finally, once the solution had passed through testing and had been stabilized, it was ready to be implemented. Implementation and deployment are largely synonymous but have slightly different inflections. Where implementation is an event, deployment is a deliberate action.

With the CLP it would be a mistake to view this final phase as a discreet period in itself. It was evident that through the inscription process the team was working to continuously implement the CLP. This work began with the discovery and envisioning phase and culminated with this final phase. In a technical sense, this idea is analogous to a practice called “continuous integration”. As one developer explained:

Integration is always the toughest part. In the old days we used to build the thing ourselves, test it ourselves, and then when it came time to deploy, we would turn it on and hope nothing went wrong. Sometimes it worked and sometimes it didn’t. I mean, it always worked! Some things just work better than others! (D3, Personal Communication, August 4, 2011).

Continuous integration is often attributed specifically to extreme programming where developers are frequently integrating their code into the solution’s codebase on a regular basis. As each new feature is finished, it is tested and its code is added. Integration is not a singular event but a series of small actions.

The process of implementing the CLP was similar in a social sense. As the team worked through each phase, they were enacting the solution, moving it closer to materiality one step at a time. The success or failure of the implementation would rest upon the degree to which the thing being implemented would be successfully translated by users. To discuss implementation requires a more elaborate discussion of the process of translation. This has been reserved for the following chapter.
Conclusion

From the perspective of ANT, the CLP is a clear example of an mediator. It is an entity that has been assembled to transport meaning between actors. Its inscription, (the process of how it was transformed from abstract idea to material thing), necessitated the association of texts (strategies, plans), resources (money, space, time) and other actors (human and nonhuman). This chapter discussed how these elements were aligned, integrated and inscribed through an incremental and iterative process. The idea of inscription refers to the process through which an entity, in its broadest sense, materializes and comes into being. In this case, it involved the synthesis of two fundamentally technical methods of practice: design thinking and agile development.

Design thinking and agile development are complimentary within the larger process of innovation. When faced with a wicked design problem such as that posed by the CLP, design thinking operated as a practical and embodied mode of reasoning (Buchanan, 1992) whereas agile development provided a framework of action that the development team (the actors) relied upon to collectively construct it. The reason why the synthesis between design thinking and agile development is so powerful is that it articulates arguments, reasoning and decision-making processes in such a way as to overcome the confusion that often results from the separation of theory and practice, planning and acting, signs and things.

Perhaps an even more significant point, is that design thinking and agile development imply an ethical dimension that is grounded in a kind of habitus (Bourdieu, 1977). I use the term “ethical” here to denote an attitude of obedience to that which is un-enforceable; namely a habitus. This habitus was on display through all phases of development. Throughout the process, design thinking and agile development provide a kind of structure that sets the conditions of communication and social interaction between groups, such that participants can improvise and orchestrate their efforts toward a common goal. These methods provided the “generative schemes” (ibid, 95) that worked to govern and condition the situated “regulated improvisations” and actions among participants.

Insofar as the development team was concerned, their experience with these techniques and with each other allowed them to coordinate their work with little need for
explicit communication. Each member knew their role, their responsibility, what needed to be done and how to do it. There was, of course, constant communication among the team, but this communication simply served to reinforce and reproduce the habitus of the group. Standup meetings, for example, could be viewed as a kind of ritual that served to reproduce the habitus of the team each day, to keep it fresh and to initiate newcomers into this mode of working.

On a larger scale, the expansion and reproduction of this habitus became more complicated. Throughout the process there was a mediation that was taking place between developers and the different groups of participants. Theoretically this mediation signified the attempt by a given group of users to articulate their own habitus and communicate it to others. This mediation involved the iterative translation of social demands and more abstractly, a habitus, into technical capabilities using the techniques I have described. With each successive stage, the habitus of the team was coming into a confrontation with the habitus of students, the habitus of teachers and the institutionalized habitus of the district.

Practically, this mediation is a challenging skill involving negotiating trade-offs between social demands and technical capabilities. In most cases these trade-offs were trivial; users had only a vague sense of their requirements. These requirements had to be iteratively developed. It was the user’s responsibility to envision the outcome and what they wanted to do with the CLP when it was finished. It was the developer’s responsibility to design the CLP’s solution architecture such that it met those initial criteria, and could evolve as these criteria evolved. The development team facilitated this refinement and attempted to meet these demands in a way that was technically feasible and economically viable.

Since users could not always be present, and could often not understand the implications of their demands (technical or otherwise), design choices often had to be made by the development team in the best interests of these users. Here we can see design thinking and agile development’s most valuable contribution. Both provide a way to think about the handshake that takes place in all systems design and development between morality and materiality (Latour, 2008, p. 5). This handshake as I have called it highlights the importance of directing this process in a way that is responsible, accountable and representative. In order for the process to be effective, the design team
must secure the trust and consent of those they represent, and this requires continuous communication over time. In this respect, the team was successful, as was the administration in enlisting user participation through the process and securing this trust.

This ethical dimension as I have called it, opens up a space where a politics of design and technology can be observed and discussed (Björgvinsson, Ehn, & Hillgren, 2012; Feenberg, 2008). What is noteworthy here is that the process I have described above has political aspects, which are carried through to the mediator that is being created. In other words, the CLP can be conceived in technical terms simply as an information system and social computing platform. But it can also be conceived in ethical terms as a representative of the social groups (students, teachers, administrators, consultants) that were involved in its creation. Alignment from this perspective is contingent upon the degree to which the CLP could represent the interests of those participants involved in its creation, and invoke the habitus that these participants attempted to communicate to each other through its development.

These observations underscore the fact that good design and speedy development are improbable if designers are unwilling or unable to reasonably incorporate all the actors into the project. This is easier said than done. It requires considerable communicative resources and competence, an ability to synthesize and translate meanings across social, material, disciplinary and professional contexts. In an agile team, performance is always contingent, yet this contingency managed through a variety of communicative rituals, resources. The reflexive nature of DT and AD methods feed into an innovation process where knowledge is constantly being reformed and refactored with the discovery of new information. The collective action of the team, right down to the individuals who are a part of it, is constantly re-aligned midst of a strategy that is continuously emerging and changing.

The team was a few weeks away from going live with the platform. Time would tell whether the CLP would be successful or not. Creating the Collaborative Learning Platform from the ground up was much like giving birth to a new actor within the WVSD. It was a bold decision that reflects the ethos of design thinkers and agile developers. This ethos thrives on its ability to provoke a reaction. The CLP was intended to provoke a reaction. As Gary told me, when we first sat down to discuss the vision, “We’re going
for an A or F here. We’re not interested in a C+" (A2, Personal Communication, March 10, 2011).
Chapter 6. The Pragmatics of Alignment

Introduction

One of my study’s central research questions was: what are the means through which alignment is enacted? There are several possible explanations, but perhaps the most obvious is that alignment is enacted through technological means. Work processes are broken down into tasks and subtasks, roles and dependencies are determined, and then tasks are assigned to the actors or in some cases automated altogether. This explanation would suggest that it is technology that maintains the alignment of the organization. From this perspective, technology operates to integrate districts, and steer them toward policy objectives. But this does not generally happen in educational organizations because they do not have a clear technological core. The closest thing to a technological core within schools are teachers. Teachers operate more or less autonomously in their day-to-day activities because the task of teaching is too complex to lend itself to technological decomposition.

Could authority be the means of alignment? After all, the authority structure of the education system is organized hierarchically like most other organizations. Could it be that provinces align districts, districts align schools, schools align teachers, and teachers align their students? If this is true, then perhaps the best way to study alignment is to examine leaders who engage students, and empower teachers. The authority explanation also seems unlikely though, because in educational organizations, the authority structure generally does not play a crucial role in structuring the actions of teachers or administrators on a day-to-day basis. Educators and administrators operate with high degrees of professional autonomy.

So if neither technology nor authority offer adequate explanations of the means of alignment, what’s left? Could the means of alignment be cultural? While the presence of "culture" is clear, its abstractness poses problems for those who are interested in
practical matters. To suggest that culture is an adequate means of alignment demands more from the idea of culture than it can deliver. It tends to assume way too much in terms of the uniformity and functional cohesiveness of culture, its force and effect. What's more, it does not provide much help in explicating the practical methodology of alignment nor of interactions involved in the process without resorting to a very slippery and abstract category.

The question of the means of alignment is exasperated by the fact that alignment researchers have largely lacked the theoretical resources to adequately describe these means. As I outlined in chapter two, for some time the means of alignment have been explained with recourse to the concept of organizational structure (as in the SAM model) or the actions of individuals (as in the SDM model). Both the SAM and SDM models (in fact, most explanations of alignment) are reductionist in that they claim that alignment is generally a function of either structure or individual actions, usually taken by managers. One determines the other. While these explanations may differ in the reductive positions they subscribe to, they are similar in separating structure from agency as well as the social and technical components of the problem. In the process, they lose their focus on describing how these things are embedded together and mobilized toward a goal.

While these approaches each offer a different perspective, whether it is examining the formal or structural aspects of alignment, or the semantic or social dimensions of alignment, there is comparatively less work that examines what I will call the pragmatics of alignment. By “pragmatics” I am referring to the situated interactions that work to transport and translate strategies and meanings between actors, across space and through time. This chapter argues that the means, method or way in which alignment is achieved, have to do with the ways in which situated actors strategically and pragmatically translate their interests through sociotechnical mediators/structures. My work observing alignment in the district suggests that the challenge of alignment has less to do with delineating its structural or social aspects, nor its strategic or technical components, but rather accounting for the process of their mutual constitution through practice.

I want to start by giving an explanation of the core ideas that comprise what I have called the pragmatics of alignment, and how they apply to my fieldwork within the district. First, of central importance here, is the concept of translation, which I have taken
from ANT. Translation describes a process through which interests are strategically delegated to other actors within the organization. It is through translation that actors enact alignment and create new relationships that have the potential to change the organization. This is where the CLP becomes extremely important as an actor in itself. It is significant because it functions as a mediator that translates the interests of other actors, connects them together, and attempts to mobilize groups of actors toward a strategic goal.

The second key point is the observation that the CLP not only connects various actors together, it makes these connections and associations more robust and durable. The crux of the argument here is that not only does it play a role in enacting alignment, it works to structure this enactment process and contain it within definable limits. In this way, the CLP exemplifies what structuration theory refers to as the duality of structure. It is both a medium and an outcome of a recursive relationship between situated actions and their translation through sociotechnical structures.

There is a final component to the pragmatics of alignment that involves the degree to which an mediator is taken up and adopted by other actors. This is related to (and to some extent embedded in) concept of translation. But this aspect differs in the sense that it goes down to the embodied skills and dispositions of the actors involved, in other words, the habitus. The pragmatic aspects of alignment from this standpoint concern the transposition of the habitus from one context to another. In this case, the transposition of the habitus of the classroom into a digital context that is familiar to users, yet new at the same time.

**The Pragmatics of Alignment**

The pragmatics of alignment refer to the interplay between the situated interactions that shape and change organizational structures on the one hand, and the structures that are enacted to contain, limit and shape these interactions on the other. To explain what I call the pragmatics of alignment, I want to begin with the concept of situated action (Suchman, 1987). The basic idea is that human beings are knowledgeable agents who act intentionally and purposively. But the way in which they act and the course of action they select, depends on the context in which they are
located. This context shapes situated action and makes it meaningful. But it can never be completely pre-determined. It is complex and difficult to describe with a formal language or model.

Yet, as I mentioned a moment ago, alignment research programs have largely chosen to slice this context into the categories of structure and action. This division is problematic because its efficacy depends entirely on the situatedness of the observer or researcher, their position in relation to their research object, and the time at which they are observing it. If the means of alignment are a matter of deliberative actions taken only by humans then the problem becomes one of identifying the parameters of action, that is, establishing precisely which actions are decisive and which are not. The problem then hinges on how does one limit the scope of possible relevant actions in the alignment process?

If, on the other extreme, alignment is a structural phenomenon, then how can we possibly account for processes of structural change? After all, structures are generally incapable of changing themselves. If change cannot be adequately explained, this is a big problem for researchers who claim that alignment has anything to do with organizational transformation. At the risk of belaboring the point, the issue here is not which category is more relevant to alignment, but rather how structures and situated actions are integrated. How are situated localized interactions linked to larger structural patterns of change?

ANT bypasses the structure-agency problem altogether by offering a premise so simple and obvious that it is seemingly too good to be true. The premise of ANT is that structures can act, and actors can structure. ANT removes the distinctions between “structure”, “actor”, “social”, “technical”, and instead offers the concepts of “actor” (an entity) and network (a relationship). If this premise is accepted, then the means of alignment depend less on what an entity is, and more so on how the actors act, how they are deployed, or how they deploy themselves.

The path, advocated by ANT is to take a pragmatic stance to the question of means. From the ANT perspective, it is not as important to worry so much about what the actors are, or even what they believe or say. It is more important to observe what
they are doing and how they are doing it (Callon et al., 1986; Callon & Latour, 1981; Law, 1992).

**Mediators and Intermediaries**

If, as ANT suggests, structure can be collapsed into action sounds too good to be true, that is because it likely is. For any intentional organizational change to happen actors need to be re-aligned. Another way of saying this is that actors need to be re-associated in some way. Once this happens, an important question concerns asking how new associations are held in place, given durability and normalized? This is a difficult question for those working within an ANT framework. The conventional sociological solution is to introduce the concept of structure, however in ANT, there is no such thing as structure!

Structure is important because it implies boundaries and limits, which help to explain how organizations stabilize, routinize and reproduce themselves. If we strictly adhere to ANT, then the concept of structure is unavailable. The closest alternative would be the actor-network which is always a socio-material construction. In ANT, it is not a social force that holds an organization together, but the physical presence of technology and other nonhuman actors (Latour, 2007 p. 34). These elements are constantly destabilizing and re-forming themselves, along with the networks they belong to. From this perspective organizations are unstable entities that are constantly re-building themselves through continuous action on the part of these nonhuman entities. The impression that ANT leave us with is that organizations are fragile, and prone to continuous destabilization and change. This explanation is not entirely convincing. After all, organizations are often much more resilient than ANT makes them out to be. But this does not mean that ANT cannot be helpful in other ways. Where ANT is useful is in its insistence on making a closer inspection of the different types of interactive relationships that social and technological actors can enact.

The interactions that comprise the pragmatics of alignment have performative and ostensive qualities. This is a critical distinction that allows us to salvage a working concept of structure which we will save and reintroduce back into the analysis later. One way to view the performative aspect of alignment is through the metaphor of a dance or
a play. The question of how people work to align organizations is analogous to asking how do dancers dance? Or singers sing? Or teachers teach, for that matter! For sure, mastering these skills requires training and study. Frequently, these activities require props, or platforms and spaces. Perhaps even more so, these things require practice. Whether speaking of the practice of dancing, singing, teaching or aligning, all of these things share a performative quality. If the dancers stop dancing, the dance ends. If singers stop singing, the song stops. And if teachers stop teaching, class is basically over. From the standpoint of ANT, in principle, if the actor’s stop acting, the network dissolves. Furthermore, if actors stop acting in a certain way or modify their actions such that they no longer conform to the expectations of others, the topology of the network is destabilized and the organization invariably changes.

These changes need to be contained and controlled or the organization risks falls apart. This is why the pragmatics of alignment also has an ostensive quality. By “ostensive” I am referring to the items within the organization that remain manifestly apparent, relatively stable, fixed and static. These items could be anything from people to processes to norms, and most definitely technologies. Ostensive elements are those which comprise taken-for-granted structures, frameworks, or systems.

ANT captures this difference between performative and ostensive qualities by introducing the concepts of “mediator” and “intermediary”. This distinction is analogous to the distinction one finds in cybernetics between trivial and nontrivial machines (Foerster, 2003). Here a mediator refers to an actor that “cannot be exactly defined by its input and its output” (Latour, 1999, p. 307). Mediators are actors with whom the relationship between input and output, their “transfer function” in engineering terms, is always uncertain. With mediators,

their input is never a good predictor of their output; their specificity must be taken into account each time. Mediators transform, translate, distort and modify the meaning of the elements they are supposed to carry (Latour, 2007, p. 39).

An intermediary, in contrast, transports “meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even it is internally made of many parts” (Latour, 2005, p. 39). The ostensive quality
that intermediaries display is important. Intermediaries work to define, stabilize and structure relationships between actors. They reduce the uncertainly of complex chains of interaction. Without intermediaries, alignment would be exceedingly difficult. What we can take from ANT is the observation that structures can act, and actors can structure. Human or not, each actor can display the qualities of a mediator or intermediary, depending on the context in which they are deployed and observed. While it may seem that the CLP might have the qualities of being an intermediary, when we take into account the process through which the creators were creatively interpreting the district's vision, and inscribing it into the CLP, it is much more accurate to call the CLP a mediator. Through the stages of inscription, there was a progressive mediation of the district's vision, and this process in itself signifies a change in the original meaning. This mediation continues to flow from developers to teachers to students; there are multidirectional influences that are significant. Realistically alignment must take into account these changes in meaning, rather than simply assume an unchanged transfer of meaning from top to bottom.

From this point of view mediators are critical in alignment because they not only describe their networks but also compose them. Mediators are special types of actors that are able to connect and structure the contextual arena of situated action. Technology plays this role quite well. But the notion that technologies could “act” in this way never occurred to social science, because its traditions had not taken (or refused to take) the premise that technologies have agency seriously. Technologies, whether in the form of a book or computer, are often considered to be simple objects, at the disposal of human actors.

We can begin to see why the CLP is of strategic importance in enacting the pragmatics of alignment. The CLP is more than simply a piece of information technology. It is an actor in which meaning is inscribed and then transported and translated.

**Translating the CLP**

John Law has argued that the “core” of the ANT approach is a “concern with how actors and organizations mobilize, juxtapose and hold together the bits and pieces of which they are composed (Law, 1992, p. 386). What Law suggests, is that ANT is
ultimately concerned with studying the phenomenon of how order emerges out of complexity. In traditional sociologies this concern is addressed through an analysis of structure. Mediators are special types of actors that can stand-in for the concept of structure. They have structuring capabilities that emerge as they participate in enacting social practices. While they can mobilize actors to act, they can also limit and shape this action.

Studying this interplay is not a one-shot event. It involves understanding how actors use and rely upon each other to communicate their interests and strategies across spaces and through time. “Translation” describes a process of tracing the path of these strategies, the way they are handed off or delegated to other actors, and the fidelity with which they are interpreted.

The process of translation begins when an actor “A” encounters another actor “B”. It makes no difference whether “B” is human or not, an individual, a corporate body, a mediator or intermediary (Callon, 1991, p. 143). As “A” initiates contact with “B”, “B” is also interpreting what “A” is, what they signify, what their goals and interests are and so on. “A” and “B” have thus begun the process of translation. It is on the basis of translations that actors qualify each other, create convergences and partnerships, decide to work together or not, and recruit others to advance their agenda.

The general path of translation spans four moments which were first articulated by Callon (1986). These moments are problematization, interessement, enrolment, and mobilization. Inspired by his approach, I use these moments as an interpretive lens in order to focus my empirical observations. The following section discusses each of these moments with reference to some examples discovered through the course of my fieldwork.

**Problematization**

The initial stage of translation, problematization, takes place when an actor or group expresses a demand or need to which another actor might offer a possible solution. The most visible example of problematization in WVSD involved the struggle to find ways to operationalize or enact the key themes of twenty-first century learning found
in the BC Education Plan (British Columbia Ministry of Education, 2011), which, as I mentioned in the previous chapter, were still in a developmental stage.
Figure 6.1

Problematization

**Administrators**
- How do we comply with and satisfy the demands of Ministry/students/parents/teachers?
- How can we best empower our students and staff with technology?
- How do we deliver a personal learning experience to all students?

**Students**
- How can we bring the technology we use in our everyday life into our school?
- How can I connect to my digital network outside the school?

**Teachers**
- How do we implement personalized learning/21C in the classroom?
- How do we engage students in meaningful ways?

**PROBLEMATIZATION**
- How can we:
  - Make the District more responsive to the demands of students/parents/teachers?
  - Encourage creativity and innovation?
  - Increase student achievement, performance and potential?
Before figuring out how the district could re-align itself, teachers, administrators and staff struggled to figure out what they were supposed to be re-aligning themselves toward. Most teachers, for instance, could easily understand the appeal of the discourse of twenty-first century learning and its associated ideas. However the significance of these ideas, especially that of personalized learning, were a matter of debate with many teachers I interviewed:

It’s a paradigm that teachers are still grappling with, but it re-frames the teacher-student interaction, and I think that personalization might be the nucleus of the whole thing (T5, Personal communication, June 26, 2011)

Another teacher who taught within WVSD’s “super-achievers” program, a program for so called “gifted” or high-achieving students elaborated on how they felt their role as a teacher would need to change with the increased emphasis on personalized learning:

With personalized learning, you’re really more of a facilitator than a teacher, and this can be a big change for a teacher who is used to more traditional kinds of interaction with students ... where they are the ‘sage on the stage’ as they say (T7, Personal communication, June. 13, 2011).

The range of ways through which teachers understood the discourse of twenty-first century learning and personalized learning was narrow. All of those I interviewed on the topic understood its meaning in similar ways. What was more interesting was the range of attitudes toward the significance of the idea of personalized learning.

I understand that we ought to be striving to meet the demands of the learner as an individual, that’s important. But I wonder if we haven’t been doing that since day one? Now some may be better at it than others, but I don’t know if it’s as radical an idea as some believe it is (T8, Personal communication, June 16, 2011).

It was clear that trying to make sense of the meaning, relevance and significance of personalized learning was a problem that many teachers were interested in but also apprehensive about. For some, the idea of personalized learning signified a radical departure from generally accepted pedagogical conventions and the traditional teacher-student roles and relationship. For others, personalized learning was simply a new way to communicate an old idea. What was clear was that the momentum of personalized
learning seemed to outpace concerns about its implementation. It was an idea that was not fully formed, and teachers were left to speculate on how it would change their practice and the education system in general. As one teacher noted:

> What seems to be going on is that those who are invested in the idea, and I am to a great extent, tend to overlook the fact that we’re really changing the system here, and we seem to want to push it toward a very individualistic focus. Education is a social enterprise, a social institution, and I wonder what this will mean in the long term. Will this help student’s achieve their educational goals faster? Will it help them become more independent and autonomous in how they think and work? Because it almost seems as if we’re actually making them more dependent on the system, like we’re telling them ‘don’t worry, we will change for you!’ Of course we know that’s not how the world works. So I guess I struggle to understand what their [students] responsibility is in making this work (T3, Personal communication, June 16, 2011).

Some of the interpretations of personalized learning were clearly pushing at the conventions of the education system. As for the idea itself, its legitimacy was problematic in that for some educators, the idea of personalized learning was already a norm in their pedagogical approach. For other teachers it signified a more radical and threatening change and a challenge to their authority in the classroom. As one teacher rhetorically asked “does this now mean that anything goes?” (T9, Personal communication, June 20, 2011). But what was clear in all instances was that the theme of personalized learning was quite abstract. Its realization in the classroom depended on each teacher. What these teachers were grappling with was their capacity to differentiate their instruction to suit the needs of each of their students. Teachers could not do it alone. The idea of personalized learning needed an ambassador.

**Interessement and Enrolment**

“Our idea right from the start was to build it and give it over to the kids” Gary said as we arrived at William George Elementary school. Today was the day the CLP was “going live” in the district. Gary had arranged to visit each school for the next 2 weeks to introduce the CLP to students and staff, answer their questions and walk them through the features of the platform. “I don’t know about the older students” he continued,

> It could be that they’re already using other things, we know that they are. It could be that they’re just not interested because they don’t see
the need. But the goal, my hope, is that when we roll it out to our younger students in elementary, they’ll use it and bring it with them as they move up into high school (Gary Kern, Personal communication, Sept. 9, 2011).

The second stage of translation, interessement describes a scenario in which one actor tries to capture the attention of another by presenting them with a solution to a problem they are experiencing, or to meet a demand that they have. Another way to think about interessement is as the beginning of an intervention, a kind of meddling mediation where one actor interposes or cuts into the affairs of another in the attempt to convince them to adopt their own solution to the problem at hand.

Interessement is followed closely by a third stage called enrolment. Although many ANT analysts choose to separate interessement from enrolment, I have treated both stages as two components of a singular moment. While interessement describes a state of affairs in which a proposition is offered, enrolment is different in that it implies a point of decision. Enrolment signifies a point in the interaction that leads to the acceptance or rejection of another actor’s solution.

The first class we visited was T6’s grade five class. T6 had prepared students for our arrival. As we walked in, school laptops were being handed out to students who did not have their own. T6, tablet in hand, was frantically trying to make sure the process went smoothly.

Once each student had a laptop, Gary addressed the class: “Over the summer, we made a website for each of you, your own personal website!” (Gary Kern, Personal communication, Sept. 9, 2011). From the expression on student’s faces they were obviously excited. They were directed to open their web browser and navigate to a specific address. Gary provided them with no context or background information to indicate why they now had their own website (called a “MySite” in the CLP) or how they could use it in the classroom. Teachers had a little more information on what was happening but not much.

Gary continued to walk them through how to login to the CLP. As students navigated to their personal learning dashboard, Gary’s plan and script began to dissolve. This was expected and by design. Students were encouraged to work in pairs to explore the CLP and interact with its features on their own with minimal guidance. As
comfortable with technology as these so-called digital natives were, their interactions
with the platform were still elementary and basic. Their ability to discover the features of
the CLP, and the enthusiasm with which they proceeded varied from student to student.

Figure 6.2 A typical student MySite.

A striking observation was that in every instance the first thing students did after
navigating to their dashboard, was to try to locate their friends through the CLP’s
“learning network” (an instant messaging feature). Almost immediately and without
direction, students were building their own social network through the platform. They
were connecting with their classmates through the platform and exploring its features
with each other. What made these sessions notable was that students appeared to
organize themselves. This self-organization began almost immediately and with some
mild encouragement from teachers. As the process continued, students appeared to be
competing in a self-organized contest between segments of students, where the goal
was to see who could discover and master the features of the CLP the fastest. For many
students the ability to connect with their friends was a critical point at which many of
them decided to engage further with the CLP and continue to explore what it could offer
them.

The second thing that I observed was that many students discovered that they
could change the theme of their personal dashboard. Students could select among
several themes that would style their dashboard in a slightly different way. This feature appeared to sustain the curiosity of many students.

![Dashboard Image](image)

**Figure 6.3 A typical student dashboard (the primary touch-point for the CLP)**

The design of the dashboard, including its layout, its functionality and its aesthetic appeal were significant factors in drawing students and teachers toward the CLP. As the primary touch-point for all users of the solution, the dashboard's design needed to be able to convey what the CLP could offer them. It needed to convey the CLP’s value proposition. In addition to instant messaging, the CLP represented a way for students to work with and track digital information that is relevant to their learning activities. Other features included district-hosted email (managed by Microsoft Exchange Server) which included a student-teacher integrated task list where teachers could assign specific tasks or assignments to students, groups of students or classes. The dashboard also provided students with the ability to store and manage documents in their own document library, a specific feature that students had requested. The centerpiece of the dashboard was a blogging application which was intended to be the primary method through which students would create and share content with their classmates, and comment on their friend’s blog posts.
In an abstract way, the dashboard was a proposition that sought to explain to students how they could bring their digital habits and behaviors into the classroom. For teachers, it signified a potential solution to the challenge of engaging students and personalizing their learning experience. The argument for its use, that is, the combination of inscriptions within the dashboard were fairly weak. While it provided these actors with a communication and collaboration capability, neither the CLP nor any of the design team that was present specified how this capability can or must be used. Students and teachers were left to figure out its application in their classrooms on their own with limited district support.

**Mobilization**

The fourth and final stage of translation is mobilization. In this stage, one actor comes to stand in place for a larger group of actors (Callon, 1991). This actor (or group of actors) comes to represent others in the movement toward furthering an agenda, program or goal. In the previous stages of interessement and enrolment, the scope of action is often limited at first; it is through these stages that roles are negotiated, accepted or rejected. Through the stage of mobilization, a “small number of individuals speak in the name of others” (Callon, 1986, p. 13). Mobilization depends on the extent to which an actor can successfully represent the interests of another, and also, the extent to which other actors follow their leader or spokesperson.

This is difficult to empirically account for without the advantage of time. During the rollout sessions with the CLP, it was clear that students were organizing themselves and enrolling each other with limited interference from teachers or anyone else. Students who seemed to be able to master the features of the platform became leaders for other students in some instances. This was easily observable on several occasions. Students would move around the classroom, and often crowd around one student who would teach the others how to start instant messaging with friends or set the theme of their dashboard, or create and share a blog post. It was impossible to tell the extent to which these “student leaders” were leaders prior to the CLP or because of it. Nevertheless, they were carrying the district’s vision and enacting its strategy, if only in an elementary way.
Yet at the same time there were other students who expressed little interest in the CLP nor what it could offer them. These students did not seem especially impressed by the CLP and it was clear that they were unmoved by the enthusiasm of their classmates. This was anticipated by the development team who had hoped that students would be in the best position to mobilize fellow students and convince them of the CLP’s utility.

Additional influence was supposed to come from teachers, which it did. But some teachers would also need to be convinced. Like their students, teachers were introduced to the CLP in an informal way. Contrast this with the typical way technology is often introduced in educational organizations, where a technology roll-out is accompanied by some form of training session. In this case, these expectations were deliberately violated. Training was largely improvised. Teachers were left to discover the CLP on their own, alongside their students. In some instances students could be seen training their teachers. This was interesting because the typical relationship of authority between teachers and students was, during this time, reversed.
Even as these initial roll-out sessions concluded, uncertainties remained. Would the CLP be able to sustain student engagement? Would teachers find the CLP empowering or threatening? Would it encourage creativity and enhance student performance the way the administration hoped? In spite of these uncertainties, these initial roll-out sessions were viewed by the development team, and the administration as a big success. Why would they not be? After all, the CLP appeared to deliver what these users had asked for. It gave students and teachers an online communication and collaboration capability within their school that they did not have before. The CLP provided them with their own digital space to organize these communicative interactions and content. It provided teachers with a kind of digital support system, that could help them engage with their students in a personalized and meaningful way, and create a space for a blended learning environment in their classroom.

Figure 6.4 Working in pairs to explore the CLP during a roll-out session.
But if nothing else, the CLP represents a program of action that was able to mobilize clusters of heterogeneous actors, and provide them with a platform upon which they could enact the district’s digital literacy strategy and align themselves with the province’s education plan.

Throughout the process of translation, whether users were aware of it or not, they were being brought into a communicative relationship with designers, developers, administrators and other actors. The efficacy of the CLP as an mediator had to do with the inscriptions it contained. These inscriptions specified, what it should do, the demands it would make of users, and how users would interact with it and with each other. These inscriptions represent design choices that are not just technical. They are deeply moralistic and imbued with strategic interests. The CLP represented these varied interests, and acted as a platform for their communication and dissemination. The ability of the CLP to represent and communicate these interests effectively, was a function of its design. As Donald Norman has suggested in his classic book The Design of Everyday Things, “Good design is an act of communication between the designer and user, except that all the communication has to come about by the appearance of the device itself. The device must explain itself” (Norman, 2002 p. xi).

To what extent was the CLP able to explain itself? To what extent was the CLP’s message translated as intended? And to what extent would users be willing to listen? Based on its initial introduction, users could understand clearly what the CLP was, but its value proposition was not as clear. As one teacher said:

It’s great to see them (students) engaged and excited. They probably know more about how to use it than I do. But my question, or my issue I suppose, is that they don’t seem to know what to use it for. I mean, they don’t seem to know why we are introducing it and how it can help them learn (T10, Personal Communication, Sept. 14, 2011).

I followed up by asking this teacher if she believed that the CLP would bring about a significant change in her role as a teacher moving forward:

I suppose so. But I’m not sure about that question either! I mean, I know, I think that building a technology platform like this can and will benefit students and teachers. Dashboards are really cool and the idea of a virtual classroom is awesome too. But we need to get beyond that “cool factor” and start putting this thing to work (Ibid).
“How do you do that?” I asked. “I’m not sure yet” she replied.

I want to take a moment to summarize the argument thus far. I have argued that the CLP is an actor that operates as a technological mediator. It does this by standing in for and representing other actors, their agendas, and strategic interests. In this respect, it can be viewed as a proxy for other entities. As the CLP comes into contact with its users, a process of translation begins where each actor attempts to connect to, and qualify the other. The translation process proceeds through four general analytical stages: problematization, interessement, enrolment and mobilization. The outcome of a successful translation, is the “generation of a shared space, equivalence and commensurability. It [translation] aligns” (Callon, 1991, p. 145 emphasis his). Alignment can thus be viewed as an outcome of translation. But, as my observations suggest, enacting alignment was not an “all or nothing” proposition. It was a protracted process and very much a matter of degree.
The Recursive Logic of Alignment

Having described the conceptual basis for alignment, the final question here concerns how alignment is reproduced. By this I am referring to the institutional features that shape, stabilize, and structure the organization and give it continuity over time. Here, ANT begins to show its own limitations because it refuses to acknowledge that institutions have structuring capabilities or structures at all! What is commonly understood as "structure", ANT insists, is a network effect (Callon & Latour, 1981; Law, 1992). And because, in principle, the network has no predetermined limits, one would have to conclude that alignment has no limits. If we follow ANT’s formulation of alignment here, the premise would be that one school district may align their students, who may, in turn, align other students, who may align other schools, who may align other districts, who may align other education systems, and so on. This is clearly confusing and implausible. It underscores the “boundary problem” in ANT analyses. The question is: if in principle, networks continue forever, where does one stop the analysis? The answer to this question, according to Callon (1991), is that this is an empirical judgment call.

Incorporating structuration theory with ANT makes up for the latter’s limitations by providing a concept of structure that has, in ANT, remained deliberately vague. More importantly, it can shed light on the way social and material dimensions of organizational structure are integrated and instantiated in practice. In addition to offering a concept of structure, structuration theory is useful in thinking about how alignment is not so much a linear process of structuring action or enacting structures, but a recursive and iterative one involving both movements. Structuration theory adds to this picture by drawing out its recursive parameters. These parameters can be understood by examining the way social and material constraints are embedded in technical systems like the CLP, and how they are reproduced with each interaction, and each instance of translation.

We can see how this works by looking at the design of the CLP’s solution architecture, and how it exemplifies what Giddens calls the duality of structure. A solution architecture simply refers to structural features of the solution and the behavior of the solution’s components. In the space remaining, I want to highlight two of these components: the CLP’s information architecture, and the CLP’s automated workflow capability. These components of the CLP’s solution architecture most clearly exemplify
the duality of structure. They represent the abstract structural properties of the district, and instantiate them with material force each time actors use the platform.

**The CLP’s Information Architecture**

The CLP’s information architecture describes how informational resources are organized within the system. Information architecture is important in generating and maintaining an overall structure for the information that the CLP interacts with. Without it, the CLP would be exceedingly difficult to navigate and use. Here, “informational resources” refers to the digital or informational assets that are relevant to teaching and learning with and through the platform. These assets are often documents and other types of content which are represented by data, maintained in the CLP’s (SQL) database.

Even classrooms can be said to have an information architecture although it is generally very basic. Much like an information architect, teachers design their classrooms in ways that are conducive to their goals, whether it involves creating inboxes and outboxes for documents, folders and filing cabinets to hold different types of documents for different periods of time, notebooks, calendars, lists, and other artifacts. To the CLP, these items in their digital form, are all simply information assets. They are resources for meaning, provided that they are sufficiently organized and placed into a context which makes them meaningful. Information architecture sets out a structure for storing and accessing digital resources and artifacts that are involved in digital learning.
Figure 6.6   A picture of a basic classroom information architecture in material form.
To understand how an information architecture contributes to usability, consider the simple example of a computer’s file directory. Generally this directory is represented through folders on the user’s desktop or within the computer’s file system. Directories are organized hierarchically which provides a very basic organizational schema. But imagine a file system with no hierarchy. Then imagine a computer which is used by multiple users who each have their own preferences in how they name, store and organize files. Very quickly, the computer would become difficult to use and users would become frustrated.

The information architecture within the CLP consists of several components including the student dashboards, the virtual classrooms, an information taxonomy along with a specification of the types of content it will manage, a classification structure, search scopes for documents, and metadata requirements, which enhance the quality of information within the platform. The CLP’s information architecture is a mapping of the system’s informational structure, created by the solution or information architect based on their interpretation of the functionality that users will require.

This mapping however, is only a mapping. It is a representation of the structural properties of a classroom or district. It gives this information a degree of materiality and transforms it into a resource for meaning. It reduces the cognitive burden for actors because they can translate bits and pieces of their work and practices into digital information and delegate responsibility for its organization and storage to the CLP.

We can see how this works if we consider any basic interaction that a user performs. With each subsequent interaction users have with the CLP, whether it is to retrieve a document or comment on a friend's blog, the CLP queries the database on their behalf, to determine who this user is, the data they have access to and the relationships they have built with other pieces of data in the past. The database then returns this data to the CLP which then presents it to the user as information, and places it in a context or view that makes it meaningful. The information architecture instantiates a type of structure comprising informational resources, passes this structure back to the actor/user who then translates it, manipulates it, or makes it available to other actors. The design of the CLP is such that this structure and these transactions are largely hidden from users, who simply understand these interactions as part of their user experience.
Figure 6.7 Figure 6.8. The user experience of the CLP’s information architecture in a typical virtual classroom.
Workflows

A second element of the CLP’s solution architecture that is relevant here is a feature called workflows. In SharePoint, workflows are a feature used to enact and automate a business process and/or apply business logic to a piece of content. SharePoint ships with several different workflows that work “out of the box” but it also supports customized workflows which can be created by users themselves. Workflows are a significant component of the solution because they enact specific interactions and structure them by applying rules. They enable users to collaborate in a more structured and productive way.

Generally workflows mirror business processes that are already embedded within an organization. By re-creating them and delegating them to the CLP, these processes can be made more consistent, visible and reproducible. The CLP does this by breaking down a desired outcome into a series of tasks that students and teachers can clearly see and track. It mediates and orchestrates collaborative activities between students and teachers, by using communication features (usually email) to inform participants when a workflow has been initiated, what is required of them, and how to respond.

Workflows are, at the most abstract level, no different in the classroom than in any other workplace. However there are differences when the idea is applied to a classroom. A workflow is simply a series of steps that proceed in time toward a defined outcome. But in the context of teaching and learning, these outcomes are not always definable. This is an important difference between how workflow is understood in a business context, and how the concept materialized in an educational one. While in a business setting, an outcome of a workflow may be a piece of work or an artifact that has economic value. In education, outcomes are not as much “artifacts” but rather critical thinking and learning. Any artifacts produced in the process are merely incidental to this primary goal. This is a critical difference. Much of what takes place in a classroom workflow is too complex to be captured by software. Nevertheless, there are some aspects of workflow that are able to be captured. Consider for a moment, that any classroom activity is made up of a series of tasks or steps that link together in a causal sequence to produce the end result. Each step often involves manipulating or adding artifacts such as documents or other relevant content to the process, and applying a logic in the form of rules and conditions.
When I asked teachers to describe the techniques they use to direct and orchestrate activities in their classroom prior to the CLP, many struggled to understand the concept of a workflow as well as its significance to collaborative work. Below is an excerpt from a conversation I had with a teacher:

Me: Classrooms have several workflows that are in motion on a given day. How does a teacher keep track of what’s going on across several classes?

T1: What do you mean by workflow?
Me: So, say the process of submitting a short research paper written by a group of students? How is that process managed?
T1: What do you mean managed?
Me: How do teachers regulate this really basic process, which I’m sure happens routinely?
T1: I’m not sure what you’re asking...
Me: OK, so for a single student to submit a research paper or any other assignment for example, there are several steps you’d like them to work through to get to that result, right?
T1: Yes.
Me: With each step, there are conditions that the student needs to satisfy to move forward to the next step.
T1: Yes.
Me: And I’m sure that in the course of creating an assignment, student’s are handing in work and getting feedback on it, maybe a few times before they complete the final copy.
T1: OK, yes.
Me: So, this process can be complicated when it comes to a single student. What happens when you have multiple students working collaboratively. Then it could become even more difficult to manage. Students might not complete a step, or they may hand something in that is missing a piece that you’ve clearly told them to include.
T1: Yeah, OK. So, sometimes it’s just as simple as giving them instructions whether it’s a tracking sheet or just writing it on the board.
Me: So we’re just talking about a single assignment. What happens when you have several assignments on the go at once?
T1: Well, they [students] need to be responsible for their own work. Yes, some of them need to be reminded about my
expectations more than others, but that has always been the case. Part of their success is about clearly breaking down the assignment I’ve given them, understanding it, asking for clarification when needed, and following instructions.

Me: So generally, you’ll break it down for them into smaller steps?

T1: Yes, most of the time I will. Sometimes they’ll be encouraged to break it down themselves. It depends on the assignment.

(T1, Personal communication, Sept 16, 2011).

It was clear from my conversations, that many teachers understood the idea of a workflow as a kind of “virtual structure” that they could simply call on as required, as any knowledgeable and competent teacher would. What’s more, there was a degree of responsibility that teachers often delegated to students, while at the same time, students often delegated responsibility to teachers. It remained to be seen to what extent each group would delegate this responsibility to the CLP.

These conversations were notable in that it seemed as though the questions I was interested in exploring, were almost too obvious to merit much discussion or interest among my participants. This left me with the impression that discussing classroom workflows was not as important to my participants, who were more interested in discussing personalized and collaborative learning in the context of 21st century skills.
Figure 6.8  A checklist for revising student writing used as a basis for creating a writing workflow.
The argument that the CLP and its designers were attempting to make, was that workflows can have tremendous application for personalized and collaborative learning because they mediate and structure the “business rules” of the classroom. They take something that has always been managed (either with documents or through some other medium) and make it visible to all participants. Teachers can enact workflows on specific assignments and even with specific groups of students. This goes a long way in giving teachers the ability to personalize their instruction and relieving the overhead associated with tracking work and administering the classroom.

Yet many teachers struggled to grasp the necessity of capturing and automating these processes through the CLP. It was unclear to them what the connection was between workflow automation, as an essential structuring technique, and collaborative or personalized learning. It was not obvious for these participants, how one contributed to the other.

In practice, the structuring capability delivered through workflow automation works in tandem with the structuring capabilities provided through the information architecture. With workflows, the CLP gives teachers the ability to create assignments within the CLP and customize them to the needs of specific students or groups of students. These assignments can be personalized and pushed out to the intended student or student group. Students can then work on the assignment individually or collaboratively. They can see where they are in the process, and finally submit their assignments to the teacher through the CLP. With each interaction, the CLP gains a little more information about what is happening, when, and between whom. It then stores this information and keeps it organized so users can recall it and use it in subsequent learning interactions. This would be impossible without an information architecture that provides users with an organized and coherent experience when they interact with their own information and with others through the platform. Without it, the CLP would be a navigational nightmare.

Theoretically, when the observations from ANT are combined with structuration theory, we can see how the CLP represents the structural properties of the district and its classrooms, and instantiates them with material force. From this perspective, the CLP provides a prime example of the duality of structure. Recall from chapter 3, the idea of the duality of structure is that “the structural properties of social systems are both a
medium and an outcome of the practices they recursively organize” (Giddens, 1986, p. 25). Giddens explains:

In speaking of structural properties of social systems I mean their institutionalized features, giving ‘solidity’ across time and space. I use the concept of “structures” to get at relations of transformation and mediation which are the “circuit switches’ underlying observed conditions of system reproduction (Ibid, p. 24).

Remember that structuration theory relies on a sociological concept of “structure” which is abstract. What then can be said about the material components found in organizations? Technologies are perhaps most clearly associated with the idea of a material structure. However, for structuration theorists, they are of incidental importance. Technologies like the CLP for instance, are just things that actors use. They are not particularly decisive in understanding how organizations are reproduced and changed. But as we’ve seen, when we view technologies like the CLP as actors and give them a degree of agency, their ability to structure other actors in intentional ways is unmistakable.

The CLP represents elements of structure that are both social and material. It integrates informational resources and business rules in the form of workflows, which I argue, satisfies the definitional criteria of “structure” within the theory. What we get when we combine the insights from ANT with structuration theory is the understanding that structures are comprised of rules which are “virtual” and resources which are material. Like other components of IT infrastructure, the CLP displays a dualistic orientation. It integrates virtual and material elements such that they recursively reproduce each other. The CLP’s business rules, inscribed in workflows, are the outcome of ways in which informational resources (material and digital) are captured and stored. At the same time, these rules mediate precisely what is captured and stored and how. The same is true for informational resources. They too are the outcome of business rules while at the same time work to shape what these rules are and how they are enacted. Thus the logic of alignment involves the recursive reproduction of social and material elements within a sociotechnical system.
The CLP as a Communication Medium

I returned to the district four months later to complete my interviews and to gain some perspective on how the CLP was being adopted by students and teachers. During this initial roll-out period, it was clear that many of the challenges that come with alignment are due to the fact that technological mediators often struggle to completely translate and represent all the social elements that work to structure meaningful human interactions. This is because many of these elements are tacit and context dependent, and are often comprised of specialized techniques, skills and capabilities, expectations, dispositions and norms. In fact, these elements constitute a different kind of structure that can only be experientially acquired and pragmatically enacted by human actors. A more theoretically informed way to express this idea is through the concept of habitus (Bourdieu, 1977). Although mediators cannot strictly speaking reproduce a habitus, they can facilitate its transposition, its circulation and it permutation. This implies a mediation that allows actors to make sense of the structural features of their practice and the way they are represented by the mediator. The result is a user experience that is at once intuitive and new.

The idea of habitus is simply a way to describe structural features of a different type. It describes a condition where the behavior of actors in relation to this or that element of structure, becomes a kind of passive or perfunctory reflex. The problem of alignment here centers on designing a technological mediator in such a way that it effectively calls up the habitus of the user in a new context.

For example, there is a habitus that gives the structure of the classroom and the relationships it contains a distinctive quality. For instance, the behavior of students toward teachers is regulated by the experience of school, taking classes and the experience of being a student in the education system. After a period of time, students do not need to be told to raise their hands to speak, or not to talk with classmates while the teacher is talking, or not to run in the halls, or send text messages from their phones in class. Students remember and internalize (if not always follow) the “rules” of the class. This is the habitus of the classroom or more specifically, the habitus of students. The concept of habitus delves deeper into the objectified structural features of an actor’s practices. In other words, the idea of habitus is a way to get at how actors can structure
their behavior vis-a-vis other actors and things with seemingly little or no conscious effort, improvising as they move from place to place, context to context.

How is the transposition of habitus facilitated through nonhuman mediators? In answering this question it's helpful to draw attention to the what can be described as a communication model that undergirds and facilitates the transposition of habitus in this new (digital) context (Feenberg, 1987). The concept of a communication model is intuitive and familiar regardless of one's experience. Such models are staples of everyday interaction. For instance, the communication model that regulates student-teacher interactions (the habitus of the classroom) is very different from the model that undergirds the same student’s interaction with their parents (the habitus of the family). Likewise, the communication model that informs a teacher's informal conversations with other teachers may be very different than the model that informs their conversation with superiors or administrators. The concept of a communication model is a way to think about how the elements of a habitus (activities, dispositions, generative principles of interaction) are transposed from one context to another.

Generally, in face-to-face human communication, communication models are tacitly acquired and called upon to reflexively coordinate interactions. There is little need to make such models explicit in face-to-face communication because actors can efficiently and reflexively understand the social context in which they are situated; a classroom has desks that are positioned a certain way, teachers are generally at the front of the class and may complete daily rituals like taking attendance. These are all contextual cues that inform a specific kind of communication model that, in turn, is designed to reproduce a specific habitus although there is no need to make this model explicit. This becomes more complicated in a digital environment where a virtual classroom has no desks, teachers cannot be seen, and the familiar rituals may or may not be relevant.

Mediators like the CLP also rely on a communication model that orients users with explicit cues and signs that inform them about what it is, what it does, and how it works. This communication model attempts to structure the user experience of the CLP in a way that activates the habitus of students and teachers, and facilitates the transposition of the habitus of the classroom. In order to further breakdown the concept of a communication model we may the draw a distinction between two complimentary
types of functions which it integrates: contextualizing functions and monitoring functions (Ibid).

Contextualizing functions refer to the ways in which an mediator establishes the general conditions of communication by providing the cues or explicit statements that indicate to users what the mediator does and who or what it represents. This is something that the CLP did quite well. For example, when a student logs on to the CLP, they are directed toward their MySite, their own personal webpage where they can post a picture, write about their interests, passions or hobbies and maintain a gallery of work they consider their best. Many students had taken the time to populate their MySite, including details about themselves and their work that they wished to express to their classmates. This in itself may not be pedagogically significant, but it is nevertheless important in recreating the sense of community often found in the classroom. Students also quickly adopted their personalized learning dashboard. The simple layout of the personal dashboard aims to contextualize the fixtures of online interaction within the context of the student’s learning activities. The most prominent features are the student communication applications such as instant messaging (via the student learning network) and email. Although students were familiar with these applications, the CLP allowed them to have their own “official” school instant messaging and email account which was new, and communicated to them that the school now expects and encourages students to use these elements in their classroom communications.

Another essential aspect of productive student work involves the creation and management of documents and in aid of this, document libraries are located along the sides, and the blog content area is prominently positioned in the center of the dashboard. Students are able to view comments on their blog posts through a comment window on the right side of the dashboard. The visual aesthetic and layout of the CLP’s learning dashboard attempts to invoke this habitus of social networking and online collaboration tools that students had come to demand and expect. Many social networking sites have long operated with a kind of dashboard view that presents basic communication applications available to users. The CLP follows this trend but presents the student with capabilities that are specific to their learning activities and that emphasize student collaboration and participation in this digital space. As it turned out, the personalized learning dashboard invoked the habitus of social networking for
students quite well. Students enthusiastically embraced the instant messaging feature and immediately started connecting with their classmates through the instant messaging (learning network) functions with minimal instruction or direction. Students were very interested in seeing which of their friends were online at the same time they were, so that they could initiate chat sessions or share pictures. The ability of the learning network to communicate the presence of a student’s classmates was essential in creating the conditions for synchronous online communication, collaboration and community, which is exactly what the CLP was intended to do.

The second set of functions involved in the communication model of the CLP can be described as monitoring functions. Monitoring functions within a communication model refer to the ability of an mediator to reinforce and validate a user’s judgments about the nature of the interactive context (ibid). While the CLP can provide explicit cues and feedback that lets users know, for example, when they have successfully submitted an assignment, or published a blog post, or when their teacher has submitted feedback directly to them, it cannot perform this monitoring function on its own. After all, the CLP cannot lead class discussions nor encourage students to blog or comment on each other’s work. Typically, this is a responsibility that is taken up by teachers. Learning technologies, in spite of their sophistication, cannot be reasonably expected to replace teachers in a way that is pedagogically productive. It takes a degree of embodied skill to align them to existing pedagogical aims (Feenberg & Xin, 2006).

An important feature that illustrates this point was the CLP’s discussion forums. These discussion forums presented on-going threaded discussions that students could join or participate in. Students could submit questions for discussion by clicking the “ask a question” button, and view or comment on other discussion questions. They could comment on discussion topics and comment on their classmate’s comments. Of course, the discussion forum feature presumes that students have something they wish to discuss, and that teachers are able to effectively moderate the discussion forum and steer it in a way that is pedagogically appropriate. These are big assumptions. While the CLP could provide a digital space were discussions could happen, it could not engage students in the same way that teachers could. And it certainly could not moderate discussions nor direct them toward desired pedagogical aims.
This is something that is important to note. In spite of the popularity of some brands of 21st Century Learning ideology, where the role of the teachers is relegated to a sort of passive guide or coach (the “guide on the side” as the cliché goes), my observations showed that students typically do not voluntarily create and sustain pedagogically productive discussions on their own. This is something that student’s delegate to teachers. And while discussion and dialogue continue to be pedagogically valuable, they are demanding to moderate. With the discussion forums, the CLP was opening up another arena of communication that teachers needed to manage. This was something that teachers I interviewed expressed reservations about. For many teachers, their reservations stemmed from the belief that there was little need for discussion forums when in-class discussions were already satisfying this pedagogical need. Indeed, many of the discussion forums I examined when I returned were sparsely populated, indicating that they were not being heavily used. From a teacher’s perspective, this is understandable. Time is always scarce and if there are no perceived problems with current instructional methods, why change them? Yet, in a sense, this signified a missed opportunity for teachers to tap into the habitus of students in this new digital context. What I mean by this is that students communicate with each other very differently online as opposed to in their classrooms. They use a different communication model entirely. In online spaces they are often more candid, informal and direct in their interactions. Students who are shy may be more outgoing. Likewise it may be easier to curb the contributions of students who tend to monopolize discussions. Tapping into these dispositions and attitudes, these modes of address and interaction, can have tremendous pedagogical value for teachers because these dispositions are often consciously suppressed in a formal classroom settings. This was the vision of the CLP’s creators, but it had clearly not taken hold yet.

There were other challenges as well. During the end of my fieldwork, the district had just held its first district-wide “blog-a-thon.” The event was an opportunity to advance the digital literacy agenda and was meant to engage students in developing their digital writing skills. The district set a goal of getting students to collectively write 5000 blog posts (at one per student that was roughly 70% of the student population.) While certainly not the only measure of success it was a goal that aimed to give the administration and the development team an indication of student engagement and whether or not the CLP was having the desired effect.
With blogging, I observed that students had to be instructed and encouraged to actively participate in the blog-a-thon and maintain their blogging activities in an ongoing basis. The act of blogging and commenting on the blogs of others did not come “naturally” for students. Rather, they had to be given reasons to blog or to interact with the blogs of classmates. Teachers had to design assignments that utilized the blog platform, including requirements to comment on other’s blogs. Some teachers struggled to see the advantage of blogging over more traditional modes of writing and student expression. As one teacher told me “the push has been on for blogging since the start. The assumption is that student’s want to blog and are going to blog if we just give it to them. Why? They haven’t told us why they think this is true.” (T6, Personal interview, January 31, 2012).

As it turned out, among the target group, students only managed to write 2267 blog posts. This outcome could be interpreted to mean that the CLP fell short of establishing the habitus that teachers expect of their students. In this respect the CLP and the blog-a-thon merely reflected larger problems that teachers had been struggling with for some time. As one teacher explained:

There’s a passiveness, and you find this no matter where you go, there is this passiveness. It’s like a Labrador retriever who comes to you only for treats and a pat. And the expectation, what they want, is to be told they’re a good dog! I guess what I’m trying to say is that the relationship between students and the motivation to learn, is almost Pavlovian. Unless there is some immediate benefit to them... And that’s about all the effort that kids will put into their learning (T3, Personal communication, January 26, 2012).

This passiveness had less to do with the CLP and more to do with general attitude that some students had toward school. Regardless of the CLP’s novelty these attitudes were simply carried forward into this new medium. As another teacher commented:

They'll (students) say things like ‘I’m not inspired’ or ‘this doesn’t interest me.’ And I’ll ask kids: ‘well, what does interest you? What are you doing to help yourself? To get inspired? To find something that interests you?’ And I’ll hear things like ‘we’ll isn’t that your job?’ (T10, Personal Communication, Jan. 27, 2012).

Teachers were clearly frustrated by this attitude that some of their students had. To some extent, the CLP became a lightening rod for these frustrations. After all, it did
represent the district’s commitment to many of the ideals found in the discourse of 21C. Some teachers were clearly skeptical of these ideals and, by extension the CLP. The blog-a-thon results seemed to reinforce their opinion. One teacher told me:

If the idea of 21st Century Learning is going to work, our students need to demand more of themselves. And there’s this notion that if we dangle the right shiny object in front of their face they’re going to zone-in and hone in on it. And all the sudden they’ll be inspired and motivated. And it doesn’t work that way (T6, Personal communication, Jan 31, 2012).

A key consideration when evaluating alignment of technologies in education is the degree to which a given technology’s communication model aligns or diverges from existing models that students and teachers already use. This accounts for why some of the other features of the CLP were adopted more slowly. From a theoretical standpoint, to speak about the pragmatics of alignment is to draw attention to the skillful integration and performance of contextualization and monitoring functions within a given technology, their encapsulation within an understandable communication model, and their translation through sociotechnical structures. The concept of a communication model (Feenberg, 1987, p. 178) provides a way of talking about how habitus can be activated and transposed in a new context; it provides a way of viewing how embodied dispositions and attitudes can be activates in new contexts. However this is by no means a straightforward process. Rather, as this analysis has tried to show, it is often messy, contingent and uncertain.

**Conclusion: The Pragmatic Dimension of Alignment**

This chapter has argued that alignment is a function of 1) the ways in which situated actors translate their strategic interests through sociotechnical structures; and, 2) the extent to which these structures communicate these interests in a way that invokes desired behaviors that are already, to some extent, ingrained in users.

I have tried to avoid reductionism by shifting the problem away from the paradox of structure and action, and instead directing attention toward the performative and ostensive dimensions of alignment. These dimensions are manifested through the circulation of mediators and intermediary actors. The distinction between whether an actor is a mediator or intermediary comes down not to what they are, but how they
behave. What makes the CLP significant in the alignment process is that it operates both as an actor that intermediates social interactions, and as an element of structure that structures these interactions at the same time. As an mediator, the CLP is not only an element of the district’s sociotechnical structure, it exemplifies what structuration theory refers to as the duality of structure. It enables and simultaneously constrains the situated activities of those involved in the alignment process. It does this by acting as an mediator that translates its own structural properties through the social contexts of practice. These properties are themselves, outcomes of these social practices whose features have been inscribed into the device. This chapter develops this argument by showing that the communicative significance of mediators lies in the observation that they play a role in representing the interests of various groups to each other, while simultaneously facilitating the transposition of the habitus of these groups in new contexts.

Did the CLP play a significant role in realigning the district toward the 21C vision? The short answer is undoubtedly “yes”. Based on my observations, the CLP was a success albeit a qualified one. It is too early to tell whether the CLP is having a definitive impact on student achievement and learning outcomes. Instead, what I have tried to show, is that aligning technology to strategy is difficult, and even more so in the case of an educational organization where the production function is not straightforward at all. The CLP and other collaborative technologies, for example, are a necessary but insufficient component to achieving the vision outlined in the BC Education plan.

The CLP is more than just a collaboration platform. It represents an argument for a new way of teaching, learning and working. It will likely take some time before this new way of working comes to be institutionalized in the district. In this initial stage, the CLP has been widely adopted. While it’s true that the participation in the blog-a-thon fell short of expectations, and that I did observe instances of apathy on behalf of teachers and students, these issues do not provide sufficient evidence upon which to reach final judgment regarding success or failure. In fact, the question of clear “success criteria” was largely unaddressed by the district. There were no clear metrics or indicators that were developed to demonstrate the success of the project and this raises an interesting problem regarding how to measure the impact of technology in education. For example, if the goal of introducing technology in schools is to increase student collaboration and
engagement (as it was in this case), then how can one measure collaboration or engagement? The experience of the district draws attention to precisely how difficult it is to develop meaningful metrics that actually represent progress toward this new vision of education.

If this case study demonstrates anything, it is that alignment is not an “all or nothing” event, but rather a longer protracted process. In answering the question of to what extent the CLP was successful in achieving its aims, it is important to consider the broader strategic vision that it represents, and its significance to students, teachers and the administration. Students for example were interested in bringing more of their digital life into the classroom and finding opportunities to connect to the networks that they were already using outside of their normal school life. The CLP made this possible and did so in a way that satisfied the district’s need to ensure that this experience is safe and controlled.

Teachers were interested in finding more personalized and meaningful ways to engage their students. Again, the CLP gave teachers the ability to do this. It presented them with powerful ways to automate the management of their classroom, and to track their specific interactions with students. What’s more, it did this in a non-threatening way. It is well known that technology is often introduced in education to reduce costs and this engenders the suspicion and indignation of teachers who feel their profession and livelihood to be under threat. This was not the case the CLP. All the teachers I spoke to, regardless of their attitude toward the digital literacy agenda and the CLP, did not feel their professional status to be threatened or disrespected. It was clear from the start that the CLP was not a solution that was intended to replace teachers, and so administrators skillfully side-stepped a major hurdle that is commonly found when technologies are implemented in schools.

For administrators, the goal was to bring about a new norm within the district, which revolved around their vision for digital literacy. The CLP played an important role in representing their commitment to this vision and creating a starting point for its future development. From the administration’s perspective, the implementation of the CLP did not actually signify a conclusion but rather a beginning. As Gary explained:
“We’re not going to be finished for a long time. It’s not as if we can flip the switch and say ‘done’! I think this is a mistake many people make. Once the rollout is completed, the real work is actually just beginning and it will take a long time to see the outcome that we know we can achieve. It takes time. But it’s important that we sustain this agenda –and we will” (G. Kern, Personal communication, February 1, 2012).
Chapter 7. Conclusion

Introduction

Just before its dissolution, the Canadian Council on Learning (CCL) produced a comprehensive report on the state of education in Canada entitled “What is the Future of Learning in Canada” (Canadian Council on Learning, 2011). The report concluded with a subtle warning that despite Canada’s consistently high record of achievement in education, it was “slipping down the international curve” and “falling behind competitor countries and economies” in absolute and relative terms (Ibid, p. 6). The report attributed the gradual decline in performance to a few interrelated factors all of which have nothing to do with the quality of instruction nor the curriculum, factors such as the lack of a federal partner or ministry, lack of productive partnerships between the education sector and other sectors like industry and non-profit. But the most interesting factor identified is the fragmentation and lack of alignment within the education system itself. The report pointed to the fact that there is no unified strategy for education in Canada much less across school districts. There are stark differences in goals, objectives and learning outcomes across Canada, and there is a clear lack of coordination in planning and the deployment of information and communication technology across regional jurisdictions.

The idea of alignment is reflects a preoccupation with order and control. It points to the way processes, structures, and systems come into an ordered relationship with each other. Strategies, plans, rules and technologies all work to order social systems. The significance of IT is that it can incorporate all of the above into a singular object or program and extend their force and effect. Yet the standard view of technology in business and alignment research is that it is simply a means to an end. This view is also prevalent in educational thought and policy. The complicated relationship between information technology and educational outcomes reflects this simplistic means-ends understanding of what technology is and how it works. In business and in educational organizations alike, technology is much more than simply a means-ends instrument. It has the ability to shape an organizational reality in accordance with a desired future
state. In this way it becomes a critical actor in enacting alignment. Previous research into alignment intuitively understands this but has largely failed to consider technology as anything more than a blunt instrument.

The research in this dissertation represents an attempt to rethink the problem of alignment using unconventional concepts in an unconventional domain. It traces the emergence of an ambiguous strategy and examines how the strategy was interpreted and implemented within a Canadian school district. This final chapter summarizes the findings of this research and presents a brief discussion of their significance in light of the movements toward education reform and change in BC (and Canadian) public schools.

A Summary of the Research Problem, Objectives and Purpose

I want to begin by recounting the first chapter of this study which provided a summation of the change imperative in the BC education system. BC, like many Canadian provinces, has been pursuing a new vision for public education. This vision began in 2007 with a conventional premise: in order for BC to remain economically competitive, and to increase it’s standing as an innovative and progressive province, the education system would need to change. This premise is also buttressed by the moral argument for change, which is simply that we owe it to students to maintain a standard of care, to create and improve an education system that serves their needs as individuals and members of society.

The vision for change in the BC public education system is expressed most directly within the BC Education Plan (British Columbia Ministry of Education, 2011). With influence from the 21st Century Learning Initiative (21st Century Learning Initiative, n.d.), the provincial education plan outlines five key themes and commitments:

1. Personalized learning
2. Quality teaching and learning
3. Flexibility and choice
4. High standards
5. Learning empowered through technology

These five elements can be distilled into three general goals:

1. Increased system wide adaptability and flexibility to meet the demands of each student as an individual (personalized learning)
2. Increased productivity and efficiency
3. Technological empowerment or integration

Implicit within the BC vision (and this is hardly unique to BC) is the assumption that the education system needs to change because students have changed. This assumption is intuitive and plausible, yet is more often than not, un-scrutinized. Why are students today so different from previous generations? Anecdotally, during my research, I frequently found that this question was answered with another foundational assumption, which is that students have changed in no small part due to technology. Students today use information and communication technologies as a central tool in their learning. Therefore, the public education system needs to acknowledge and implement these technologies in the classroom to engage these students.

The BC Education Plan reflects these assumptions and suggests that technology can, will, and is playing an empowering role in delivering on the promises of a new “21st century” approach to learning. It is technology that will deliver a flexible personalized learning experience. Technology will provide for greater flexibility and choice for students and parents in how they engage with the education system. Technology can also play a role in ensuring quality and high standards in teaching and learning. So technology, at least within the BC plan, does more than simply empower learners. It is a critical actor in making BC’s Education plan a reality. What’s more, it plays a key part in realigning the system toward the realization of these goals. With this context in mind, this research project began with two basic questions.

1. How are school boards and districts, educators and administrators involved in mediating the relationship between organizational
performance outcomes, technology and larger patterns of organizational change?

If alignment is about the relationship between strategic plans, IT, and organizational change, how are various groups of actors involved in mediating this arrangement? This question led to further questions such as how do actors work to align IT despite uncertainty over the strategy? And what are the means through which alignment is enacted in practice? What role does technology play in the process? These were empirical questions that motivated my fieldwork. These questions were not motivated by administrative or “technical” concerns. For example, I was not interested in creating a dissertation that offered another technical prescription for what I assumed to be a complex problem.

Along with these empirical questions, the dissertation was also concerned with some theoretical questions. I had also assumed from the start that alignment is a largely contingent phenomenon. What I mean by this is that IT alignment may happen in one way or another. It may resemble the models on display in the literature, or it may not. I assumed that the variability of the process would require attention to be paid to the selection of an approach that could accommodate contingency and complexity. This realization led to my second basic question:

2. What conceptual approach to alignment captures the complexities of organizational activities and functions related to the above question, can describe their interconnections, and situate or "ground" them within the empirical context of an educational organization?

What is required is work that acknowledges the themes of complexity, contingency, ambiguity and uncertainty. I also believe the situation calls for work that backs away from offering prescriptive advice and instead offers a more modest accounting of alignment that is thoroughly and deeply contextualized in the specifics of an organization in question.
Charting a New Course

In chapter two, I began to chart this new course. This assumption, that alignment was full of complexity, was validated after I dove into the existing literature on the topic. After a review of the literature, it was evident that even those who have been studying alignment for years continue to be puzzled as to why it seems to be so complicated. For a social scientist working within a constructivist tradition, I was especially disappointed to discover a lack of attention being paid to the sociological and communicative aspects of alignment. This is troubling given that we have reached a point when IT has become increasingly “social” and the scope of communication exponentially enlarged with cheap, networked, mobile devices becoming ubiquitous in many organizations. While the literature could identify levels of alignment, antecedents, triggers, processes and patterns, these observations appeared to have little explanatory coherence. What’s more, the prescriptions that much of the work offered appear to be ineffectual. After all, if the abundance of prescriptions that orthodox alignment research often comes with were proving to be technically useful, then why does alignment appear to be a perennial topic in IS and business research? Why was the alignment puzzle not solved a long time ago?

I mapped out the research corpus by acknowledging the contributions of other alignment researchers and contextualized the research program using two influential models: the strategic alignment model (SAM) and the social dimension model (SDM). For some time the strategic alignment model (SAM) has been the dominant conceptual schema with which alignment researchers worked (Henderson & Venkatraman, 1993). The model is premised on a basic distinction between external and internal domains of an organization, and then between business and IT functions. Essentially the model takes the distinction between organizational strategy and operations and extends this relationship to the IT function using the same categories (Figure 1). Alignment thus describes a linkage between business strategy and IT strategy as well as the functional integration between such strategies and operations.

In the model, strategies and plans are created at the executive level as managers attempt to understand the external domain (operating environment) that the organization must face. Such strategies and plans are then implemented at the operational level, within the organization’s internal domain. Henderson and Venkatramen (1993) envisaged several relationships between the quadrants in their model, each
contributing to the alignment of the organization. For many alignment researchers, alignment was understood as the degree to which business and IT strategy complemented each other, or the degree to which the IT strategy supported the business strategy. There has been comparatively less work on how such strategies are actually implemented and mapped onto operations and capabilities (vertical relationship).

Figure 7.1 The Strategic Alignment Model (SAM)

The prevailing assumptions with this model and the work it inspired can be summed up as follows: 1) creating and developing organizational and IT strategy is (at least implicitly) the most important activity in the alignment process, 2) it is an activity reserved only for executive management; and, 3) that such strategies are generally implemented as planned. Because the model and the research it inspired considered
strategic planning in a formal way, it could scarcely account for the substantive problems many organizations come across through the course of strategy implementation, problems which often involve process and technology.

The social dimension model (SDM) (Reich & Benbasat, 2000) attempted to elaborate these substantive problems by focusing on the degree to which participants shared knowledge and communicated with each other through the course of the alignment process. The SDM model attempts to shift research away from purely formal and structural understandings toward a more interactional perspective. But the SDM model does not go far enough in explaining how participants achieve or maintain alignment. The notion that alignment is simply a matter of sharing knowledge and increasing the level and quality of communication remains simplistic and general. The model makes no effort to acknowledge that participants often have competing ontological assumptions about the organization, and acquire these assumptions through different epistemological lenses.

What is perhaps more interesting than the models themselves is the observation of the historical movement within alignment research, from models that are structural in their epistemological orientation, to models that increasingly acknowledge the inherently social character of alignment and the significance of expressed agency on behalf of participants. This is encouraging and frustrating at the same time.

There are a few surprising observations that one could draw with even just a cursory survey of the literature. Perhaps what might be most surprising to someone who is just encountering alignment research, is that both of the models I have laid out, in fact, much of the research on IT alignment makes little effort to incorporate IT into the analysis at all! While there is much discussion about strategy within the SAM and SDM models, they ironically pay little attention to the material aspects and specificity of IT itself! There is no acknowledgment of the complexities of specific IT infrastructures, platforms, applications, or systems. Evidently, an organization’s strategy does not need to take into account the specifics of the organization’s critical IT investments and their capabilities! It is all simply “IT”.

What I found even more curious was that there appeared to be no lack of conceptual models that attempted to capture the process. Yet in spite of the abundance
of models, there remained no generally accepted definition of what alignment actually is! While some researchers studied "fit", others studied "integration". Nevertheless, my objective was not to discredit these models, improve them nor add another one to the collection. Nor did I want to be drawn into language games that contest the meaning of alignment. For me, this conceptual pluralism and definitional murkiness was symptomatic of complexity. The claims many researchers were making, were neither necessarily true nor false, but dependent on how alignment was being observed.

My frustrations with the inadequacy of these models were compounded by the dominant epistemological paradigm within which alignment research is often conducted. I have commented on this in chapters two and four and so I will quickly summarize my remarks here. Positivism, as it is operationalized in alignment research struggles to account for complexity and contingency. This is a huge limitation, I argue, because complexity and contingency are alignment’s defining attributes. The positivist paradigm within IS research is complicated because many of the assumptions that undergird it often go unacknowledged and unchallenged. Generally those operating within the positivist paradigm tend to assume alignment to be an empirical phenomenon. We are led to believe that it is distinct and clearly observable, regardless of who is doing the observing. Alignment is a phenomenon that is objectively manifest, and as such, has variables that can be isolated and accounted for regardless of social, technical or organizational context. This point of view has consistently generated reductive explanations that fail to take seriously the complexity of alignment, the multitude of variables, and their heterogeneity.

It also often does not bother to acknowledge that in the final analysis, alignment is a construct. It is a metaphor used to describe sociotechnical relationships and configurations. Alignment is an abstract conceptual invention, a social construction which was invented at a point in history when no one knew quite what to make of the strategic importance of new information technologies to organizations. Nevertheless to ascribe the shortcomings of orthodox alignment research solely to positivism is too extreme. The point that this research makes is that alignment is much more complex than many researchers and practitioners are willing to admit. Based on my review, three problems came into focus.
What is "alignment" anyway?

The definition of alignment was unclear. To me, this was an amazing discovery! In spite of the volume of work on alignment it was not entirely clear what “alignment” actually means. What was more astonishing to me was that despite its conceptual imprecision, this had not stopped some researchers from measuring alignment with little acknowledgment that they were attempting to measure a complex and contested conceptual abstraction! One of the objectives of my approach was to confront this imprecision directly and provide thick descriptions of my observations of how research participants were observing alignment.

What exactly is being aligned?

A second problem that was evident in the research literature was that there was a methodological opposition between approaches that were built upon a structuralist conceptual chassis, and those that presented an interactionist approach. Whether focused on delineating the structural aspects of alignment or the interactional processes involved, what is central to those interested in alignment is how social and technical interactions connect to, and are embedded within organizational structures. Focusing on one at the expense of the other could only illuminate a portion of the problem.

This observation led me to reframe the alignment problem in terms of the paradox between structure and action that has long been a central problem in sociological and organizational theory. The purpose of reframing the problem in this way was that it allowed me to “de-exoticize” alignment, move it out of the confines of IS theory and bring it into contact with a larger problem within organizational theory. “De-exoticize” is not quite the right word. I would not describe alignment research as being particularly “exotic”. The point is that most alignment research remains estranged from the theoretical traditions and problems that have informed social science and organizational research. In consequence alignment research has largely disconnected from any semblance of a theoretical project, and has remained epistemologically and methodologically insulated from potentially valuable work in social science and the sociology of technology. Reframing the alignment problem in more general terms not only allows us to acknowledge this schism within alignment literature, but also presents
alignment as a general problem to which other work in neighboring disciplines may be able to contribute to in a productive way.

**How to Bring Theory In?**

Finally, I noted that alignment research displays a noticeable lack of theoretical sensitivity. As I have already mentioned, the literature on alignment is full of models but lacks theory. This is clearly a problem because it is readily apparent that there is little cohesiveness between alignment models and the observations they yield. The continuous onslaught of prescriptions on how to “solve” the alignment puzzle has become exhausting. This led me to suggest that the motives of alignment researchers may be misguided in the sense that the attempts to produce technical knowledge in order to control a complex social process, is a losing battle.

My call for theoretical sensitivity is a suggestion that researchers ought to concern themselves less with devising increasingly clever and more sophisticated prescriptions, and focus instead on understanding and penetrating the layers of complexity that stand in the way of our understanding of the problem. To be frank, academics are not practitioners. The belief that academic knowledge of organizations has relevance beyond the academic domain is often a conceit. This is a limitation that should be acknowledged. The credibility of this kind of research depends on it. Such knowledge may be more helpful in organizing what is often a confusing empirical world. However, to do this, researchers must first engage with this world in a substantive way. They must endeavor to understand how participants understand, and make sense of this world together in a natural way.

**Approach**

If alignment is about the strategic creation, deployment and use of information technologies, then those studying it should be able to more precisely account for how intentional human action works to shape, and is shaped by such technologies. My starting point was to argue that the problem of alignment can be correlated with the structure-action dichotomy within social science. Briefly, this dichotomy rests upon an epistemological problem within sociological theory that can be summarized as follows.
All structures, regardless of their social or material constitution, are productive outcomes of human action. Organizations can, for instance, be considered as structures that are produced and reproduced by those working within them. At the same time, all human action remains limited or constrained by such structures. From this perspective the structural aspects of an organization are always implicated in the ability of actors to act. It is a dichotomous problem because at any given time, one can plausibly mount arguments that emphasize either perspective but it is difficult to maintain both perspectives at once. It is usually human action that determines structure, or structure that determines action; one or the other.

The problem is especially relevant in organizational theory and more specifically explaining organizational change. Any explanation of organizational change should be able to demonstrate how organizations are reproduced and changed through intentional human actions. But as I just pointed out, these actions are embedded within social and material structures. If we are interested in understanding organizational change the question becomes where to start?

It is tempting to consider strategic plans and IT as simply elements of structure. So it is not surprising that alignment research continues to offer largely structural explanations. However this emphasis on structure misses the opportunity to explore the interplay between structure and action, and how both appear to be implicated in alignment. Focusing on one at the expense of the other (structure over action, or vice versa) only captures one side of the problem. Any account premised solely on structure or action would be incomplete because it misses the point that structure and action are mutually constitutive.

My theoretical approach was designed to get right in the middle of this problem. The underlying idea in ANT is that the analytical distinctions that underlie modern sociological and social science work are artificial. Whether we wish to separate structures from agency, social from technical, human from nonhuman, the point ANT wants to make is that reality is often messier, more unruly and uncertain than our distinctions allow. The distinctions we use to explain this reality become problematic once we renounce our authorship of them and forget that they are constructs. ANT’s Approach encourages us to question these distinctions and at least be open to the possibility that they can obscure our understanding just as much as they can illuminate
it. ANT can appear to be quite radical and even threatening the more one is invested in models built on pre-given conceptual schemas. It is important to consider that in light of the growing complexity of organization designs, the technologies they use, the networks they build, and the roles people adopt, such schemas may be doing more to limit understanding than enhance it.

ANT’s first principle is an insistence on observing the premise of generalized symmetry. This has been a flashpoint for much misunderstanding. Because ANT’s sociology is agent-centric, it is above all concerned with accounting for the capacity of actors to act. But it also understands that such a capacity is so much more complex than we often believe. To attribute action solely to individual intention is ridiculous given all the other factors that often compel actors to act.

One of the most important and pervasive of these factors is technology. In fact, so much of mundane human action relies on a technological (i.e. nonhuman) coefficient. So accepting generalized symmetry commits one to the proposal that technology has an equal claim to agency; that technology can act and can do things. It also entails that technology should be treated as more than simply an object that people use at will. For example, from an ANT perspective, it could be that it is technology that is the decisive actor that is aligning everything. With the principle of generalized symmetry, the critical role of IT in alignment comes into sharper relief.

I have improved the dissertation’s theoretical approach by incorporating structuration theory and Bourdieu’s reflexive sociology. For all of ANT’s inventiveness, it also comes with some limitations. It is useful in studying the interactive relationships that produce alignment but it has less to say about the role of structures in maintaining and reproducing alignment over time. In ANT, the emphasis is on process and change. In the context of organizations “change” or “reproduction” implies a reconfiguration of people, processes and technologies. But it also implies continuity. This relationship between change and continuity is difficult to understand without some way to describe what holds everything together. It is difficult to describe without a concept of structure. However, in ANT “structure” is conceived solely as a verb. It is a process that people and things do. The ANT explanation is that the reproduction of any organization is achieved through consistent, similar and successful translations. Organizations are thus performative achievements, and effects of this translation process. But this emphasis on process
implies that stabilization is always short-lived. The process is never complete because organizations and actors are always in a process of perpetual change and restructuring. Their continuity can never be taken for granted because other actors are constantly (intentionally or not) destabilizing the actor-networks which comprise them. So stability is always tenuous and reproduction always uncertain.

From an empirical standpoint, for those studying an organizations this claim is hard to defend. The education system and the organizations that comprise it are much more durable than the characterization offered by ANT leads us to believe. They maintain their constitution through formal and legislative frameworks, systems and bureaucratic structures. Rather than reduce these structures to an almost infinite chain of interactions, it is much more economical and intuitive to retain a concept of structure that can account for the problem of reproduction. If, as I argue in the dissertation, problem of alignment is analogous to the structure-action problem, then any account that excludes a discussion of structure is incomplete.

This is why I have incorporated structuration theory into my approach. Structuration theory represents the most elaborate attempt to develop the sociological concept of structure. It is a good fit for the goals of this dissertation because it was created to address the dichotomy between structure and agency. What is useful about structuration theory is that it reformulates the concepts of structure and agency and describes how each implicates the other in the reproduction of social systems.

Structuration theory drops the notion that structure is something separate from human beings. Structure is not something that is exterior to social practice. It is enacted through social practice. At the same time, the theory does not locate agency completely within the individual. Agency cannot simply be correlated with human intentions because it is, to a considerable extent, conditioned by elements that are beyond the actor. In the theory, structure and agency are mediated through “modalities” which can be analytically understood as being composed of “interpretive schemes”, “facilities” and “norms”. These modalities express the properties of social structure to knowledgeable agents, who then in-turn, use these modalities to enact and change such structures. Another way of saying this is that an actor’s competence consists of their ability to draw upon or create shared understanding and knowledge, mobilize resources and invoke policies and rules to establish and modify the structures that they work within.
What is especially valuable in structuration theory is that it underscores the duality of structure. Structure is dualistic in the sense that it is enacted by knowledgeable human agents, and is to this extent and outcome of social practice. It also operates to condition and parameterize the enactment process, and to contain it within limits. Structures are thus essential in enabling actors to act in specific ways by imposing constraints that are external to them. The duality of alignment, I have argued, is a way to describe the recursive logic of alignment. Information technologies can be considered an element of an organizational structure which competent actors create and install to realize a desired outcome. These outcomes can be “tactical” in the sense that they are concerned with routine, everyday operations. These outcomes can also be “strategic” in that they are concerned with broader goals or objectives. Whatever the type of outcome, information technology imposes (acts) to structure the activities of actors, guide their action and make the realization of a predetermined outcome more probable. This relationship is recursive in the sense that it continues cyclically over time. The duality of structure then describes the interplay between structure and agency in a way that avoids the mechanical objectivism of a functionalist explanation, and the subject centered explanations that are sometimes found in interpretivism. I have rounded out the theoretical framework by including the work of Bourdieu and specifically, his concept of habitus. The reason I have incorporated habitus is because I needed a way to discuss how actors draw upon their own embodied logic and experience to pragmatically improvise key activities involved in aligning sociotechnical systems. I needed a concept that would help to explain how actors align (or fail to align) technology without consciously following a strategy or plan. My own professional experience has made clear that although actors in practical settings may often talk about “alignment” they are often unable to precisely explain what the concept means or how alignment works.

Habitus is an embodied belief, which gives actors a kind of structure that allows them to creatively improvise their practice. Whether the concept of alignment is real or not is irrelevant once we observe that actors use the term and act in accordance with this understanding of what they are doing. Habitus is an historical concept so it develops over time as actors draw upon it and intentionally or unintentionally alter it. It is a difficult concept to use when studying alignment because, as I have tried to show in chapters five and six, in order to align technology actors must consciously draw on habitus in order to make an alignment initiative or program intelligible to participants, while
simultaneously reshaping the habitus. Users draw on a habitus to use technology but also create and transform it (Sterne, n.d.).

This combination of ANT and structuration theory has allowed me to address the major questions I have posed in this dissertation. ANT’s descriptive approach provided me with a conceptual inventory that I have used to make sense of my empirical observations. A distinctive way that ANT contributes to our understanding of alignment, is its insistence in including technologies in the analysis alongside human actors. I have followed this analytical strategy to draw attention to the materiality of alignment. While this research stops short of suggesting that technologies have agency in the same way that humans do, I would suggest that technologies like the CLP do possess an ability to act, to make others do things, and so this can be considered a kind of agency that has significance. To use ANT in a productive way one has to suspend disbelief just long enough, and be willing to accept the possibility that one may look at the interface between humans and technology in a different way.

While ANT provided a descriptive approach that I used to create a high resolution picture of sociotechnical interaction, structuration theory allowed me to link this picture to a more general mode of theorizing, and to draw out the recursive character of alignment with greater depth. This is an issue which I argue is central to understanding the logic of any alignment process. The synthesis of ANT with structuration theory provided the theoretical foundation upon which I have addressed my central research questions. The result of this approach was the development of a middle range approach to theory construction that attempted to bring empirical and theoretical research into a productive partnership.

**Contributions**

This research makes several contributions to the study of alignment. Perhaps the most basic contribution of the dissertation is that it treats alignment as a complex and wicked sociotechnical problem. Considered in relation to other work on alignment, this is not a trivial contribution. This dissertation goes on to develop this observation and in so doing, contributes to the understanding of alignment in several ways. This section
provides a summation of the key contributions and arguments that this dissertation makes.

**It presents a study of alignment in an unconventional domain.**

The vast majority of research on alignment focuses on explaining it in business organizations. This is not surprising given the origins of the alignment concept (chapter two). But there is no reason why the study of alignment should be confined to business organizations. This research examines alignment in an educational organization and thus sheds light on some institutionally specific factors and conditions that impact alignment but have remained under explored.

**Provides an unconventional approach.**

Much alignment research remains methodologically homogeneous and arguably isolated from other theoretical approaches and methodological orientations. While researchers may acknowledge complexity, often their methods and attitudes toward it reflect an impoverished understanding of what complexity is, what makes sociotechnical systems complex, and why. Instead, variables are isolated, reduced and sometimes quantified. This dissertation argues that this investigative strategy is severely limited. Rather than follow this path, I have relied on an unconventional approach. My synthesis of ANT and structuration theory while not unprecedented, is relatively underrepresented in the research body. The choice to adopt such an approach has proven useful in elaborating the conceptual content of alignment and its theoretical constitution in a novel way.

**Offers a study of alignment that is focused on examining the implementation of strategy.**

There has been a tremendous amount of work done that examines the relationship between strategy development and its relationship to alignment. Ironically, less has been written on what is arguably the bigger issue: the implementation of strategy. This work focuses on the implementation of a strategy rather than its development. While it acknowledges the importance of strategy, it challenges the assumptions that often come with orthodox work on alignment by suggesting that
strategic planning may not be as relevant to the pursuit of alignment as is often assumed.

**Depicts alignment as an ongoing pragmatic activity, involving the strategic creation and deployment of technological mediators.**

The pragmatics of alignment is a term I have used to describe the ways in which alignment appears to be made up of a series of activities that are context dependent. This context encompasses the institutional features of the organization, human, and nonhuman actors. These elements and entities work to shape this context through their communicative interactions with each other and the relationships they form. The notion that alignment proceeds in accordance with some formal strategy is only half true at best and wishful thinking at worst. Again the dissertation does not suggest that strategy is inconsequential. It only suggests that the ability of some strategy or plan to control communicative interactions is improbable. Viewing alignment from a pragmatic standpoint underlines the need to explore how everyday contexts of interaction are produced, reproduced and changed through processes of mediation and intermediation. This perspective encourages one to focus less on what a relevant actor is (is it a person or a technology, manager or a worker? etc.) and redirects attention toward how the actor behaves.

**Mediators have agentive and structural properties.**

Actors can display the qualities of being a mediator or intermediary. Intermediaries are entities that join other actors together and transport information in meaning between them with force and effect. Intermediaries convert inputs into outputs in a predictable way and thus work to lend a degree of continuity to communicative interactions. Mediators cannot be described by this input–output relation. Rather, mediators are entities that modify the information and meanings they are tasked with carrying and/or communicating. This distinction is foundational. Yet these designations do not describe the essential qualities of an actor. They are nominal in the sense that they are observer and context dependent, and thus not fixed. IT for example, can act in either capacity. Computer software systems such as the CLP, can be said to act as mediators.
Human or not, mediators are critical to alignment because they participate in the recursive enactment of a strategy or program of action, while simultaneously structuring what is often an uncertain enactment process. Mediators act as “go-betweens” that transport and translate meaning between other actors. However, mediators in the form of information technologies have special significance in that they often incorporate rules and informational resources that work to hold these translations in place and give them materiality. Because of this, technological mediators can be considered as elements of a broader socio-material structure. In the terms of structuration theory they signify both a medium and an outcome of situated communicative interactions.

**Mediators have functional and social dimensions.**

Technological mediators have a material basis from which they derive their functional (i.e. business) value, utility and capabilities. Mediators have functional value because they provide other actors with capabilities that they would otherwise not have. This value is always a matter of perspective. For example, for the district to deliver a personalized learning experience to its 7000 students, “value” consisted of a solution that could provide digital content creation and collaboration capabilities, and that would scale easily and inexpensively. For students, this functional value consisted in the CLP’s ability to place them at the center of the learning interaction and give them tools to manage their digital work and workflow. For teachers, this value consisted of its ability to operate as an engagement vehicle; a way for them to intervene in and control online spaces and communication channels that are relevant and increasingly important to student learning. But this functional quality of Mediators is not what makes them interesting. This understanding only captures half of the reason mediators are important.

Along with their functional value and capabilities, mediators also have social significance. Understanding this significance is key to uncovering the strategic and transformative potential of IT, or perhaps accounting for why this potential is seldom realized. Organizational strategies, of course, are pointless unless they can be carried and translated through-out the organization. The social significance of mediators resides in the observation that they represent the strategic interests and agendas of various stakeholders and groups to each other, and attempt to translate these interests between them. Mediators stand-in for a group or community, help to sustain their agenda or
strategy and mobilize others by translating this strategy through its functional capabilities. It is within this translation process that mediators attempt to draw upon and activate embodied techniques in users, while simultaneously structuring the way these techniques are performed. This is why a purely functional analysis of IT is inadequate. It misses the fact that technology is always pragmatically aligned through the skilled embodied techniques of knowledgeable actors.

Inscription denotes a process of defining actors and the groups to which they belong, creating a patterned relationship between these actors and actions, and then embedding this relationship within an mediator (in this case, the CLP). Computer programming for example is an instance of inscription. Computer programming is just one activity within the broader inscription process which principally involves a solution’s design and development. The inscription process is important because it signifies the material expression of social interests. These interests are often reduced to a series of technical requirements (functional, nonfunctional, usability, performance, design, etc.). What is often lost in this reduction is the ability to recontextualize these technical requirements within the social practices from which they were abstracted. In this respect, IT solutions have technical requirements but also social requirements that may be strategically important to groups of actors and communities of practice. These social requirements are difficult to capture with approaches that rely heavily on formalization because these requirements are difficult to formally articulate. They are tacit, contextual, and emerge through practice or practical interaction with prototypes. They are refined iteratively. It is through the process of iteration that participants move from ambiguity to clarity. This is done with a variety of techniques. The design of the CLP relied on a synthesis of two bodies of knowledge that provided these techniques: design thinking and agile development.

The principle advantage of these approaches, as I argued in chapter five, lies in their ability to mediate between technical requirements and the social demands of groups or communities of users. An important side-effect of this process is that it often draws out conflicting, contradictory or unclear social demands that would have otherwise remained dormant and unexpressed until after the mediator has been deployed. These approaches do not provide a means for resolving these issues, but create an interactive context in which affected groups can understand the implications that their demands
have. The heavy reliance on interactivity and face-to-face communication throughout the inscription process increases the odds that development teams will be able to build a solution that satisfies technical acceptance criteria, and represents the demands and interests of stakeholder groups adequately and fairly.

The other critical process in alignment is translation. Translation describes a process through which actors define other actors, their roles, relationships and interests, and align themselves through the mediators they use. Translation involves a process of delegation or displacement that takes place between actors. In chapter six, I analyzed this process through four analytical stages: problematization, interessement, enrollment and mobilization. It is through translation that mediators are established, vetted, supported, and promoted. These mediators in turn, hold these translations in place, stabilize them and reproduce them. Where there is perfect translation, mediators are highly representative of their human and nonhuman constituents. Each group of users accepts the role that has been delegated to them and is willing to engage in this role through the mediator. Perfect translation however, is improbable. It is always a matter of degree.

This work drew attention to a few controversies surrounding the translation of the CLP. However at the heart of the matter, is a controversy over the degree to which the mediator truly represents an actor or a group and can activate their historically embodied dispositions (habitus). This issue of representation along with invoking the techniques to reshape habitus is tricky to navigate. The temptation may often be to fall back on the ideas of authority and hierarchy as a means to enact and explain alignment with a given strategy. Based on my observations this is not how alignment is enacted. Authority and hierarchy are complicated in educational organizations. The mode of production in these organizations requires that workers retain a degree of autonomy if they are to be effective. For sure, teachers can abuse their professional autonomy or exercise it for selfish reasons, but also productive ones as well. If they believe a given mediator is unrepresentative of their interests or their student's interests, or if they distrust such mediators and their motives, it is easy for them to withdraw from an alignment initiative - actively or passively. In the case of the CLP many teachers and students were willing to change their respective roles, while some were not. But if nothing else, the CLP magnified the variation in beliefs and attitudes toward learning and technology that
teachers, administrators, and students held. The idea that the habitus of these actors with all of their different attitudes could be represented easily or completely is simply unrealistic.

**Why is Alignment so Difficult? Some Implications of this Research**

There are two aspects to the concept of alignment. The first is the idea of a “fit” or integration between strategies and technological capabilities. The second aspect is the association between alignment and increased organizational performance, which signifies a kind of change or transformation. Often the first aspect implies the second. If the literature (perhaps inadvertently) makes anything clear it is that alignment is always something that is slightly out of reach. The abundance of prescriptive literature (academic and popular) implies that previous approaches have proved to be inadequate (hence the new research) but at the same time it cannot quite admit that nobody really knows what alignment is. Alignment in a way, has become the MacGuffin of IS research and professional IT domains. Lots of people have heard of it. A few people some time ago claimed to have seen it. But nobody quite remembers what it looks like or how to find it.

Nevertheless, the search for alignment continues and academics and practitioners alike create and test new methodologies in the hope that someday the solution will be found. To some extent measuring the productive output of technology and correlating its contribution to strategic objectives (assuming they are clearly defined) makes sense in an industrial factory. But with the transition to a service economy and the so-called “information revolution” organizations and their “information/knowledge workers” increasingly rely on collaborative modes of production that require social computing applications and platforms to deliver value.

As so many authors have pointed out, these new modes of production differ from the old. They are often highly creative, nonlinear, emergent and interconnected. In short, they are much more complex. Today it makes even more sense to fundamentally rethink what is meant by “alignment”, what constitutes successful alignment, and how do we know? The answers to these questions may be organizationally and institutionally
specific. If this is true, it goes a long way toward explaining why alignment appears to be so problematic. Yet research has continued as though this was not a cause for concern, and has continued to draw attention to “antecedents”, “enablers” and “forces” that lead to or obstruct alignment. The underlying assumption has been that the more we understand the mechanisms of alignment the more we can control it. In light of the developments I mentioned a moment ago, it is obvious that any attempt to control the alignment process is not just an attempt to control technical relationships, but social ones as well.

It is no surprise that the idea of alignment originated somewhere in between management science and IS research. Orthodox alignment research shares the underlying assumption of management research: that social relations and the behavior they engender are controllable. But the idea of control is often conceived in a narrow sense, as something akin to domination. This is a longstanding association that is captured in the notion of “command and control” management, which has since been replaced by the rhetoric of “leadership”. I do not want to suggest that control is not important. However the point that management science and this type of alignment research miss, is that in a social scientific sense, control is intimately bound up with communication. This is because to assert control one must communicate, and that the success of any control depends on the extent to which communication is successful (Baecker, 2001, p. 2).

Communication implies a negotiation of meanings, actions and interests. It implies a process of translation, which as this work has shown, is always uneven, imperfect and contingent. Translation is a special type of communicative process. It requires a translator, a person, group or thing being translated, and a medium through which the translator can inscribe their translation (Callon, 1991, p. 143). Translation involves defining actors, their roles and relationships, and aligning them in a coherent and ordered way. As this dissertation has made clear, these definitions and relationships can be found within mediators, who mediate such translations and in so doing come to stand in place for, and help to align others.

Translation is always contingent because it does not preclude the possibility that the translator may get it wrong, cut corners or come across a scenario where some elements, roles or relationships are untranslatable. In this last case there is a gap for
which the translator has to compensate. When it comes to designing IT systems this compensation could take the form of creating use cases or user stories which detail how developers imagine users should interact with the mediator. Another technique might be to create a nonfunctional prototype which users can interact with and modify repeatedly before it is built and implemented. In some cases the imperfections of translation are tolerated and a given mediator represents the interests of others “more or less.” In other cases the imperfections of translation are seen as acts of betrayal: “that’s not what I meant” or “I did not sign off on this”. The gap becomes a disconnection and those involved scramble to realign themselves or in some cases, actively or passively disengage from each other.

So why is alignment so difficult? There could be a number of reasons. Misalignment could be due to a lack of clarity between an ambiguous strategy its inscription into a technological mediator. This, in turn, could indicate a gap in how a strategy or plan is translated from one context to another (an imperfect translation). It could also be due to disengagement by one or more actors, which is a sign that the interests of those involved are incommensurable (a failed translation). These issues often compound the alignment problem. They stack on top of each other. An imperfect translation at the executive level can be compounded by a failed translation at lower levels, or vice versa. Consider this common scenario. What would happen if a CIO in charge of an organization’s IT department, passively rejected the role that the business attributed to IT? Perhaps this CIO believes that IT should be a critical “driver” of the business strategy rather than simply a business “enabler”. This could create considerable confusion within the department and among employees regarding how they might best serve the demands of internal business users and/or external customers. Frustration can often give way to disengagement, which is apparently pervasive in today’s workplace (Gallup, 2013).

There is always a gap between future and current states, strategy and implementation, structure and action, thinking and doing, signs and things. The expectation that this gap can be overcome, bridged, closed, etc., may be at the root of the problem.
The focus of this dissertation is on the implementation and alignment of IT in educational organizations. Questions regarding how these technologies affect teaching and learning, in other words their pedagogical significance, are better left to another project. With this in mind I will offer some observations on learning and teaching with technology, which are intended to preface a broader and more informed discussion.

The idea of students today as digital natives leads us to believe that today’s students are technologically savvy and comfortable with information and communication technologies. However I would argue that this notion often creates more confusion than clarity within the politics of educational change. An ability to use smart phones, tablets, Google and Facebook may signify the residue of an historically new kind of habitus in students, but it is certainly not a measure of technical savviness nor meaningful skill. Nevertheless, student demands for allowing such items and practices into their classrooms are now commonplace, As are complaints that schools remain disconnected from students’ digital worlds. Such demands and complaints were certainly observable through the course of my research.

Among the educators I interviewed, many expressed that they have noticed the increasing prevalence of a new persona in their students. In 21C circles, this new persona has been called the “free-agent learner”. The term “free agent” of course, is often used to refer to professional athletes who for one reason or another are no longer under any contractual obligation to their employer. Free agents are able to field offers from other teams and are able to enter into contract with whomever they choose. More simply, a free agent is a person who is not bound by any commitment that limits or restricts their actions. It’s an interesting metaphor to describe this new breed of student. In discussions on 21C learning, a free agent learner is generally a student that is technologically enabled, self-directed and self managing, autodidactic, highly creative and collaborative. Perhaps a free agent learner is a student who can effectively control the terms of their learning, take responsibility and initiative for it. The metaphor is appealing. After all is this not a picture of an ideal student?
One of the implicit beliefs that often comes with the idea of the free-agent learner is the assumption that by providing students with technology, many will be able to adopt this new role that has been delegated to them. And certainly pursuing this course of action is a way to empower students and to satisfy their demands for a more digitally connected educational experience. Providing students with the permission and access to use these technologies does transfer degree of power and control to them. But this transfer of power comes with the implicit understanding that teachers now demand more from their students.

Returning to the free-agent learner metaphor, a free agent is someone who is released from his or her contractual obligations. One lingering question here is who exactly is releasing whom? Are students the ones who have “released” their teachers and their schools? Or are educators releasing their students? In a 21C learning environment, who is actually controlling the terms of the learning interaction? Of course I do not mean to imply that either group is fully “releasing” the other. My point is simply to draw attention to be ambiguousness of this new understanding of the prototypical student-teacher relationship.

My observations of student apathy with the CLP imply that a considerable amount of students struggle with the proposal to become “free-agent learners” and to manage their own learning, to motivate themselves, and to play the game. My observations suggest that to some degree, students have rejected this new persona that has been attributed to them by education reformers. Some have no interest in playing the role of the free-agent. And why would they? If the condition is that they must now take responsibility for their own learning, my guess is that at least half of a given number of “21C learners” do not want or are not prepared to handle this responsibility. They would rather delegate this to their teachers. While, cultivating student motivation is among the oldest and hardest challenges educators face, I remain suspicious of the suggestion that the engagement or motivation problem (depending on how one looks at it) can be mitigated with technology. What’s more, I would argue that the demands for technological empowerment by so-called free-agent learners is becoming more problematic, given that the risk of digital distraction is so high and the demonstrable benefits of technology so low. Clearly, some students are willing and able to take responsibility for their own learning. This is nothing new. But many students are unwilling
or unable to become free agents. This makes the challenge of effectively managing the classroom, and creating a consistent learning experience more difficult. Teachers would require ways to assess the performance of their “free-agents” toward their personalized learning goals, while monitoring and shepherding their other students toward their own teacher-defined learning outcomes. The appropriate assessment protocols, as of now, have not been implemented in any large scale way. And there is some question as to whether a radical re-assessment of assessment in a 21C classroom is politically viable. Standardized testing regimes remain the norm.

What can be said about teachers? Anecdotally, in discussing my research with others outside of education I was often confronted with the suggestion that it is often teachers who pose a major barrier to meaningful change. Pointing the finger at those old obsolete teachers is another popular pastime for those concerned with the future of the education system. In most cases this attitude stems from ignorance and a lack of trust in the educator’s abilities. It was certainly not my experience. Most of the teachers I met were and are curious about using new approaches and new technology in their classrooms. In the case of the CLP, most were willing to try it out in their class. There were also many teachers that were confused about emerging technology, and the CLP specifically. I found that most teachers could appreciate the novelty of new technology but struggle to understand its usefulness.

My position here is that most teachers certainly do not attempt to block the implementation of educational technologies, but they also generally struggle to understand or even accept its value proposition. Many teachers struggle to understand the educational value of learning and teaching with technology. The situation is disappointing. But it should not be surprising. There are many teachers that simply do not “get it”. But what is there to “get”? Consider for a moment that even the most optimistic and cooperative teacher, with years of experience has often “been there, done that.” And it is hard not to be cynical when you have seen dozens of implementations and promises, year after year. From a teacher’s perspective, it is easy to adopt a “here we go again” mentality.

A common theme I often heard expressed with my interviewees is that the role of the teacher has to change, that teachers must learn to become more “dynamic”, that they must go from being a “sage on the stage to a guide on the side.” These themes and
idioms are tired clichés that merely point to the need for continuous innovation in instructional approach. This demand may be accelerated by technology but it certainly does not come from technology. The teacher’s job has always been to enhance the conditions of learning (and if possible to motivate the student) by manipulating the learning environment to help students achieve outcomes in their own best interest. When properly done this has always been a “dynamic” process. This dynamic relationship is the essence of all learning. Technology is simply another way to shape these conditions but it can also be a critical actor in the learning process. Yet another common refrain I heard among many teachers was that they simply “do not have time” for technology in their classrooms. They do not have time to experiment with it, to learn it, or to tinker with it. This lament reflects a feeling of overload that is felt by many teachers. It is also shorthand for a more troubling attitude that for these teachers, the cost of their time investment in learning the technology is simply not worth the payoff. If this is the case, then these teachers are leaving a considerable amount of “money on the table.”

Technologies are not simply another means to an end. While the CLP for instance was referred to as a “solution” it and other technologies are much more. They can shape worlds (Feenberg, 2002, p. 125). In the case of web-based technologies these worlds are social and interactive. The good news for “traditionalists” is that the web is essentially a written world (Ibid). It follows that if the basic goal of education is to teach literacy, teachers cannot afford to ignore this world. Web technologies are not displacing traditional literacy they are actually retrieving it. Teachers are in a pivotal position to influence this retrieval. And while technology can enhance or supplement instruction, it cannot properly be expected to “change” the fundamentals of a learning interaction.

My position is that at this moment, the pace of innovation in technology has far exceeded the pace of innovation in learning models and pedagogy. Pedagogical models have struggled to really exploit technology to its fullest potential. While teachers may struggle to see how technology enhances learning in the classroom, students struggle to see how the classroom enhances their learning. The concept of blended learning is relevant here because it is not simply about blending the “real” world with the “virtual” or technologically mediated online world. Blended learning is an acknowledgment that the
“real” and the “virtual” are part of a singular experience! The online world is part of the “real” world; it is an extension of this world, and rich in its own right.

Technology implementation in education is not an either/or proposition. To be drawn into debates over the perceived value of technology to student outcomes is to miss an important point. A considerable part of student life is spent online. Online or not, the ability of a student to thrive in their environment is connected to the effectiveness of their teachers. Teacher effectiveness has always involved an ability to align technology - from textbooks to tablets - with their own pedagogical goals and commitments, and to use it to shape the learning environment.

For those interested in the transformative potential of technology in education, these are truly exciting times. The convergence of broadband (and wireless) networks that can support powerful web applications and services, running on inexpensive mobile devices, which display cheap plentiful content, has created a kind of perfect storm in education. The confluence of these factors have created the conditions where everyone can now create as well as consume content, and participate in collaborative learning interactions that span space and time. This was not practically feasible just three years ago! This capability is powerful and many educators agree, if not begrudgingly accept this.

As a mediator the CLP did not just bring a set of tools into the classroom. It represented the district’s strategy and attempted to communicate this strategy and mobilize teachers and students accordingly. In this sense, this research demonstrated how IT systems like the CLP should be consider dynamic actors that translate strategic visions. To understand the full impact of the CLP would require a longer timeline. It is likely however, that as teachers and students continue to use it, their investment in it will alter its path of development. It is likely that the CLP will change –as the district continues to change. New capabilities will be added while others will be eliminated. As the pedagogical philosophies and ideas that informed its design continue to evolve, the CLP should evolve alongside them. At this point, it remains an open question as to what this evolution will look like.
References


Tallon, P. (2003). The alignment paradox ; It's not always the case that better IT alignment leads to business gains. Avoid creating information backbones too inflexible to embrace marketplace change. *CIO Insight, 1*(32), 75.


Appendix A. Sample Research Instrument

Interview Questions for Study: Understanding the Alignment Paradox
Principal Investigator: Brad King, PhD Candidate
Supervisor: Dr. Richard Smith, Dr. Andrew Feenberg

School of Communication
Simon Fraser University

Interviews will be semi-structured around the following thematic areas:

1) Introduction
   a) Introduction and explanation of purpose of study.
   b) Scope and Objectives
   c) Consent form and voluntary participation
   d) Preliminary questions or concerns?

2) Conceptual Questions regarding general understanding:
   a) How do you understand the concept of “alignment” within your organization?
   b) As you are probably aware, for some time this concept has been problematic for many organizations and IT departments. Why do you think this problem persists?
   c) Some professionals have suggested that this problem has been “invented” by consulting houses. Do you believe that the problematization of alignment has been exaggerated?
   d) What are the “dimensions” of the problem? Do you see this as an issue that pertains to IT only?
   e) Professionals have suggested that the concept itself is paradoxical and because of this, it’s impossible to operationalize in a meaningful way. Comment?

3) Empirical Questions directed toward understanding the operationalization of the concept:
   a) What role (if any) do industry ‘best-practices’ play in understanding this recurring problem.
   b) How do your procedures and work processes reflect the sensitivity of this problem?
   c) What are the key business indicators of alignment and how were they formulated?
   d) How prominently is this problem featured within your organization’s strategy?
   e) Different organizations view their IT capability and the role of IT in very different ways. In your experience, how would you characterize the role of IT within your organization?
   f) Often in professional circles, we hear that “alignment is ‘cultural’ more than ‘technical.’” Do you think this is a cliché? What role does “culture” play in the alignment projects you’ve been involved in?
Appendix B. Interview Schedule

For the purposes of maintaining participant confidentiality, pseudonyms have been used to represent the names of district staff, teachers, and the schools they worked at.

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<th>Reports to</th>
<th>School/Location (Pseudonym)</th>
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