ATHABASCA UNIVERSITY

EXPLORING A TRANSACTIONAL DISTANCE-BASED MANAGEMENT MODEL TO IMPROVE PERCEPTION OF EFFICACY WITHIN DESIGNATED CORPORATE COLLABORATION COMMUNITIES

BY

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Approval of Thesis

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Dedication

This dissertation is dedicated to my wife, Karen, and sons Andrew and Liam, without whom I would be lost. May their own learning journeys be as winding, compelling, and rewarding as mine continues to be.

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Abstract

Oil and Gas (O&G) companies are adopting blended learning models to move away from traditional face-to-face training programs that are viewed as costly and less efficient. A small number of larger O&G companies have demonstrated that establishing effective collaboration communities can lead to millions of dollars in annual savings. Cenovus Energy initiated a structured knowledge management program in 2014 with the intent of creating a network of collaboration communities to support non-formal learning across the company. Previous efforts to establish collaboration communities were unsuccessful due to poorly defined or absent business processes and practices for this type of activity. In order to resolve these challenges, a standardized management model was required by Cenovus to support efficacy in the creation and sustainment of its collaboration communities.

The purpose of the Cenovus initiative, upon which the study was based, was to create a replicable and scalable business process for developing effective corporate collaboration communities. A comparison of literature between *Communities of Practice* and *Transactional Distance theory* provided the following premise: the perception of value and effectiveness of Communities of Practice can be affected by the manipulation of the three transactional distance elements to influence how communities are *structured*, how the *dialogue* between participants is fostered and contributes to collaborative efforts, and the degree to which the participants' *autonomy* allows them to shape the community. It was proposed that the management of transactional distance through a controlled manipulation of structure, dialogue, and autonomy may support the deliberate reduction

or creation of a difference in understanding to align to business objectives within corporate collaboration communities.

This study was conducted using a design-based research methodology to support the iterative development of collaboration communities within Cenovus, evaluate the influence of different activities on the levels of transactional distance within these communities, and synthesize a transactional distance-based management model for community design and activities. Although the corporate initiative was suspended indefinitely in 2016 due to the economic downturn resulting from global oil price collapse, Cenovus has approved and adopted the preliminary findings and framework produced by this study as the corporate practice for collaboration communities.

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CHAPTER 1 – INTRODUCTION

The research presented in this dissertation focused on exploring the application of Moore's theory of transactional distance (Moore, 1984, 1993, 1997; Moore & Kearsley, 2005) to support enhanced collaboration within corporate communities of practice. Interest in this topic was created during the conduct of parallel research in non-formal learning activities; although a number of corporate studies were found that indicated potential business and learning value in establishing corporate collaboration communities, there was very little learning theory research found to explain how to achieve consistent learning or performance outcomes within the communities. Predominantly, the research was focused on high-level business processes and concepts, and not learning theory itself. As a result, the "mechanics" of how to achieve efficacy within a corporate collaboration community from a learning perspective were not found to be well researched or articulated. During the course of this preliminary research, it was noted that there was potentially strong alignment between the three elements of Moore's theory of transactional distance (namely *structure*, *dialogue*, and *autonomy* (Moore, 1993, 1997)) and Wenger's work on social learning communities (Wenger, 1998, 2000) which highlighted three community dimensions: *alignment*, which has parallels to Moore's concept of structure; *engagement*, which has parallels to Moore's concept of dialogue; and *imagination*, which has parallels to Moore's concept of autonomy. This led to the development of the thesis for this research: *within corporate collaboration communities, the transactional distance elements of structure, dialogue, and autonomy can provide a design framework with which to shape activities, processes, and objectives to support the intended business outcomes*.

In order to conduct this study within a corporate business environment, permission was received from Cenovus Energy ("Cenovus"), an oil and gas (O&G) company based in Calgary, Alberta, Canada, to have them act as the organizational host for the research. The challenges of conducting academic research inside a corporate organization necessitated significant flexibility in the study's design and subsequent execution, particularly in response to global economic pressures that impacted on Cenovus and created additional delimitations (described below) on the study during its conduct.

This dissertation provides the details of how the research was conducted, the conclusions that resulted from the study, and outlines the business processes that were produced as a result.

Background and Overview

Cenovus employs a workforce of over 3,000 people across Alberta and Saskatchewan. The predominant oil extraction method utilized by the company is referred to as "Steam-Assisted Gravity Drainage" (SAGD), which is a relatively new technology field compared to conventional productions methods (the O&G industry's first commercial SAGD facility (Cenovus' Foster Creek production site) only began commercial production in 2001). As a pioneer in a new field marked by continuous adaptations of technologies and processes, Cenovus has three predominant "operational" learning challenges:

- Their facilities, practices, and processes are continually expanding and evolving; hence, continuation training is a constant process to ensure that workers remain fully qualified and able to work both safety and productively;

- Their organizational knowledge remains predominantly within its people, and has not yet been captured and integrated into reference content from which traditional training programs and curriculum can be derived easily (i.e. tacit versus explicit knowledge); as such, the transfer of knowledge and development of skills has been done predominantly in-person, similar to trade apprenticeship development albeit without much structure or rigour; and
- The geographic separation of its facilities by hundreds of kilometres, and the unique culture of each site, which have historically acted as autonomous sites independent of one another, has created significant transactional distance and knowledge gaps between sites. There has been reluctance and resistance to open collaboration between the sites, which is a key business driver behind the initiative to build improved collaboration networks; in one case documented within the company, Cenovus lost over $10 million due to waste fluid production issues at one site that personnel at another other site had resolved two years earlier.

Like many O&G companies, the company's learning and development programs have historically relied heavily on face-to-face and classroom-based training models and methods; however, current operational demands on time and resources have made lengthy, formal, course-based training programs less desirable as the primary vehicle for learning. As a result, alternative learning activities and post-training support initiatives have been explored to augment course-based training as the primary tool for learning. In January 2013, Cenovus established a Knowledge Management (KM) team and program to support the creation, capture, validation, and sharing of knowledge within and across

the organization. As noted by Cenovus in their letter of support for this study (Appendix M), one of the pillars of this program was the establishment of collaboration communities and broader collaboration community networks to support knowledge capture and sharing within and between different business units. Although collaboration communities had not been formally established at Cenovus previously as part of a broader delivery strategy (as noted the predominant focus was on course-based instruction), they were identified as a specific action area within the KM program to help enhance collaboration, knowledge capture and sharing, and best-practice identification and adoption. Case studies with larger and more established O&G companies, such as Schlumberger and Shell,[1] have demonstrated that they were able to create tens of millions of dollars of value through internal knowledge sharing and collaboration communities, and Cenovus intends to move towards that goal through the creation of its own knowledge sharing / learning communities program.

While blended learning can provide cost and value advantages as compared to face-to-face training (the more commonly used delivery model within O&G companies), introducing a new approach to learning across a large and diverse organization adds complexity to engaging and supporting learners. This is especially problematic in complex workplace learning environments that include multiple elements that most often create “distance” between participants and negatively impact learning. This distance

[1] Note the case studies referred to above have been produced by the American Productivity & Quality Center (APQC) and are available through corporate subscription. Reproduction rights do not permit enclosure within this dissertation.

includes but is not limited to separations associated with a variety of factors, including, for example, geographical distance, time, access to technology, personal perspective, and philosophical or cultural perspective and bias between people. As noted by Moore (1997), this separation can in turn cause a potential for misunderstanding between learners, content, and instructors, and lead to unintended or undesirable learning outcomes, or failed learning. At a theoretical level, this condition is referred to as *transactional distance.*

Transactional Distance Context

Much of the academic literature on transactional distance focuses on the potential for “misunderstandings” or “miscommunications.” These word choices by themselves imply a negative effect that subsequently needs to be “overcome” in order to support positive learning outcomes. A key potential gap in the consideration of transactional distance, however, is that definitive studies have not been produced that adequately address questions regarding cause and effect between transactional distance and learning outcomes. Giossos, Koutsouba, Lionarakis, and Skavantzos (2009) provided an alternative perspective regarding the definition of transactional distance:

> …one could support that transactional distance in distance learning should be defined exclusively as "the distance in understanding between teacher and learner", and not as "the psychological and communication space between the two." The question that rises at this point is to what understanding refers to. Understanding refers to mutual understanding (co-understanding). In the vernacular, the phrase 'you don't understand me' or 'you're not following me' is commonly used to stress the lack of mutual understanding or common perception

> of ideas, emotions, situations, etc. *Transactional distance*, therefore, is nothing more than the lack of common or mutual perception of knowledge, thoughts, approaches but also needs (psychological and educational), emotions, etc (p. 3).

This definition provides a much more neutral perspective of transactional distance, and enables a more objective approach to exploring its dynamics: while a lack or difference in understanding in some circumstances can lead to a negative outcome, in other circumstances a difference in understanding may drive further investigation and dialogue that leads to new knowledge creation or a change in perspective. This is an important distinction for consideration within Cenovus, as gaps and differences in understanding can and have led to key safety and business challenges in performance; in some cases, misunderstandings between teams for implementing key procedures has resulted in significant incidents, while in others, differences in understanding when considering a problem has created solutions that were not seen as possible previously. If the degree of mutual understanding can be consistently influenced to achieve intended outcomes, then this can be leveraged as a key factor within the management model. For example, any difference in understanding of practice or policy with corporate learning topics such as workplace safety may increase operational risk. Topics such as this are taught using a behaviourist approach to ensure conformant behaviours and adherence to strict performance guidelines, and works to ensure common understanding; any transactional distance that undermined these objectives would therefore be undesirable. As such, an associated collaboration community would presumably benefit from a structure and activities that resulted in low transactional distance, and hence support a close alignment of thought and understanding to foster appropriate workplace

behaviours. In other circumstances, however, such as business activities for which innovation is the desired result, a difference in understanding may actually be beneficial in achieving the intended outcome, where a common problem can be considered from multiple perspectives depending on different conceptions by contributors. In this case, an associated collaboration community would benefit from a structure and activities that fostered higher transactional distance, and therefore more opportunity for different perspectives, understandings, and conceptions to influence knowledge creation. Given different foci of each community, or type of community, the activities undertaken by a given community for a given intended outcome would require differing levels or types of transactional distance in order to align to the intended outcome.

Using the context of realism to position transactional distance within an epistemological framework, Giossos et al. (2009) offered that "…science investigates *actions*, which, through *mechanisms*, produce *results* under certain conditions. From this point of view, *transactional distance* is one of the results of teaching (*action*), and structure, autonomy, and dialogue are *mechanisms* of *transactional distance"* (p. 4). In this context, given that different collaboration communities will have differentiated business outcomes, and that these outcomes can be supported or put at risk through varying degrees of transactional distance within each community, the effective *management of transactional distance* becomes an essential business process to achieve their intended business outcomes. It was this general possibility - that transactional distance may in some circumstances be put to positive use - which the study sought to investigate.

Statement of the Problem

Established as a new company in December 2009, Cenovus did not have a formalized model or processes for the development or sustainment of collaboration communities (this remains a common condition within the O&G companies considered by the researcher). Ad hoc efforts between 2010 - 2013 saw four Communities of Practice created by different business units; however, all of them reported limited success or business value realized in the adoption and activities of the Communities. Viewed internally through a "business lens," the initial Cenovus analysis determined that a lack of business process, a lack of alignment to clear business objectives, and insufficient stakeholder engagement and training were the principle contributors to the lack of success. Subsequent discussion from a learning theory perspective, however, determined that none of the initial efforts included design considerations for the geographic, cultural, or even organizational separation (and hence transactional distance) between of participants. Based on dialogue with the KM team, some of whose members had participated in the earlier efforts, it was assessed that these elements were key contributors to the breakdowns in community cohesion and subsequent function in the earlier efforts.

In order to avoid these challenges going forward, a standardized management model was required by Cenovus to support efficacy in the creation and sustainment of its collaboration communities. Building upon Moore's seminal works on transactional distance theory (Moore, 1984, 1993, 1997; Moore & Kearsley, 2005), and Wenger's work on social learning communities (Wenger, 1998, 2000; Wenger & Snyder, 2000; Wenger, McDermott, & Snyder, 2002), specific research was required to determine if,

through the deliberate manipulation of its three component elements of structure, dialogue, and autonomy, transactional distance can be manipulated or "managed" effectively within corporate collaboration communities to achieve targeted learning outcomes.

The purpose of the Cenovus initiative with which this study was associated was *to create a replicable and scalable business process for developing effective corporate collaboration communities within Cenovus.* A cornerstone of this process model, and a focus of the study itself, was exploring *how the management of transactional distance through differentiated activities and structures can support the achievement of targeted learning and business outcomes for different collaboration communities within a large and diverse corporate organization*.

Research Questions and Methodology

This study was conducted using a *design-based research methodology* to support the iterative development of collaboration communities within Cenovus, evaluate the influence of different activities on the levels of transactional distance within these communities, and synthesize a transactional distance-based management model for community design and activities. The study sought to answer the following questions (note that the full question text, including the data and analysis elements for each question, are detailed in Chapter 3):

1. **Question:** When designing collaboration communities, to what extent do the transactional distance elements of structure, dialogue, and autonomy provide a structural base upon which to plan activities, processes, and objectives in order to support the intended business outcomes?

2. **Question:** To what extent do changes in the nature or conduct of specific collaboration community activities and processes aligned with structure, dialogue, and autonomy improve the perception[2] of efficacy relative to intended outcomes to a degree of practical significance, as perceived by the stakeholders?
3. **Question:** What form might the collaboration community management model take within Cenovus to support the targeted outcomes as perceived by participants and managers?

Aligned to a previously established business initiative, the study was intended to support the establishment, evaluation, and improvement of approximately 24 collaboration communities within Cenovus. Individually supported within a 120-day enactment cycle, each community was to undergo structured and iterative design and activity changes based on 30-day interval assessments using a modified Delphi Technique to determine any corresponding shifts in participant perception (the specifics of the Delphi Technique and its application for this study will be detailed in Chapter 4).

During the evaluation cycles, standardized online survey instruments were to be utilized across all communities to assess the impact of any changes and individual perceptions within each community separately. The surveys supported an assessment of progress towards the community objectives from a corporate work perspective, while the study effort mapped questions and responses to the transactional distance elements of structure, autonomy, and dialogue in order to determine potential direct linkages between

[2] Wenger, Trayner, & de Laat (2011) (Chapter 2) highlight the significance of "perception" in assessing value within a collaboration community.

the manipulation of the transactional distance elements and the resultant effects. A comparative analysis of all of the produced data from the communities was planned following completion of the individual community evaluation cycles to determine patterns of common response or effects relative to transactional distance. The intent was that patterns or trends of significance identified by the research that connected the manipulated variables with identified business outcomes would form the basis for the derived management model.

A graphic overview of the study flow for each community, and the study overall, is provided at Appendix A. The findings were subsequently peer reviewed / validated by the Evaluation Steering Committee established within Cenovus for this study, which was open to agree or disagree with the findings prior to inclusion within the Cenovus business process.

Significance of the Study

It has been validated by peer O&G companies that establishing effective collaboration communities can lead to millions of dollars in annual savings; as a young organization, however, Cenovus has lacked business processes and practices to do so. The establishment of a repeatable and scalable process grounded in research and learning theory will enable Cenovus to enhance its business practices significantly through collaboration communities. External to Cenovus, the broader adoption of this process model by other corporate or academic organizations could support enhanced value realization across a range of audiences. The outcomes of this study support these objectives.

Suspension of the Study by the Host Organization

Unfortunately, global economic conditions resulting from the collapse in world oil prices in 2014-2016 had an unforecasted and prolonged impact on Cenovus Energy, the corporate host for this study. This in turn created a significant limiting effect on conduct of the study itself, as noted below:

- In order to dramatically reduce operating costs and remain sustainable during the collapse in revenues, Cenovus initiated a reduction of 24% of its workforce between March – November 2015 (over 800 people), and accelerated a restructuring of many operational functions to centralize services and eliminate redundant work. This disrupted all of the potential collaboration communities that had agreed to participate in the study, as much of the leadership that supported the effort were either moved to new roles or departed the company, and the associated members were largely dispersed across the company.
- The continued downward pressure on oil prices in 2016 below $35 per barrel WTI (WTI is an industry pricing benchmark that refers to the West Texas Intermediate industry crude oil blend, which is used as a common unit of measure for pricing) resulted in significant daily multi-million dollar operating losses for the company; as such, executive direction was given that all non-essential work be halted or deferred until the economic situation improves, and a further 440 positions were reduced, including almost all of the KM team (only one member remains from the nine positions in 2014). Business support initiatives such as developing collaboration communities

will not be part of key corporate work for the foreseeable future, and hence it cannot be predicted at this point as to when data collection will be able to recommence, or what type of sample will be established.

Given this study was predicated on a sample of convenience, and this work was deliberately turned off by the business teams within the host organization, the study required adjustment to reflect a change in circumstance outside of the control of the researcher and the KM team. That said, the rigour that went into the development of the processes, methods, and instruments was such that the company ultimately adopted the proposed framework as presented, notwithstanding the inability to complete the full research program as originally designed. The data collection effort and validation of the framework was suspended indefinitely; however, it is anticipated that the communities work will be restarted in the future once the company resumes a program of business improvement activities. In the interim, Cenovus has approved the findings and framework produced by this study, which have been adopted as the corporate process going forward. A letter from the company affirming its support and adoption of the work completed is attached at Appendix G.

Chapter 1 Summary

Collaboration communities can drive significant business value for companies; however, little research was found to demonstrate how to consistently establish efficacy within collaboration communities. Research parallels in the works of Wenger and Moore suggest that transactional distance theory, and its elements of structure, dialogue, and autonomy, can provide a theoretical foundation from which to derive a design and management model for corporate collaboration communities. The research presented in

this dissertation explains the learning theory, instruments, and practices developed to establish a new business process within Cenovus, and makes recommendations on subsequent implementation of this process.

Given the external global economic circumstances and the associated cessation / deferral of work regarding collaboration communities, the initial business objective of this effort – the establishment of a network of collaboration communities across Cenovus – could not be achieved within the planned time-frame of this study; however, the process and management framework was largely completed, and it is anticipated that additional validation will be provided through future community implementations and subsequent data collection and analysis. The initial management model adopted by Cenovus will serve as the basis for additional data capture and analysis going forward as the corporate work patterns normalize, and support a subsequent continuation of this research effort outside the timeframe of this study.

Glossary of Terms

The purpose of this glossary is to provide a common understanding of key terms that are used within this dissertation in the context of their meaning relative to this study and Cenovus Energy, the corporate sponsor for this work:

- **Behaviourist teaching**. Behaviourist teaching is used in training programs to induce standardized behaviours or understanding across a group of people, in accordance with an established practice, process, or standard. The predominant goal of the associated teaching activities is the successive approximations of the desired behaviour ("shaping" of behaviour), leading to consistent conformity of learner behaviours and/or action with respect to a specific action, policy, or

direction provided. Examples where behaviourist outcomes are preferable include safety, technical procedures, maintenance tasks, and policy adherence, where common performance outcomes are the primary objective;

- **Collaboration (Cenovus context).** Purposeful interactions between people and /or people with content designed to drive business impact through the enhanced creation, sharing and application of knowledge;
- **Collaboration Community.** A social and / or organizational construct used to support learning and collaboration between people with a shared purpose, professional field of expertise, or subject of interest to its members;
- **Communities of Practice.** These are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis (Wenger, McDermott, & Snyder, 2002);
- **Constructivist learning.** Constructivist learning activities seek to create new knowledge or practices by supporting a learner's "construction" of a new understanding, awareness, or skill within a given area of consideration. The goal is to create enhanced or "new" knowledge by combining information and prior knowledge with real-world experiences, thereby enhancing personal understanding and insights. Constructivist activities are often used to support critical thinking, complex problem-solving, innovation, and organizational learning objectives. Note that this definition aligns with Henriques' (1997) Information Processing view of constructivist learning;

- **Delphi Technique.** A data collection and analysis technique in which respondents work independently to pool their written ideas about a relevant issue, then are provided with a synthesized collective response from the group as the basis for additional analysis, which they subsequently submit. There is usually more than one round of assessment, with the view to obtaining consensus (Dixon & Harding, 1990);
- **Design-based Research.** Design-based research is a methodology that seeks to establish new theories and practices through the resolution of actual problems at the practitioner level; through a collaborative and iterative process that directly includes practitioners as research participants, problems are explored in a cyclical process that repeats until the participants are satisfied with the outcome, or an experimental result is determined where the proposed result is absent, or an otherwise expected effect does not occur;
- **Dialogue.** A component of transactional distance used to describe an interaction or series of interactions between people having positive qualities that other interactions might not have (Moore, 1997). Moore (1993) states that a dialogue is purposeful, constructive, and valued by each party, and that the direction of a dialogue in an educational relationship is towards the improved understanding of the student (p. 24);
- **Efficacy.** The power to produce a desired result or effect (Merriam-Webster, 2014). In the context of the study title, it refers to the capacity to deliver repeatable high-quality results within corporate collaboration communities;

- **Formal learning**. Formal learning is defined as activities undertaken by an educational, training, or corporate organization which follow a defined curriculum, lead to a recognized qualification, certification, or credential, and are intentional from both the organization's and learner's perspective. Formal learning is characterized by well-defined structures, learning objectives, content, and outcomes, and normally includes assigned instructional personnel;
- **Informal learning**. Informal learning is learning that results from daily life activities related to work, family, or leisure. It is not structured in terms of specific learning objectives, learning time, or learning support, and typically does not lead to certification by itself (note that some certification programs may combine both formal learning and on-job / on-task experience as requirements). Informal learning as an activity may be intentional at a very high level, but in most cases the learning outcomes themselves are non-intentional or pre-defined;
- **Iteration.** A procedure in which repetition of a sequence of operations yields results successively closer to a desired result (Merriam-Webster, 2014). Within this study, this will be reflected in the execution of multiple design-review-implement cycles for community activities that should lead to enhanced outcomes through progressive improvements;
- **Learner autonomy**. A component of transactional distance which refers to the ability and desire of the learner to direct or control their own learning activities and outcomes. Moore (1993) provides that it is the extent to which, in the teaching/learning relationship, it is the learner rather than the teacher who

determines the goals, the learning experiences, and the evaluation decisions of the learning programme (p. 31);

- **Non-formal learning.** Non-formal learning is defined as structured learning activities that are supported by an educational, training, or corporate organization, are intentional from either or both the organization's and / or learner's perspective, but do not lead to a formal qualification, certification, or credential. Non-formal learning is characterized by established program structures such as high-level learning objectives, learning time, or learning support, but with activities, content, and curriculum tailored to meet the situational needs of the organization or the learner;
- **Structure.** A component of transactional distance which expresses the rigidity or flexibility of the programme's educational objectives, teaching strategies, and evaluation methods. It describes the extent to which an education programme can accommodate or be responsive to each learner's individual needs (Moore, 1997); and
- **Transactional Distance.** Paraphrasing Moore (1997), transactional distance is a psychological and communication space between an instructor and learner(s) that creates a "potential for misunderstanding." This "space" can result from separations in distance, time, philosophy, culture, language, experience, and other factors.

CHAPTER 2 – REVIEW OF THE LITERATURE

A preliminary literature review was conducted to support the development of the study proposal. Four initial topic areas related to the proposed research questions were explored: contemporary corporate training challenges; categories of workplace learning types; communities of practice as a model for workplace learning; and transactional distance theory. A range of literature sources were examined in order to integrate multiple contexts and perspectives. These included:

- academic literature, journals, and dissertations;
- corporate white-papers and business journals; and
- reports from both government and non-government organizations.

The literature review first outlines the scope of training challenges in the O&G sector to highlight both the scale of the problems and some of the barriers that are leading to learning activities outside of formal training and development programs. Different categorizations of workplace learning types being adopted will be discussed in order to establish common perspectives that will be used within this study, following which communities of practice will be reviewed to highlight an existing model for learning in the workplace, using seminal works by Wenger and others as the basis for consideration. It will then provide a more detailed review of transactional distance theory and its elements of structure, dialogue, and autonomy to correlate the business challenges with established learning theory, and begin to set the potential foundation for a management model for collaboration communities.

Although numerous dissertations and journal articles were reviewed relative to the topic areas, specific qualitative or quantitative studies correlating learning

communities with transactional distance management in either corporate or academic environments were not found. Further, few detailed corporate studies were found that highlighted specific challenges or solutions implemented in a level of detail to support research findings of significance. As a result, the literature was reviewed primarily with respect to establishing the theoretical foundation for the proposed study, and not as a critique of specific prior research efforts.

Challenges in Corporate Training and Development Programs

In order to define the nature, scope, and scale of the learning challenges for O&G companies, literature was reviewed to outline the contextual backdrop for this study. This was an important positioning element for this study in terms of establishing the operational and theoretical foundations for the research, but also for considering the potential significance of the research to O&G companies, and highlighting the potential investment case to be made in support of additional research funding.

At a macro level, workforce challenges in the O&G sector are not limited to Alberta alone. Pyron (2008) provides:

> A survey by Ernst & Young and Rice University confirmed the extent of the struggle that companies have undergone to recruit, retain, and develop a sufficient number of employees in recent years. Nearly 90% of the senior human resources (HR) executives at 22 top international oil and gas companies believe their industry faces a talent void and call the problem one of the top five business issues facing their companies (p. 4).

More recently, The Economist Intelligence Unit (2012) reported:

> Last year, skills issues came fifth on our list of barriers and were only identified as a top-three issue by 25% of respondents. This year, the issue has risen to second on the list and has been identified as a key barrier by 34% of respondents (p. 20)

Specific to the Alberta oil and gas sector, the Alberta Department of Finance and Enterprise (2009) indicated that labour productivity in this sector declined by 10% between 2000 and 2007, and specifically noted:

- Labour shortages have been a barrier to growth in the sector and have raised business costs. In addition, a lack of qualified workers has likely contributed to the recent decline in labour productivity in the sector (p. 36); and
- A shortage of skilled labour, and lack of training and development infrastructure. Moreover, senior management and technical specialist ranks are significantly older than the average workforce and new graduate numbers are declining (p. 138).

In terms of industry impact costs, CRES (2008) cites a US oil and gas industry study that "…concluded that the US oil and gas industry lost between $4 and $5 billion US dollars in 2006 as a result of the skills shortage (p. 28).

While these references highlight significant impacts and costs arising from the lack of skilled workers with respect to lost productivity and lost revenues, the operational costs associated with trying to enhance the workforce are also significant. The 2011 Industry Report published by Training Magazine highlighted that total 2011 U.S. training expenditures jumped 13 percent to $59.7 billion; of that total, over $9 billion was spent externally by companies for training products and services (Training Industry Report,

2011). At a micro level, the training costs to individual global energy companies are also enormous: The Economist Intelligence Unit (2012) notes that vocational training is a key component of BP's[3] employment offering, with a $500 million annual budget earmarked for training and development purposes globally (p. 21).

In addition to monetary costs, businesses also face pressures of time and availability for people to participate in training programs; particularly during times when training costs more, many people are also receiving less of it. Surowiecki (2012) states that:

> In 1979, young workers received an annual average of two and a half weeks of training. By contrast, a study last year by the consulting firm Accenture found that only twenty-one per cent of the employees surveyed had received any training at all over the previous five years (p. 36).

Part of the challenge for companies investing large amounts of time and money in training programs is realizing a return on that investment. Strother (2002) indicates that formal corporate training remains effective to a large extent, with savings in time, effort, and cost realized by many organizations. Historically, however, the overall business value of corporate training being provided has been questioned. Bernhard and Ingols (1988) noted that in that year "…U.S. businesses would spend at least $30 billion to provide 17.6 million formal training development courses for their employees, and a

[3] BP plc is a global O&G company headquartered in London, United Kingdom. Relative to its investment in training and development, in 2011 it was the third-largest energy company in the world by revenue, and employed over 83,000 people (as of December 2011).

good portion of that investment will be thrown away" (p. 40) through ineffective training or training that did not support business goals and objectives. A further challenge with investing heavily in training and development is that the value is only fully realized if the people trained remain with the organization that trained them. A changing corporate trend in talent management over the past two decades – hire versus develop – has further changed the nature of investing in training programs. Although well-established training and development programs were the norm in the 1950s – 1970s (Cappelli, 2008; Surowiecki, 2012), these were normally based on well-defined career paths and succession plans within a stable workforce. By the late 1980s – 1990s, a shift in the available workforce led to more career-mobile workers who changed employers more frequently, often negating value of long-term development programs as the training investment by one company would more likely benefit their competitor than themselves over the longer term (Cappelli, 2008). This circumstance has become very pronounced during the economic downturn in Alberta in 2015 – 2016, as many O&G companies significantly reduced their employee and contractor workforce to respond to significant operating losses tied to the low price of oil (Statistics Canada [2016] noted that Alberta's natural resource sector lost over 28,000 jobs in 2015, along with tens of thousands of construction sector jobs). For these companies, all of these departures reflect significant investments in employee development programs that will not provide them with any return on that investment.

Additionally, the concept of outsourcing for talent has created its own challenges, as noted by Cappelli (2008): "Companies found they were attracting experienced candidates and losing experienced employees to competitors at the same rate. Outside

searches became increasingly expensive, particularly when they involved head-hunters, and the newcomers blocked prospects for internal promotions, aggravating retention problems" (p. 2). Additionally, formal programs may not be appropriate as a vehicle for rapid workforce development: they cost too much, take too long, and pull workers away from their primary duties which further impacts their productivity. A further challenge with formal learning programs is that the O&G industry is faced with an accelerated pace of change with respect to scientific processes, operational technologies, and regulatory requirements; this pace of change is frequently not conducive to long development and delivery cycles associated with formal programs. O&G companies face both an immediacy of the problem in terms of needing to reduce time-to-competency of new workers, as well as reducing the time to develop new learning programs and materials. This has led many companies to explore the virtue of less-formal workplace learning models as viable alternatives or augmentations to formal corporate training and development programs (Wenger, 1998; Cofer, 2000; McDermott & Archibald, 2010).

Against this backdrop of increasing cost, challenges in realizing business value, changing employee demographics, and changing operational demands, the delivery of training and development programs has also changed significantly as companies try to adapt to emerging trends and learner demographics. For example, 73% of all training in the year 2000 was delivered by an instructor in a classroom, 6% was delivered by an instructor at a remote location, 13% was delivered by independent computer-based study, and 9% by other means (Galvin, 2002). In the 10 years that followed, there was a significant shift away from classroom training as the predominant delivery method as noted in the table below (a decrease of approximately 30%); however, the delivery trends

noted over the past five years for companies of Cenovus' size indicate little significant expansion year-over-year in the use of mobile or social learning in the workplace as a core element. Although ample mobile and social learning platforms and technologies are available in the modern workplace, sufficient corresponding effort and investment into changing delivery methodologies have not yet been made to capitalize upon these emergent capabilities – hence the need for adapted corporate learning models such as that being explored by this study. An outline of the training delivery trends for corporate learning programs is provided in the table below.

Table 1. Training Delivery Trends for Mid-Size Companies Between 2011 - 2015

Training Delivery Element	2011[a]	2012[b]	2013[c]	2014[d]	2015[e]
Percentage of training hours delivered via Blended Learning (combining the methods listed below)	24.1%	26.4%	25.3%	26%	30.5%
Percentage of training hours delivered via Instructor-led Classroom Only	44.4%	45.1%	41.8%	47.3%	43.4%
Percentage of training hours delivered via Virtual Classroom / Webcast Only (remote instructor)	10.0%	12.4%	15.4%	12.4%	14.1%
Percentage of training hours delivered via Online / Computer-based Methods Only (no instructor)	20.1%	24.4%	26.7%	25.5%	29.6%
Percentage of training hours delivered via Mobile-technologies Only	0.2%	1.5%	1.9%	1.7%	1.1%
Percentage of training hours delivered via Social Learning Only	0.7%		2.9%	4.9%	4.4%
Training Staff per 1,000 employees	12.2	18.6	13.1	12.4	5.8

Note. All table data was sourced from Training Magazine's annual Industry Reports to ensure consistency of method and data presentation within the comparison; links to each report are provided in the References. Midsize companies are defined within the reports as those between 1,000 and 4,999 employees.

[a]Training Industry Report (2011)

[b]Training Industry Report (2012)

[c]Training Industry Report (2013)

[d]Training Industry Report (2014)

[e]Training Industry Report (2015)

As seen in the table, social learning remains a small part of contemporary corporate learning programs. The Training Industry Report (2015) further noted that only 25% of the 777 total respondents for the survey reported using social learning to

some extent (30% of the total respondents were small companies [100 – 999 employees]; 41% were mid-size companies [1,000 – 4,999 employees]; and 29% were large companies [10,000 or more employees]).

In exploring alternatives to classroom-based teaching, research demonstrates the effectiveness of online learning. For example, Yaw (2005) demonstrated no statistical difference in transfer of learning at Kirkpatrick Level 3 (the level at which change in behaviour has occurred because the participant attended the training program [Yaw, 2005, p.52]) between e-learners and classroom learners; however, this shift in delivery modality reduces the direct relationships between learners and their instructional inputs, and can contribute to the creation of "transactional distance" as a constant in many corporate distance learning programs.

As outlined by Moore (1997), and explained in greater detail below, transactional distance is a psychological and communication space between an instructor and learner(s) that creates a "potential for misunderstanding." This "space" can result from separations in distance, time, philosophy, culture, language, experience, and other factors. Gysel & Krinock (2004) noted that an increase in transactional distance may lead to reduced effectiveness within learning activities; as such, an inability to manage transactional distance with corporate learning programs could further undermine value realization of these programs to the business.

In summary, the literature indicates that the Alberta O&G industry faces diverse and significant challenges with respect to training and development:

- there is a significant shortage of skilled workers in this industry regionally, nationally, and globally;

- the shortage of skilled workers is impacting negatively on productivity, and represents sizable losses of billions of dollars in potential revenue;
- the cost of developing skilled workers has increased significantly, and not all training programs produce a tangible return on investment for companies providing the training;
- providing extensive training programs for employees can be cost effective compared to hiring skilled workers, but only if the trained workers remain with the company that trained them;
- formal training programs are being augmented or replaced with alternative forms of workplace learning in order to offset time and resource constraints; and
- shifting trends in training delivery and workplace learning technologies reflect viable alternatives to classroom-based programs, however these changes also increase the transactional distance for learners and may impact negatively on learning and performance outcomes.

Collectively, the nature of these challenges creates a potential conundrum: legacy programs and delivery models are increasingly costly and do not necessarily provide best value to business; however, changing methods and delivery models may increase both complexity and transactional distance, and ultimately have a negative impact on learning outcomes. The next section of the literature review will provide an overview of different types of workplace learning to contextualize a continuum of learning activities, and contribute to the rationale as to why this research is important to Cenovus.

Categorizing Types of Workplace Learning

As outlined above, a range of different learning activities is being explored in the workplace as alternatives or augmentations to formal classroom-based learning programs. In order to provide a common understanding and perspective for the proposed research, literature was reviewed to determine different categorizations of workplace learning and establish a common definition set for use in the study.

Ample literature supports a perspective that the workplace is a viable and rich environment for learning (for example, see Boud, 1999; Engestrom, 2001; Eraut, 2004). However, the workplace is not a homogenous environment within which all learning is seen as equally valuable. As noted by Billet (2001):

> On the one hand, there is a valuing of the authentic experiences that workplaces provide for the development of the vocational knowledge needed for work. On the other hand, workplaces are characterised as being 'informal' learning environments that fail to provide coherence in the structuring of learning experiences, are devoid of access to instructional episodes and lead to piecemeal, concrete and situationally specific learning outcomes. (p. 3)

Part of the challenge in establishing a commonly recognized value proposition for learning in the workplace is that the definitions such as "informal learning" and "workplace learning" have not been well defined or commonly accepted. Citing their earlier work from 1990, Marsick and Watkins (2001) provide the following:

> Formal learning is typically institutionally sponsored, classroom-based, and highly structured. Informal learning, a category that includes incidental learning, may occur in institutions, but it is not typically classroom-based or highly

> structured, and control of learning rests primarily in the hands of the learner. Incidental learning is defined as a by-product of some other activity, such as task accomplishment, interpersonal interaction, sensing the organizational culture, trial-and-error experimentation, or even formal learning. Informal learning can be deliberately encouraged by an organization or it can take place despite an environment not highly conducive to learning. Incidental learning, on the other hand, almost always takes place although people are not always conscious of it (p. 25)

The Education Development Centre (1998) provides a different characterization between formal and informal learning, largely based on alignment of outcomes:

> Formal learning occurs when the organization has an explicit goal (e.g. An organization wants its workers to learn to operate a new machine) and the process is formal (e.g. it sends workers to learn about the machine in a classroom with an instructor and a manual). Informal learning occurs any time the learning process is informal (i.e. not determined by the organization, whether or not the learning is in pursuit of an organizational goal) (p. 36)

The Education Development Centre (1998) further highlights two circumstances which further delineate informal learning based on goals and processes:

- Organizational Goal / Informal Process. An example of a case where the organization has a formal goal, yet learning happens informally is the situation in which the organization wants the employee to learn the pragmatics of the job by a certain date without a formal learning process. In this case, the new employee may pair up with a more senior employee in a

mentoring relationship and get help finding resources, understanding the task parameters, etc. Although the organization has defined the goal of the learning, it has not defined the process. The individuals involved determine how learning takes place. Consequently, the learning itself is informal (p. 36)

- No Organizational Goal / Informal Process. Informal learning also occurs when the organization does not have a specific goal for learning to take place. For example, individuals may broaden their knowledge without any prompt from management by observing operations in other work areas. Employees may socialize with co-workers and, in the process, learn more about production procedures (p. 36)

Stating that the term "informal" was too broad and situationally relevant to be an appropriate counter-point to formal learning, Eraut (2000) proposed a typology for "non-formal" learning which incorporated implicit learning that gives rise to tacit knowledge, as well as reactive learning, which is near- spontaneous and unplanned, and deliberative learning (p. 115) (note that implicit learning is defined as "the acquisition of knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired" [Reber, 1993, p. 5]).

Colley, Hodkinson, and Malcolm (2002) also sought to provide clarity across literature to better distinguish between formal, informal, and non-formal learning, and provided the following definitions from the European Commission's 2001 *Communication on Lifelong Learning* for formal, non-formal and informal learning:

- Formal learning: learning typically provided by an education or training institution, structured (in terms of learning objectives, learning time or

learning support) and leading to certification. Formal learning is intentional from the learner's perspective;

- Non-formal learning: learning that is not provided by an education or training institution and typically does not lead to certification. It is, however, structured (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner's perspective; and
- Informal learning: learning resulting from daily life activities related to work, family or leisure. It is not structured (in terms of learning objectives, learning time or learning support) and typically does not lead to certification. Informal learning may be intentional, but in most cases it is non-intentional (or "incidental"/ random).

Notwithstanding the lack of consensus on specific definitions, an inference can be drawn from the literature that forms of learning apart from formal learning are a key component of workplace learning; Cofer (2000) noted that the research supports informal learning not as a replacement for formal activities, but as a complement to them within the workplace (p. 3). It can also be considered that these alternative categories of learning may be differentiated by their degree of structure, learner autonomy, and the assignment of learning objectives (i.e. organizationally, personally, or non-intentionally).

In summarizing this section, the following categorizations will be used in the context of corporate learning for the purpose of this study:

- *Formal learning*. Formal learning is defined as activities undertaken by an educational, training, or corporate organization which follow a defined curriculum, lead to a recognized qualification, certification, or credential, and

are intentional from both the organization's and learner's perspective. Formal learning is characterized by well-defined structures, learning objectives, content, and outcomes, and normally includes assigned instructional personnel;

- *Non-formal learning*. Non-formal learning is defined as structured learning activities that are supported by an educational, training, or corporate organization, are intentional from either or both the organization's and / or learner's perspective, but do not lead to a formal qualification, certification, or credential. Non-formal learning is characterized by established program structures such as high-level learning objectives, learning time, or learning support, but with activities, content, and curriculum tailored to meet the situational needs of the organization or the learner. Non-formal learning also has a reduced reliance on formal instruction / instructors as a mechanism for knowledge transfer. For example, mentoring is a type of non-formal learning that may follow common program guidelines and broad organizational objectives, but is tailored to meet the needs of the mentee or protégé; and
- *Informal learning*. Informal learning is learning that results from daily life activities related to work, family, or leisure. It is not structured in terms of specific learning objectives, learning time, or learning support, and typically does not lead to certification by itself (note that some certification programs may combine both formal learning and on-job / on-task experience as requirements). Informal learning as an activity may be intentional at a very high level, but in most cases the learning outcomes themselves are non-

intentional or pre-defined. For example, a worker may be assigned to a job rotation in order to enhance their skills or abilities in a particular area; while the job assignment would be a "programmed" or intended action, there would be little capacity to predict or derive specific learning outcomes that may result from simply working in an unstructured environment for learning.

Notwithstanding the establishment of clarity between these terms, it must be reinforced that formal and non-formal learning are structured *activities* intended to create learning outcomes, while informal learning is predominantly a *learning outcome* in itself that occurs through the conduct of activities. As such, informal learning will frequently occur as part of or in parallel to formal and non-formal learning activities, in addition to occurring outside of structured learning activities. In the context of this study, non-formal and informal learning are frequently listed together for consideration, given non-formal learning speaks to activities with intended learning outcomes, and informal learning speaks to learning outcomes that may arise in addition to the planned outcomes. This is an important consideration when planning any learning activity, as the potential for unintended learning outcomes must be considered during the design process to either foster benefit or mitigate risks of associated informal learning.

With respect to this study, part of the gap in the current research is that while types of learning may be distinguished by elements such as structure, intent, and who provides the learning, the research does not provide linkages between these elements and learning outcomes. For example, models could not be found that highlight how changing the variable of structure in non-formal learning environments specifically improve or degrade learning outcomes. The absence of defined models and frameworks is a key

contributor to the lack of successful adoption of non-formal and informal learning programs within O&G companies. Specific to Cenovus, it has been recognized that past efforts in this area were not successful, in large part due to ad hoc individual approaches that were not grounded in established practice or learning theory. As such, this study was endorsed as a means to develop a new practice grounded in an analytical, structured, and repeatable process framework.

At the practitioner level, models, practices, and activity design parameters must be developed that allow for repeatable, scalable, and measurable applications of theory that support enhanced learning and performance outcomes. One such model for workplace learning that can support both non-formal and informal learning is the "community of practice," which is explored in the next section.

Communities of Practice as a Framework for Workplace Learning

The rise of alternative forms of learning in the workplace has resulted in ample effort to define effective associated structures and processes; one concept model that has developed from this effort is the community of practice. This section will provide an overview of research into this concept model, and highlight characteristics of structure, autonomy, and knowledge exchange that may align to the corporate challenges of transactional distance within formal, non-formal, and informal learning programs.

Wenger and Snyder (2000) briefly defined a community of practice as "…groups of people informally bound together by shared expertise and passion for a joint enterprise" (p. 139). The specifically indicated structural concept of these communities being "informally bound" was further articulated by Wenger (1998):

> Members of a community are informally bound by what they do together—from engaging in lunchtime discussions to solving difficult problems—and by what they have learned through their mutual engagement in these activities. A community of practice is thus different from a community of interest or a geographical community, neither of which implies a shared practice. A community of practice defines itself along three dimensions:
>
> - *What it is about* – its *joint enterprise* as understood and continually renegotiated by its members;
> - *How it functions* – the relationships of *mutual engagement* that bind members together into a social entity; and
> - *What capability it has produced – the shared repertoire* of communal resources (routines, sensibilities, artifacts, vocabulary, styles, etc.) that members have developed over time (p. 2).

From the description above, it can be understood how communities of practice can bind together informally. Wenger (2000) stated that communities of practice depend on internal leadership, and enabling the leaders to play their role is a way to help the community develop (p. 231). Wenger and Snyder (2000) provided that "…it's not particularly easy to build and sustain communities of practice or to integrate them with the rest of an organization. The organic, spontaneous, and informal nature of communities of practice make them resistant to supervision and interference" (p. 140).

This should not be perceived to mean, however, that communities of practice do not have or need formalized structures; simply that their structures are based on primarily on its people internally, and not on rigid external processes or models. More recent

research into community-based learning has provided an enhanced understanding of communities themselves with respect to interactions and functions, and how to create and support them with specific design processes and structure (Wenger, McDermott, & Snyder, 2002; Cambridge, Kaplan, & Suter, 2005; Mahar, 2007). This has led to a deeper understanding of where communities of practice can support learning, as well as the potential business value proposition to company stakeholders. McDermott and Archibald (2010) note that: "though in-house networks of experts—or "communities of practice"— were once entirely unofficial, today they are increasingly integrated into companies' formal management structures" (p. 2). They subsequently provide that "unlike the independent and self-organizing bodies we saw years ago, today's communities require real structure. Though we once envisioned few rules, we have since identified four principles that govern the design and integration of effective communities…" (p. 3), which are summarized below:

- *Focus on issues important to the organization.* Sustainable communities tackle real problems that have been defined by senior management (p. 3).
- *Establish community goals and deliverables.* Rather than inhibiting the exchange of ideas and information, formal goals and deliverables energize communities. They provide a focus—a reason to meet and participate. More important, they establish the contribution of communities to the organization (p. 4).
- *Provide real governance.* To be well integrated into the organization, communities, like teams, need strong, formal relationships with the organization's top leadership (p. 5).

- *Set high management expectations.* However intangible, management's expectations have a strong influence on communities, just as they do on teams. Senior managers' sponsorship is useless if they're not genuinely engaged with the communities (p. 5).

This shift in thinking over the past decade now highlights a dynamic balance of elements within communities that must be established and maintained in order to create both learning and business value: leadership and independence by participants to define their own goals and activities; and processes, structures, and support mechanisms that align learning outcomes with organizational needs. Following a detailed examination of workplace learning research, LeClus (2011) provides that the quality of learning depends on the kind of activities engaged in, access to support, guidance and how co-workers constructed their knowledge of different situations (p. 358), citing Billett (2001, p. 21):

> … these factors influence the process of learning and what is learnt. In doing so, they reflect the interdependence between work and learning, providing a basis to consider not only the contributions of the workplace as a learning environment, but also how the workplace might be organized to improve learning.

Even though it has broad support in academic literature, learning in the workplace should not be viewed as a panacea; a number of articles have also been published that caution against assumptions that all workplace learning has value. Kleiner and Roth (1997) note that "…in corporate life, even when experience *is* a good teacher, it's still only a private tutor. People in organizations act collectively, but they learn individually" (p. 3). Hansen (2009) makes a similar caution:

> Internal collaboration is almost universally viewed as good for an organization. Leaders routinely challenge employees to tear down silos, transcend boundaries, and work together in cross-unit teams. And although such initiatives often meet with resistance because they place an extra burden on individuals, the potential benefits of collaboration are significant: innovative cross-unit product development, increased sales through cross-selling, the transfer of best practices that reduce costs. But the conventional wisdom rests on the false assumption that the more employees collaborate, the better off the company will be. In fact, collaboration can just as easily undermine performance" (p. 2).

Specific examples of how collaboration can have a negative impact on performance are provided by Surowiecki (2004), and Sunstein (2006). Surowiecki (2004) provided a detailed examination of "the wisdom of crowds," illustrating how statistical models have been validated that highlight high levels of accuracy and aggregated problem solving through polling of large populations of individual people. However, he also noted the challenge in assuming that all crowds or collaborative efforts will have that same level of value:

> If you ask a large enough group of diverse, independent people to make a prediction or estimate a probability and then average those estimates, the errors each of them makes in coming up with an answer will cancel themselves out. Each person's guess, you might say, has two components: information and error. Subtract the error, and you're left with the information. Now, even with the errors canceled out, it's possible that a group's judgment will be bad. For the

> group to be smart, there has to be at least some information in the "information" part of the "information minus error" equation (p. 10-11).

This is reinforced by Sunstein (2006), who cautions:

> But for those who embrace crowd wisdom…, there's an important qualification... Suppose that each individual in a group is more likely to be wrong than right because relatively few people in the group have access to accurate information. In that case, the likelihood that the group's majority will decide correctly falls toward zero as the size of the group increases (p. 1).

Particularly relative to this study, given the corporate context of a distributed and diverse workforce, Gray (2004) added a further nuance to the discussion of communities of practice and their business value by considering distance and online activities:

> Although some online learning communities thrive, many fail to live up to the "great expectations" of their sponsors or providers. It is important that we increase our understanding of the functions online communities can serve in an organization and what factors influence learning and participation in these voluntary contexts (p. 21).

Given the inconsistency of success within collaboration communities, mechanisms must be established to allow for measuring success or its absence, such that improvements can be made, or value assessed. Wenger, Trayner, & de Laat (2011) distinguish five cycles of value creation:

- Cycle 1 – Immediate value for participants from activities and interactions that directly support or reward the participants themselves, such as getting an

answer to a question, a solution to a problem, or help with a challenge, or cooperating on seeking innovative approaches (p. 19).

- Cycle 2 – Potential value, where activities and interactions can create "knowledge capital" where the value may be realized at a later time, such as learning from a participant's experience of what to do, or not to do, during an incident (p. 19).
- Cycle 3 – Applied value, where the application of knowledge capital can result in changes or innovations in actions, practice, tools, approaches, or organizational systems (p. 20-21).
- Cycle 4 – Performance improvement, where the effects of applying new ideas to practice or the use of resources from the community are analyzed to determine any improvements in performance (p. 21).
- Cycle 5 – Reframing value, when social learning causes a reconsideration of the learning imperatives and the criteria by which success is defined (p. 21).

In considering these cycles, they further note:

> While there are causal relationships between the various cycles, it is important not to assume a hierarchy of levels or a simple causal chain. First, learning is not a linear process with distinct phases of production and application of knowledge. When practitioners themselves produce and use knowledge, learning is a dynamic process in which producing and applying knowledge are tightly intertwined and often indistinguishable. Second, it is not the case that one cycle necessarily leads on to the other, or that a community or network is only successful if it reaches the final cycle. Different aspects are likely to be important to different stakeholders.

> Facilitators may be more interested in successful activities or the production of outputs (cycles 1 and 2). Members might care about solutions to challenges in their practice (cycle 3) and definition of success (cycle 5). Managers might be most interested in performance (cycle 4). Still these five cycles taken together provide a dynamic framework of aspects of value creation to consider (p. 21).

In assessing value creation within a community or network Wenger, Trayner, & de Laat (2011) provide the following series of questions for participants to reflect on value produced:

- Cycle 1 – Immediate Value: *What happened, and what was my experience of it?*
- Cycle 2 – Potential Value: *What has all this activity produced? How has my participation changed me? How has my participation changed my social relationships? What access to resources has my participation given me? What position has the community acquired? How has my participation transformed my view of learning?*
- Cycle 3 – Applied Value: *What difference has it made to my practice / life / context?*
- Cycle 4 – Realized Value: *What difference has it made to my ability to achieve what matters to me or other stakeholders?*
- Cycle 5 – Reframing Value: *Has it changed my or other stakeholders' understanding and definition of what matters?*

Although they provide further sub-questions for each cycle, these framing questions alone illustrate that the assessment of value through this framework is made from the perspective of the participants themselves, and not through external observations. As

will be detailed subsequently, this context was a key contributing factor to the selection of the Delphi technique for data collection within the study, given the need to assess value through the perceptions of the participants, and potential changes in their perceptions over the duration of the study.

In summary, ample research on communities of practice can provide a starting point for exploring a model for enhanced non-formal and informal workplace learning. In consideration of the definitions provided for workplace learning in the previous section, it is important to note the alignment of communities of practice to these categories as follows:

- Non-formal learning. A community of practice aligns to this category when it is established following a structured process or method, is aligned to organizational objectives, and is intended to support common learning outcomes across the audience. Participation in a community of practice does not normally follow prescribed curriculum, and will not normally result in a formal certification; however, the design and moderation of associated activities are intended to support an assessment of learning or business outcomes at the collective / group level; and
- Informal learning. For community members, informal learning will likely result from collaboration within a community of practice in addition to the intended outcomes. Engagements with other community members, individual synthesis of content and discussions, and alignment to personal experience may lead to ideas and conclusions that may not be shared with the group, may fall outside of the scope of the community, or may be relevant to the community itself, while having

value in another context or situation. The learning that arises in this fashion will likely be easily articulated or assessed, and may only present itself to the community leaders through inference or indirect evaluations.

Due to the difficulty in assessing learning outcomes within a community given the absence of formal curriculum and standardized assessment vehicles, alternative forms of evaluating learning and value outcomes must be considered in order to assess efficacy of the community as a workplace learning activity. The literature suggests that the effectiveness of communities with respect to workplace learning is related to three key aspects:

- the nature of how the communities are structured;
- the independence of the learners within the community; and
- the information available to, and understood by, the people themselves

The literature also indicates that the determination of value within a community can be assessed through the perspective and perceptions of its participants, which was a key contributing factor in the design of the study.

Transactional Distance and its Influence on Learning.

As noted earlier, the challenge of overcoming complex instructional and learning needs involving a separation of distance and time between learners and teachers is not new with the field of distance education. Established in the 1970s, Moore's theory of "transactional distance" began to model the nature of the inter-play between teachers and learners as a foundational element of distance education. Moore (1991) highlights an important postulate:

> …when we talk about distance education we are referring to a distance that is more than simply a geographic separation of teachers and learners. It is a distance of understandings and perceptions, caused in part by the geographic distance, that has to be overcome by teachers, learners, and educational organizations if effective, deliverable, planned learning is to occur (p.2).

Moore (1991) further notes that there is some transactional distance in *any* educational program, even where learners and teachers meet face-to-face, and that "the relative nature of transactional distance means also that within the subset of educational programs that we call distance education programs there are many different degrees of transactional distance" (p. 3).

Moore (1997) further clarifies the articulation of transactional distance with the addition of the following context:

> The transaction that we call distance education occurs between teachers and learners in an environment having the special characteristic of separation of teachers from learners. This separation leads to special patterns of learner and teacher behaviours. It is the separation of learners and teachers that profoundly affects both teaching and learning. With separation there is a psychological and communications space to be crossed, a space of potential misunderstanding between the inputs of instructor and those of the learner. It is this psychological and communications space that is the transactional distance (p. 22).

Moore & Kearsley (2005, p. 224) note the following characteristics of Transactional Distance:

- It is a continuous rather than discrete variable; a program is not either distant or not distant, more distant or not distant;
- Transactional distance is relative rather than absolute;
- There is some transactional distance in every educational event, even in those in which teachers and learners met face-to-face in the same space;
- Transactional distance is more prevalent in distance education as the separation of the teacher and learner is so significant as to affect their behaviours in major ways; it affects how teachers plan, present content, interact, and perform the processes of teaching in significantly different ways from the face-to-face environment; and
- Transactional distance in a learning activity makes special organizational and teaching behaviours essential; how special will depend on the degree of the transactional distance.

As detailed by Moore (1993), transactional distance is composed of two dynamic variables that comprise the "distance" for a given program:

- Dialogue. The term "dialogue" is used to describe an interaction or series of interactions having positive qualities that other interactions might not have. A dialogue is purposeful, constructive and valued by each party. Each party in a dialogue is a respectful and active listener; each is a contributor, and builds on the contributions of the other party or parties. There can be negative or neutral interactions; the term "dialogue" is reserved for positive interactions, with value placed on the synergistic nature of the relationship of the parties

involved. The direction of the dialogue in an educational relationship is towards the improved understanding of the student; and

- Structure. Structure expresses the rigidity or flexibility of the programme's educational objectives, teaching strategies, and evaluation methods. It describes the extent to which an education programme can accommodate or be responsive to each learner's individual needs.

A third interconnected element of transactional distance theory introduced subsequent to the original two variables of dialogue and structure is that of learner autonomy. Moore (1984) stated:

> In the context of a programme, the term learner autonomy describes the extent to which in the learning-teaching relationship, it is the learner rather than the teacher who determines the goals, the learning procedures and resources, and the evaluation decisions of the learning programme. (p. 85)

Moore and Kearsley (2005) provided that this element recognizes that learners have different capacities for making decisions regarding their own learning, and the degree to which different learner behaviours exist is an important consideration in program design.

It is generally acknowledged in the literature that the degree to which a program can address these variables and minimize transactional distance has a positive impact on learner performance, as the higher the transactional distance, the greater the potential for misunderstanding (Moore, 1894, 1993, 1997; Moore & Kearsley, 2005; Rabinovich, 2009). This has not been consistently validated, however, and many authors provide qualified or generalized statements of relationship. For example, Gysel and Krinock (2004) provided that "…learning techniques involving minimal transactional distance

seem to be generally more effective" (p. 145), which provides a perception of a relationship, and not a definitive statement. This ambiguity is more clearly highlighted by Cleveland-Innes and Ally (2004) who noted that "…the impact on learning outcomes of close versus remote transactional distance is unclear" (p. 20). This gap in clarity regarding transactional distance was also highlighted by Gorsky and Capsi (2005) who found that "Despite the considerable time span over which the theory has been evolving, very few researchers have carried out empirical studies to test the validity of its key constructs and, especially, the relationships among them" (p. 3). As stated by Garrison (2000) with respect to transactional distance:

> Clearly, Moore's work remains one of the most appealing and well known theories of distance education. Yet, more macro-level theoretical work is required that goes beyond simply refining this promising and appealing theory (Moore & Kearsley, 1996). Future work might focus on the interrelationship amongst the variables / concepts of dialogue, structure and autonomy (p. 9).

As if to illustrate this point, dissertations by Pruitt (2005) and Shearer (2009) respectively explored the relationships between transactional distance and learner autonomy, and transactional distance and dialogue. They highlight a multitude of studies that illustrate the presence of the transactional distance elements of dialogue, structure, and autonomy within learning programs, yet collectively do not provide definitive evidence or findings that would support a singular, concrete model for transactional distance and its function and management in learning programs.

A key potential gap in the consideration of transactional distance is that much of the literature focuses on the creation of "misunderstandings" or "miscommunications" as

originally perceived by Moore. These word choices by themselves imply a negative effect that subsequently needs to be "overcome" in order to support positive learning outcomes; however, as noted above, definitive studies have not been produced that resolve questions regarding cause and effect between transactional distance and learning outcomes. Giossos, Koutsouba, Lionarakis, and Skavantzos (2009) provided an alternative perspective:

> …one could support that transactional distance in distance learning should be defined exclusively as "the distance in understanding between teacher and learner", and not as "the psychological and communication space between the two". The question that rises at this point is to what understanding refers to. Understanding refers to mutual understanding (co-understanding). In the vernacular, the phrase 'you don't understand me' or 'you're not following me' is commonly used to stress the lack of mutual understanding or common perception of ideas, emotions, situations, etc. Transactional distance, therefore, is nothing more than the lack of common or mutual perception of knowledge, thoughts, approaches but also needs (psychological and educational), emotions, etc (p. 3).

This definition provides a much more neutral perspective of transactional distance, and enables a more objective approach to exploring its dynamics. Using the context of realism to position transactional distance within an epistemological framework, Giossos et al. (2009) offered that "…science investigates actions, which, through mechanisms, produce results under certain conditions. From this point of view, transactional distance is one of the results of teaching (action), and structure, autonomy and dialogue are mechanisms of transactional distance" (p. 4).

In summary, the literature illustrates ample research has validated the nature of transactional distance and its elements of dialogue, structure, and learner autonomy, and that:

- Transactional distance is more prevalent in distance education as the separation of the teacher and learner is so significant as to affect their behaviours in major ways;
- Transactional distance in a learning activity makes special organizational and teaching behaviours essential;
- the impact on learning outcomes of close versus remote transactional distance is unclear; and
- little definitive work has been produced that addresses the management of the elements of transactional distance as a means to enhance learning impacts.

It has been suggested that further research is required to fully appreciate the mechanics of transactional distance, and understand how these mechanics can be applied to enhance learning outcomes (Garrison, 2000; Cleveland-Innes & Ally, 2004; Gorsky & Capsi, 2005; Giossos et al., 2009). Combined with the need to address the specific nature of emergent corporate learning environments prone to transactional distance, a targeted research effort and method will be required to address both continued theoretical development as well as the operational needs of the research partner.

Literature Review Summary

As outlined in this review, extensive business literature highlights both the scope and magnitude of training and development challenges within the O&G industry with respect to money, time, and effort. Continued investment in formal programs has grown

in cost while potentially shrinking in value, as career-mobile workers shift employers more often, frequently making the return on investment from training by one organization to the benefit of a competitor, and not the training organization. Although the advent of technology-enabled learning environments provides new opportunities to enhance learning programs and outcomes, there is insufficient development and implementation of the methodologies, practices, and polices within many organizations that would achieve the potential that is perceived. As a result, shifting trends in training delivery and workplace learning technologies away from classroom-based programs may also increase the transactional distance for learners, and ultimately impact negatively on learning and performance outcomes.

Complementing formal training through non-formal and informal workplace learning is a trend that has been seen as valuable by many authors; however, there is ample literature that highlights poor learning outcomes when the learning is not supported appropriately. *Communities of Practice* is one model for supporting less-structured learning in the workplace that has seen growing adoption over the past decade; again, however, much of the literature deals with the philosophical nature of the communities, and not standardized practices to support large scale implementation across multiple industry fields. This represents a potentially significant gap in the research to support further adoption of informal / non-formal learning programs within corporate learning environments. Additional research needs to provide sufficient rigour to support a replicable, scalable, and well-structured model that corporations can apply with purpose in order to achieve specific learning and performance outcomes.

Research in transactional distance theory describes the elements of dialogue, structure, and autonomy that could be applied to workplace learning programs to support intended learning outcomes. Understanding the dynamics of each of these elements within specific workplace learning activities, and their linkages to specific learning and performance outcomes, would provide the basis for a new corporate learning model. However, there has been insufficient direct research into the dynamic interactions these elements can have with respect to learning outcomes. Additional research is required to develop a model for the management of transactional distance appropriate to a contemporary, dynamic, and distributed corporate workforce.

Key elements from the literature review that contribute specifically to the theoretical framework for this study are as follows:

- Non-formal learning programs are required to enhance corporate development efforts within Cenovus and other O&G companies. These programs need to be structured and aligned to organizational objectives, yet tailored to meet the situational needs of the organization or learner;
- Communities of Practice can be utilized as a construct to support non-formal learning activities, with the literature indicating that the effectiveness of communities with respect to workplace learning is related to three key aspects:
    - the nature of how the communities are structured;
    - the independence of the learners within the community; and
    - the information available to, and understood by, the people themselves;

- Value creation within Communities of Practice can be assessed based on the perception of the respective participants;
- Transactional distance is present in every learning activity as a discrete and continuous variable. The impact of transactional distance on learning outcomes is unclear with respect to the manipulation of its core elements of structure, dialogue, and autonomy; however, these elements align very well with the three variable aspects that affect the effectiveness of communities listed above; and
- Independently, the theories for Communities of Practice and Transactional Distance appear incomplete in supporting the objectives if this study. While the work of Wenger provides ample examination of the process elements to establish, operate, and evaluate a community of practice, it does not provide specific insights into how to manage discrete activity variables to support an improvement in efficacy. Similarly, while the work of Moore provides ample theory on transactional distance and its elements, it is unclear as the how the manipulation of the elements leads directly to resultant changes in learning outcomes. Together, these two bodies of work provide ample articulation on the process and outcomes that may be derived from learning activities, but not the mechanics of the interplay between the key elements that can support intended changes in outcomes. This gap is explored in greater detail in the next section.

CHAPTER 3 – THEORETICAL FRAMEWORK

The potential alignment of theory between Wenger's research on communities of practice and Moore's theory of transactional distance provided the following premise for this dissertation: the perception of value and effectiveness of Communities of Practice can be affected by the manipulation of how they are structured, how the dialogue between participants is fostered and contributes to collaborative efforts, and the degree to which the participants' autonomy allows them to shape the community. It was therefore proposed that the management of transactional distance through a controlled manipulation of structure, dialogue, and autonomy could support the deliberate reduction or creation of a difference in understanding to align to business objectives within corporate collaboration communities. Provided this premise could be validated, the extent to which this difference in understanding impacted on learners and the learning/teaching program either positively or negatively, and to which these outcomes could be replicated consistently across multiple communities, would provide a basis for the creation of a validated management framework.

In consideration of different objectives across a number of collaboration communities, and hence differences in levels of transactional distance relative to their intended outcomes, communities can be visualized along a continuum of transactional distance levels and influences that would shape how a community was designed and supported. Building upon the earlier example in considering a community focused on workplace safety, it was suggested that any difference in understanding on safety practice and policy could increase operational risk, and hence an associated collaboration community would benefit from very low transactional distance. Accordingly, this

community could benefit from high structure to provide clear alignment to objectives, outcomes, and organizational influences; controlled dialogue to ensure that the correct messages were communicated, and that the information provided and discussed was accurate; and low participant autonomy, as the key safety messages and outcomes would not be open to interpretation by individual community members. With tight control over the elements of structure, dialogue, and autonomy, the objective would be to minimize any differences in understanding corporate safety practices and behaviours. Conversely, at the other end of the continuum, a community focused on innovation and new business practice would likely benefit from much higher transactional distance, as differences in understanding, perspective, and opinion on current technologies and practices would be much more likely to foster improvements than if everyone had the same understanding, and ideally support much more constructivist learning-based activities within the group. This community could benefit from lower levels of structure to allow for variability of outcome relative to current practice or organizational leadership influences; free-flowing dialogue intended to promote members that challenge the status quo; and high participant autonomy to support ideation, creative thinking, and opportunity creation that may not have been foreseen by the organizers. In order to develop this theoretical position into a management framework, the following research questions and associated data sources were established for the study:

1. **Question:** When designing collaboration communities, to what extent do the transactional distance elements of structure, dialogue, and autonomy provide a structural base upon which to plan activities, processes, and objectives in order to support the intended business outcomes?

a. **Data:** Perceptions of community participants and the Cenovus KM team, expressed by them to the evaluator in a series of programmed surveys.

b. **Analysis:** Using a form of the Delphi Technique, views will be assessed using calculated means/medians/modes, sorted lists, and other non-parametric tests to determine the degree of consensus among participants. Participant opinions will be used to determine what changes / evolutions seem to participants to be most useful. Where views / opinions are neutral, negative, or inconstant, changes will be solicited, implemented, and assessed by the same participants in subsequent activity iterations using the same parameters to determine if (and if so, to what extent) the changes made have had a positive effect.

2. **Question:** To what extent do changes in the nature or conduct of specific collaboration community activities and processes aligned with structure, dialogue, and autonomy improve efficacy relative to intended outcomes to a degree of practical significance as perceived by the stakeholders?

   a. **Data:** Perceptions of collaboration community participants and the KM team, expressed by them to the evaluator through surveys / interviews.

   b. **Analysis:** Data from multiple communities across their design iterations will be analyzed *independently* to determine potential associations between activities undertaken and outcomes achieved. Participant opinions will be used to determine what changes /

evolutions seem to participants to be most useful, and incorporated into subsequent design iterations / communities.

3. **Question:** What form might the collaboration community management model take within Cenovus to support the targeted outcomes as perceived by participants and managers?
    a. **Data**: Complete data set resulting from Question 2.
    b. **Analysis**: Upon completion of the data collection phase, data from multiple communities across their design iterations will be analyzed *comparatively* to determine any associative trends between activities undertaken and outcomes achieved; synthesis of these trends will form the foundation of the model.

Structure

When considering "structure" as a design category for activities within a collaboration community, the following variable elements were considered as potential influences to explore within the study, based on information stated previously in the literature review:

- Management Structure. Wenger (1998) indicates one option with communities being "informally bound," while McDermott and Archibald (2010) support more formal management structures and processes. This supports the idea of a continuum of structural influences depending on the purpose and intended outcomes for the community;
- Definition of Purpose. Across the literature, there was a common expression of the need for a community to have a clear purpose, establishing both the

joint nature of the effort to help bind the participants together, and to be aligned to organizational need and priorities such that the community will be sponsored and supported as an approved use of corporate resources and time;

- Statement of Objectives. Aligned to purpose, different levels of structure can be established through the articulation of specific objectives, goals, and measures to track progress within a community. At higher levels of structure, benefit realization may also be tied to performance objectives of the community as part of the organizational objectives;
- Leadership. An option continuum also appears to exist regarding internal leadership structure created to direct the community. As noted previously, Wenger and Snyder (2000) provided that "…it's not particularly easy to build and sustain communities of practice or to integrate them with the rest of an organization. The organic, spontaneous, and informal nature of communities of practice make them resistant to supervision and interference" (p.140), while McDermott and Archibald (2010) stated that "To be well integrated into the organization, communities, like teams, need strong, formal relationships with the organization's top leadership (p. 5). This indicates that the approach to community sponsorship and leadership are a key element of structure; however, community leaders need to balance positional power with personal power appropriately as an application of situational leadership to align to the needs of a given community and its members; and
- Roles / Committees. Below the leadership levels of a community, providing increasingly defined roles and responsibilities related to the purpose of the

community and intended levels of transactional distance is another means to influence structure. This may occur with individual contributors at lower levels of structure, or could include formed committees / sub-committees at much higher levels of structure;

Dialogue

In exploring "dialogue" as a design category for collaboration community activities, the following variable elements were considered as potential influences to explore within the study:

- Control and Monitoring. The level of control over dialogue within a community (i.e. degrees or levels of autonomy) was identified as a variable to explore. While some communities supported the ideas of free-form dialogue (i.e. higher autonomy), questions still arose around how dialogue would be initiated, how conclusions would be drawn, how dialogue threads would be concluded, and how appropriateness of context could be maintained (i.e. ensuring respectful discourse for sensitive topics or differing perspectives). Aligned to the concept of roles associated with increasing levels of structure, additional dialogue controls were identified for implementation through the function of facilitators, moderators, or stewards for specific communities, topics, or discussions. In this manner, participant autonomy would still drive the directionality and flow of dialogue, however support structures could still be provided to enhance richness if needed;
- In-person versus At-a-Distance. The predominant collaboration activity at Cenovus during 2014 – 2016 was in-person meetings. While this represented

the more comfortable behaviour, it was also recognized as largely inefficient: participant working time was lost travelling between meeting locations, detailed agendas were seldom created or followed, meetings were often scheduled for much longer than required, and a preponderance of scheduled meetings reduced productivity by limiting available time for participants to execute work. Supporting a shift towards distance collaboration activities, new tools for audio, video, and desktop conferencing were introduced during this period, and reports were reflecting increased utilization within Cenovus as an alternative to physical meetings. This created additional forms of dialogue to consider within communities based on the preferences, characteristics, technical skill, and autonomy of the participants;

- Synchronous versus Asynchronous. Similar to meetings, the provision of different tools for asynchronous collaboration also supported a shift in patterns. Telephoning colleagues was the predominant form of synchronous person-to-person distance communication, while email was the predominant asynchronous tool. Both of these methods were augmented with additional capabilities, namely desktop sharing in support of synchronous conferencing, while instant messaging, discussion boards, blogs, and wikis became available for asynchronous collaboration. These additional capabilities provided different design options for influencing dialogue within collaboration communities; and
- Quality of Dialogue. Different perspectives were considered in how to influence the quality of dialogue within a community depending on its

intended outcomes, with design consideration being given to categorizing specific tools to support an intended use in order to create a structured / repeatable approach. For example, transient or inconsequential information could be shared through news feeds and general announcements; personal opinions could be expressed through blogs, as a personal form of communication to a general audience; structured discussion boards could be created for focused topics of interest for a defined group; and wikis could be established to create, share and publish structured content for which there is little difference in consensus. Establishing this type of standard was important to help ensure that participants were able to quickly navigate to, and associate with, the right type of dialogue to meet their personal or business objectives; alternatively, if participants were disappointed by a lack of richness or clarity of purpose in their dialogue, they were less likely to contribute.

Autonomy

The level to which perceived participant autonomy can be leveraged as a design consideration was seen to be largely driven by the nature of the community and its participants. It was assessed that communities established to support a core organizational objective or specific outcomes would be best served through lower levels of participant autonomy with respect to establishing what needed to be accomplished; however, it was acknowledged that participants should still have the ability to influence how the work would actually be executed, given a sense of ownership and control is required to support engagement as indicated in the literature. It was also determined that

the level of autonomy was influenced by the seniority and experience of the participants themselves, as those with more experience in working within communities could be provided more autonomy in their own growth and sustainment, while those with less experience need more oversight and guidance to ensure that better practices are followed and fewer challenges are encountered.

Value

In order to foster organizational support for collaboration communities as a beneficial non-formal learning activity for Cenovus, consideration also had to be made to try and quantify and qualify value as part of the outcomes. As noted during the literature review, the perception of value by the participants themselves is a key indicator within a community, and therefore was a cornerstone of the evaluation approach detailed below. It was also understood that although learning outcomes for the participants could be perceived as valuable at the individual level, there was still an inherent need to translate those learning outcomes into business value for the organization. For this study, the organizational value determination was to be established through the business outcomes achieved, such as a problem that was solved, a practice that was improved or created, or savings that were realized through a change in process.

Theoretical Framework Summary

In this section, the key transactional distance elements of structure, dialogue, and autonomy were aligned to variables for community design that were anticipated to contribute to differing levels of transactional distance, and which in turn could be aligned to intended outcomes or objectives. It was theorized that the situational application of these design choices could be measured in respect to the value achieved as perceived by

the participants, and subsequently support conclusions of cause and effect if a pattern of consistent outcomes became apparent. If such a pattern was defined, then a model for workplace communities could be articulated to manage transactional distance between community members by manipulating structure, dialogue, and autonomy, and support the design and management of learning activities that achieve intended learning outcomes.

CHAPTER 4 – DESIGN

Consideration of Research Methodologies

In order to develop and validate a theoretical and functional model for enhanced workplace learning, different research models were considered that would provide authentic research conditions and outcomes. Action Research (also referred to as Participant Action Research, or PAR) and Design-based Research were initially considered given their focus on addressing actual operational problems while supporting ongoing development of theory; ultimately, design-based research was selected as the appropriate method. This section will provide an overview of related literature and highlight the rationale for the selection of design-based research for this study as opposed to action research.

Given this study's focus on learning activities within a corporate / real-world environment, key distinctions between research types and methodologies were sought in order to support the selection of a methodology. An initial distinction between empirical research and developmental research based on the intended research goals was provided by Reeves (2000):

- *Empirical Goals* - Researchers with empirical goals are focused on determining how education works by testing conclusions related to theories of teaching, learning, performance, assessment, social interaction, instructional design, and so forth. Information technology researchers with this type of goal usually employ experimental (or quasi-experimental) methods to determine the effects of some form or aspect of a technological innovation under

controlled conditions. This type of research has dominated instructional technology for decades, but reviews reveal that it is often done poorly.

- *Development Goals* - Researchers with development goals are focused on the dual objectives of developing creative approaches to solving human teaching, learning, and performance problems while at the same time constructing a body of design principles that can guide future development efforts.

The figure below from Reeves (2000) illustrates key contrasts between empirical research and development research:

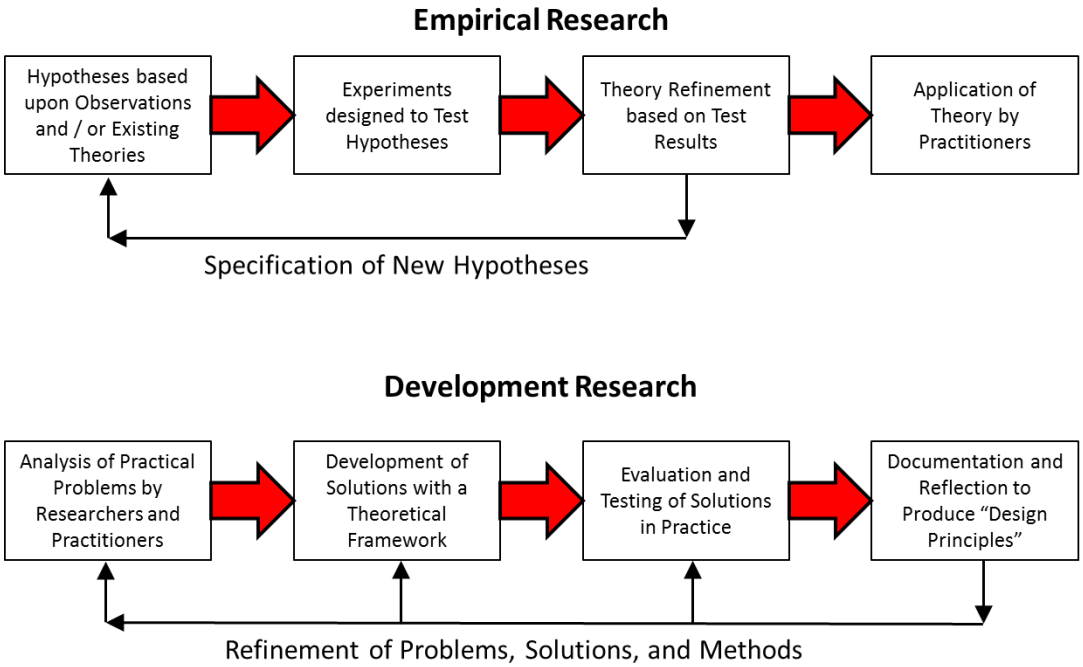

Figure 1. Empirical and Development Approaches to Research

In framing this study, it was noted that elements supporting both approaches appeared to be present: an initial hypothesis had been created regarding the potential use of transactional distance theory as a management model; however, the design of the communities was to be driven by the problems they needed to solve, and not designed

foremost to test the hypothesis. Literature over the past two decades suggests that the development approach to learning research may be better suited to technology-enhanced learning environments. Given the nature of this study, where existing corporate challenges initiated the research and not the conceptual hypothesis to be proven, an initial decision was made to use developmental research. Two key forms of developmental research – Design-based Research and Action Research – were subsequently considered. Although they have several similarities, design-based research and action research are separated by two critical distinctions: *their primary goals* and *the function of researchers*. Within design-based research, a primary goal is the development of theory and broader design principles that can be applied to other circumstances; within action research, the primary goal is to improve practice within the local context, and not necessarily to shape practice externally (Wang & Hannafin, 2005; Reeves, Harrington, & Oliver, 2005; Cohen, Manion, & Morrison, 2007). With respect to the function of researchers, Wang & Hannafin (2005) provided that "researchers within design-based research initiatives manage research processes in collaboration with participants, design and implement interventions systematically to refine and improve initial designs, and ultimately seek to advance both pragmatic and theoretical aims affecting practice" (p. 6). Conversely, action research is typically derived from the participants' own research which is facilitated by researchers, rather than interventions designed and progressively refined jointly with researchers (Wang & Hannafin, 2005; Cohen, Manion, & Morrison, 2007).

Based on these distinctions and their applicability to this study, design-based research was selected as the study's predominant research methodology and further reviewed to support the research design.

Design-based Research

The term and concept of "design experiments" was introduced in 1992 by Ann Brown and Allan Collins, and was developed as a means to carry out formative research to test and refine educational designs based on principles derived from prior research (Collins, Joseph, & Bielaczyc, 2004); this has since led to the widely-adopted term of *design-based research*.

Design-based research has evolved to become a proven methodology to improve educational processes through systematic collaboration between researchers and practitioners in real world settings, and an iterative analysis, design, development, and implementation process (Wang & Hannafin, 2005; Reeves, Harrington, & Oliver, 2005). Collins (1999) highlighted design-based research as a more suitable methodology for education research as compared to laboratory studies by contrasting seven aspects of their methodology:

- *Laboratory settings vs. messy situations*. Experiments conducted in laboratories avoid contaminating effects, learners concentrate on the task without any distractions or interruptions, and the materials to be learned are well defined and are presented in a standardized manner. Design experiments are set in the messy situations that characterize real life learning in order to avoid distortions of laboratory experiments.

- *A single dependent variable vs. multiple dependent variables*. In most psychological experiments, there is one dependent variable, such as the number of items recalled or the percent correct on a test of some kind; in design experiments, there are many dependent variables that matter, though researchers may not pay attention to them all.
- *Controlling variables vs. characterizing the situation*. Psychological experiments use a methodology of controlling variables, where the goal is to identify a few independent and dependent variables, and hold all the other variables in the situation constant. In design experiments, there is no attempt to hold variables constant, but instead the goal is to identify all the variables, or characteristics of the situation, that affect any dependent variables of interest.
- *Fixed procedures vs. flexible design revision*. Psychological experiments follow a fixed procedure that is carefully documented, so that it can be replicated by other experimenters. Design experiments, in contrast, start with planned procedures and materials, which are not completely defined, and which are revised depending on their success in practice.
- *Social isolation vs. social interaction*. In most psychological experiments, the subjects are learning in isolation. There is no interaction with other learners and usually no interaction with a teacher or expert; the material to be learned is simply presented by text or video. By contrast, design experiments are set in complex social situations, such as a classroom.

- *Testing hypotheses vs. developing a profile*. In psychological experiments the experimenter has one or more hypotheses, which are being tested by systematically varying the conditions of learning. In design experiments the goal is to look at many different aspects of the design and develop a qualitative and quantitative profile that characterizes the design in practice.
- *Experimenter vs. co-participant design and analysis*. In psychological experiments the experimenter makes all decisions about the design and analysis of the data, in order to maintain control of what happens and how it is analyzed. In design experiments, there is an effort to involve different participants in the design, in order to bring their different expertise into producing and analyzing the design.

From an application perspective, Reeves, Harrington, & Oliver (2004) note that design-based research:

- focuses on broad-based, complex problems critical to higher education;
- integrates known and hypothetical design principles with technological affordances to render plausible solutions to those complex problems;
- provides rigorous and reflexive inquiry to test and refine innovative learning environments as well as to reveal new design principles;
- establishes longer-term engagement among researchers and practitioners to continually refine protocols and questions;
- establishes intensive collaboration; and
- maintains a commitment to theory construction and explanation while solving real-world problems.

As an operational research model, four distinct phases and their associated elements can be identified within design based research: Informed Exploration, Enactment, Evaluation in Local context, and Broader Impact Evaluation (Bannan-Ritland, 2003). These phases are illustrated at the conceptual and functional levels in the following diagram originally depicted by Bannan-Ritland (2003).

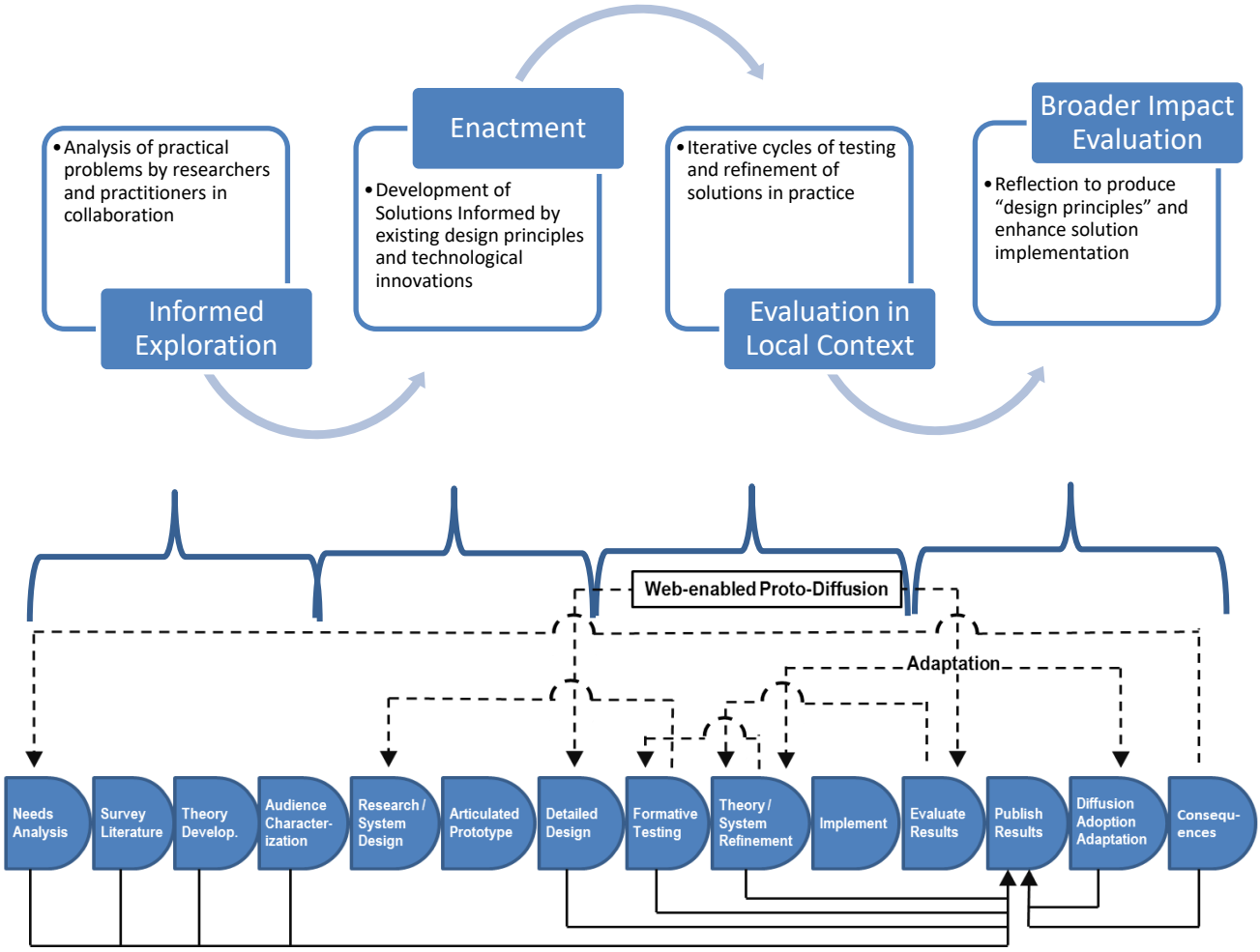

Figure 2. Phases and Elements of the Design-based Research Process

A key advantage to this process is the iterative consideration, design, test, refine, and validate cycle that leads to theory / solution development at both the local level and in a broader context. For each of the phases shown above, appropriate methods, data collection instruments, and research activities will be defined within the research plan. Potential elements as described by Bannan-Ritland (2003) are provided in the table below.

Table 2. Research Methods / Instruments by Phase Within Design-based Research

Informed Exploration	Enactment	Evaluation: Local Impact	Evaluation: Broader Impact
Methods: Quantitative: Survey of Experts Qualitative: Interviews Focus Groups Observations	**Methods:** Qualitative: Designer Logs Expert Review Audience Review	**Methods:** Quantitative: Pre/Post Surveys Qualitative: Usability Testing Expert Review Qualitative / Quantitative Aspects of Formative Evaluation	**Methods:** Quantitative: Data Mining Qualitative: Multi-site Interviews, Surveys, and Observations
Data: Benchmarking of Competitors Needs Assessment Documents Role Models / Persons	**Data:** Abstract Prototype Model Flowcharts, Storyboards Design Specifications Physical Prototype	**Data:** Expert Panel Review Journal Entries Videotape Logs Research Reports	**Data:** Usage Pattern Reports Diffusion and Adoption Trends Correlation Studies

Notwithstanding the support in literature for this methodology, Wang & Hannafin (2005) also highlight a number of challenge areas for consideration when planning a design-based research project:

- Methodological development is needed to both enhance rigour and account for the importance of local context. A design may prove effective in a local context yet not support broader design principles or theories; alternatively, an effective design can generate useful design principles, yet not achieve the

specific outcomes of the local context. In either case, determining the "success" of a research project may only be relative to specific outcomes and the perception of participants of any value realized, in lieu of specific empirical measures;

- Design-based research comprises a collection of multiple research frameworks that are internally consistent but assume many forms and reflect varying levels of discipline and rigour. Aligning research practices and methodologies with those of operating practitioners may not be an easy task, given the difference in structure and application of the different processes; and
- Design-based research requires documenting the whole design process and using multiple research methods in real-world learning environments; the data are typically extensive and comprehensive, requiring both extended time and resources to collect and analyze (Collins et al., 2004). Due to the volume of work associated with this approach, participants may be inclined to minimize this effort or discard large amounts of the data; this can impact negatively on both the research quality and overall project outcomes.

Selection of Methodology

As provided above, development research is a form of research that may be better suited than others to technology-enhanced learning environments. Two forms of development research were considered for this study; however, design-based research was selected based on the intent to develop theoretical advancements in conjunction with solution development, as well as the intended role of the researcher in initiating and

leading the research effort. The literature indicates that through a collaborative and iterative design process, design-based research can support research activities that are characterized by less-structured or "messy" situations, have multiple and dynamic variables, and leverage data collection and analysis to create understanding and theories, and for which more structured legacy research models may be less appropriate. All of these conditions existed within the study, as was already known that each of the collaboration communities would have a different / contextually unique business problem to be solved, and that each community would have to be tailored to address their identified problem. It was also noted, however, that design-based research also has drawbacks that also had to be considered: the volumes of data can be overwhelming, and the fluid nature of the process can impact on the rigour associated with the outcomes. Notwithstanding these points, design-based research was selected as the methodology for this study based on three overarching considerations:

- The study participants had limited expertise in learning theory or activity design, necessitating a reliance on outside sources (i.e., the researcher and KM team) to inform and facilitate the development and implementation process. This reliance on outside sources due to a lack of internal expertise and direction, made an action-research approach less appropriate than design-based research;
- Design-based research uses an iterative design-build-evaluate model that will support incremental learning and solution development within the participant groups; this would allow the study participants to focus on addressing real-

world issues during the course of the study, and not create redundant effort for purely "academic" purposes [theory-building vs. description]; and

- The objective of this study was to develop and test a management model applicable to collaboration communities within Cenovus, while the parallels in activity and practice in related O&G companies would allow for the subsequent use of this study by other large, complex organizations which have similar objectives and use similar processes. Considering each community as individual test cases supported the ideas of the local evaluation, while abstracting those elements in a broader context supported the model for all of Cenovus. Leveraging this output as the basis for comparison to other O&G companies, the potential for an even broader evaluation would exist as potential subsequent research to further pursue this line of inquiry. The design-based research model allows for the scalability of this investigation across multiple levels, and hence provided a strong foundation for both immediate and continuing research efforts.

Methodology and Evaluation Approach

The design-based research model as described by Bannan-Ritland (2003) can involve four stages: *Informed Exploration*, where knowledge is gathered to support the development of the design process; *Enactment*, where iterative solutions are created in prototype for trial implementation; *Evaluation in a Local Context*, where solutions are evaluated in small scale through application; and *Evaluation in a Broader Context*, where solutions validated in small scale are then evaluated across broader use cases to

determine the extent to which generalizations and potential theories can be made. Adopting this approach, the study was conducted as follows:

- *Informed Exploration* was conducted through literature review and the comparison of prior collaboration community development activities at Cenovus Energy, Husky Energy, Suncor Energy, and Nexen (related companies in the same industry) by members of the KM team. This effort provided the foundation for the development of both the business initiative and this study;
- *Enactment* saw the establishment of a cluster of collaboration communities within Cenovus that formed the focal point for the investigation. It was recognized by the KM team that different groups within Cenovus had different community dynamics (i.e. operational versus administrative focus, technical versus non-technical communities). As a result, five such groups were identified: Asset-based communities / networks; Operations-based communities / networks; Function-based communities / networks; Technical field-based communities / networks; and Process-based communities / networks supporting the Cenovus Operations Management System. It was anticipated that approximately five communities / networks would be established for each of these groups in order to establish an appropriate representative sample, as well as to allow for potentially unsuccessful outcomes for some communities. Each of the study's selected communities was treated as an individual case, with supporting activities grouped into three-month iterations. The design phase of enactment for each community

utilized a small membership group (i.e. six to twelve people for each of the selected communities) and validated the initial design models. The implementation / "launch" phase of enactment expanded the audience in each community (i.e. 30 – 50 people) and improved upon the model design and outputs during three months of collaboration activity. Note that the intended initial sample size assumed that the communities initiated would not all complete the study for reasons such as a lack of sufficient participation, potential shifts in business priorities, or changes in key personnel within the communities;

- *Evaluation in a local context* was done using each community as a unique case. Each of the communities was evaluated individually to assess how well its design, activities, and outputs align with the desired objectives; this served as the basis for enhancements within and between each iteration. This was predominantly done through surveys, data collection, and, as required, interviews with community participants and leaders to determine the attainment of intended objectives and value. It was originally planned that each community would go through three iteration cycles to provide sufficient evaluation data from which to draw conclusions; and
- *Evaluation in a broader context* was to occur upon completion of the individual community iterations for all groups. Analysis across all the cases was to provide the basis for a synthesized transactional distance management model, provided the findings were supportive of that outcome.

Given the number of potential groups involved, and the inherent risk within design-based research of excessive data volumes, different evaluation strategies were considered to ensure a manageable process and alignment to the objectives of the study. As provided earlier, the research by Wenger, Trayner, & de Laat (2011) on assessment of value within communities based on participant perception; as such, it was considered that measuring potential changes in their perception over time in response to community design and activity changes in each iteration would allow the researcher to identify patterns of cause and effect. This in turn would provide insights into the manipulation of structure, dialogue, and autonomy and the resultant learning impacts in relation to the intended outcomes (note that this premise was ultimately not able to be validated due to the suspension of the study prior to completion of this effort). Based on this premise, a modified Delphi Technique was devised to support the local evaluation process. As noted by Hsu & Sandford (2007):

> The Delphi Technique is a widely used and accepted method for gathering data from respondents within their domain of expertise. The technique is designed as a group communication process which aims to achieve a convergence of opinion on a specific real-world issue. The Delphi process has been used in various fields of study such as program planning, needs assessment, policy determination, and resource utilization to develop a full range of alternatives, explore or expose underlying assumptions, as well as correlate judgments on a topic spanning a wide range of disciplines. The Delphi Technique is well suited as a method for consensus-building by using a series of questionnaires delivered using multiple iterations to collect data from a panel of selected subjects (p. 1).

In this study, the consensus perspective of value creation within a community was designed to be assessed based upon the design and activity changes introduced over time. The Delphi Technique provided an additional advantage to this approach for the purpose of this study, particularly in light of the nature of collaboration communities within a hierarchical organizational structure; Hsu & Sandford (2007) also note the value of statistical analysis using this approach:

> That is, each subject would have no pressure, either real or perceived, to conform to another participant's responses that may originate from obedience to social norms, customs, organizational culture, or standing within a profession. The tools of statistical analysis allow for an objective and impartial analysis and summarization of the collected data (p. 2).

Conduct

In order to answer the study's research questions, a link needed to be established between the implementation of specific community structures, processes, and activities associated with the transactional distance elements of structure, dialogue, and autonomy, and the attainment of the intended learning outcomes of the community. As indicated previously, a graphic representation of the study's conduct is included in Appendix A. In overview, the sequence of the research effort was as follows:

- An initial occupational and business needs analysis identified 49 business stakeholder groups that could be part of the Cenovus communities' network (see Appendix B). Communities were subsequently evaluated for inclusion in the study based on:

  - critical operational areas in Cenovus where an absence of knowledge sharing / collaboration is impacting performance, such as the development of optimized maintenance procedures and practices;
  - other areas of professional / technical excellence of importance to the company, such as professional teams focused on geology, geophysics, project management, and business process management; and
  - degree of sponsorship already in place or committed to by senior management;
  - degree of cultural, procedural, and technological readiness within the respective groups to support collaboration community development;

- *Community engagement sessions* were conducted with each potential community using standardized face-to-face interviews conducted by four Learning Advisors from the KM team (note that "Learning Advisor" is an organizational role title within Cenovus; they provide internal learning consultancy services to other Cenovus teams). Engagement interview questions and checklists were developed by the researcher in conjunction with the KM team focused on three question areas:
  - What is the business problem to be solved, or opportunity to be realized?
  - What is the intended business impact or learning outcome to be achieved?

  - How will success be measured?

The questions created for the engagement sessions are included as Appendix C.

- A *comparative analysis* of the data collected during the engagement sessions was used to determine candidacy and prioritization for community selection with the study sample. A *sample of convenience* of 27 communities (see Appendix B) was established from the pool of groups identified for the first iteration within the design–enact–evaluate cycle. A high-level charter was created for each community as it was initiated to focus the framing of the effort. The charter template is included at Appendix D.
- *Community design sessions* were conducted with each selected group to establish the initial structures, processes, activities, tools, etc., that were employed to establish each community, with each of these elements aligned as appropriate to the transactional distance element categories of structure, dialogue, and autonomy as determined by the KM team. This included elements such as the governance framework, activity selection relative to objectives, selection of collaboration / communication tools, member engagement plan, etc.
- *Standardized evaluation metrics / instruments* were developed and validated with the pilot communities (see Appendices G, H, and I). Online surveys were used as the predominant data collection method; supplemental in-person interviews were scheduled as required for more detailed investigation of

particular cases when the KM team determined that the initial responses were incomplete / insufficient to make effective changes for a given iteration.

- *Community Charters* (sample enclosed at Appendix D) were created based on the design process, and three-month design–enact–evaluate iterations were planned for each participating community to support implementation, local evaluation, and enhancements. To support this process throughout each iteration, each participating community had an assigned representative from the KM team in support with respect to process, activity initiation, and implementation of the supporting collaboration tools. Data collection efforts for each iteration sought to determine if and how the design elements / activities supported progress towards attainment of the desired outcomes / objectives. Online surveys were scheduled with participant communities at the 30-day, 60-day, and 90-day mark following commencement for each iteration to assess impact of any changes made relative to structure, dialogue, and autonomy.
    - *30-day evaluation*. This evaluation was intended to confirm that initial levels of training, adoption, and activities align to the initial plan (i.e. the participants have the appropriate levels of training and motivation to execute the activities as intended).
    - *60-day evaluation*. This monitoring evaluation was used to assess activity levels and outputs relative to the community design. This evaluation will serve to support any iterative changes to activities related to dialogue,

structure, or autonomy that may better align activities with intended outcomes.

  - *90-day evaluation*. This evaluation assessed the achieved business and learning outcomes relative to those intended during the design stage. It also served to support any iterative changes to activities related to community design, processes, activities, etc. that would be made for future iterations of the design–enact–evaluate cycle.

- During each iteration, data was gathered primarily through participant surveys and workshops conducted by the KM team to identify and assess any changes of perception as a result of adjustments made to community activities. An ongoing comparative analysis of activities and outputs to the community design was used to support iterative changes and enhancements for each supported community as part of the design-based research process; the template used for recording results and associated community design / activity changes is provided at Appendix L.

Activity and performance outputs relative to the intended outcomes were evaluated to determine degree of learner engagement / participation; patterns of behaviour that were established or adjusted; and the potential influence / impact of transactional distance within the learning communities. Upon completion of the individual community design-enact-evaluate iterations, a collective analysis was to be conducted across all the communities to identify different attributes and effects of the activities designed to influence the elements of dialogue, structure, and autonomy. The analysis would have sought to identify differences in performance between the cohorts

relative to the manipulation of structure, dialogue, and autonomy, and the outcomes achieved. The primary output of this phase, had the data supported a definitive conclusion, was to have been a collaboration community design and management framework that specifically answers the research questions of the study.

Throughout this process, the study outputs and the data collection were overseen by an Evaluation Steering Committee to objectively monitor the study's progress and alignment with Cenovus business objectives, and to assess its findings in support of a unified business process model. The Committee was chaired by the Vice President for Business Excellence at Cenovus (who holds a PhD), and included the Group Lead for the KM team, who had supervisory accountability for the members of the KM team. The Committee was used as an independent body representing the host organization of the study, and as such was open to agree or disagree with any findings and recommendations. The Committee also served in an ethical oversight capacity to ensure that the participants were not subjected to any conditions or influences that put them at risk, as noted below

Ethical Considerations

The study was perceived to be of minimal risk for participants as defined by the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, December 2010:

> "minimal risk" research is defined as research in which the probability and magnitude of possible harms implied by participation in the research is no greater than those encountered by the research participant in those aspects of their everyday life that relate to the research (p. 23).

In this case, Cenovus initiated the development of a business process for collaboration communities independent of the research opportunity, which was proposed after the Cenovus effort had been initiated. The research study simply served to provide a framework and structured approach to a workplace initiative already established by the company and its employees. Cenovus routinely uses survey instruments and formal activity audits within its assurance function, which are not normally subject to ethical review. As such, the associated activities of this study and potential for risk were no different for the participants than the everyday workplace processes and responsibilities already in place. These include:

- the KM team has the responsibility to develop a standardized business process for the development and sustainment of collaboration communities;
- surveys were routinely conducted within Cenovus to solicit employee feedback and develop work processes;
- new collaboration tools (*SharePoint*2013) were introduced to the company in January 2015, for which collaboration capabilities and communities were previously scheduled to be deployed in 2015;
- pilot projects at Cenovus were used as a normal precursor activity to enterprise adoption of new technologies and practices;
- business leaders had already self-identified as stakeholder communities for the pilot efforts;

The research study augmented these pre-established efforts by:

- improving the process of investigation through the use of a structured research approach;
- providing an alignment to established learning and community theory as a foundation for the business model; and
- improving the transparency and voluntary nature of the data collection processes.

As such, the outputs of the collective effort had mutually supporting objectives. The study would generate data and findings to create a validated collaboration community management model for adoption within Cenovus; for the researcher, it would provide a case example from which to explore an application of learning theory that, if successful, would be applicable to many complex business organizations.

With respect to the study itself, collaboration community participants within the pilot groups were identified as a function of their normal work responsibilities, and NOT through a separate recruitment process specific to the study. The study derived a sample of convenience from the identified community groups to support structured data collection. The following conditions were established to provide objectivity within the study:

- access was negotiated with Cenovus organization to ensure alignment of the research and business objectives, and correspondence of procedures;
- all the study participants were adults employed by Cenovus, and as part of the engagement process were provided with detailed information within the letter of consent (Appendix G) regarding the purpose of the study, its intended

benefits to both them and Cenovus, and the data collection protocols detailed below;

- data collection through surveys was anonymous, personal information was not gathered, and participants were free to avoid answering any question or withdraw from a survey without prejudice to the participant. The surveys for each community were created and coordinated by a Learning Advisor on the KM team based on the template and process established by the researcher and the broader KM team. Note that there were two elements of researcher blinding within this effort: the principle researcher did not have direct involvement with or knowledge of the people participating in the surveys; and the KM team was not looking for a specific result given the exploratory nature of the study, and hence could not inadvertently "steer" the participants towards a preferred response;
- completion of a survey could be halted at any time prior its final submission. Participants were not able to withdraw their data once a survey had been submitted online; given the anonymous nature of the surveys, it was not possible to differentiate between participant responses for completed surveys;
- withdrawal from or failure to complete one or more surveys did not constitute a participant's withdrawal from the study; given their participation in the community is a function of assigned work by the business, withdrawal from the complete study was only considered if a formal request was made by the business or individual participants;

- communities had the ability to withdraw their data up to the point at which the analysis phase was completed and their data embedded with the study findings;
- no authority or influence relative to the participants' employment or contribution to the study were exerted by the researcher or the KM team; survey data was only to be provided to business leaders by exception, and no individual participant identification would be possible due to anonymous data collection;
- the researcher remained at "arms-length" from the study participants, without a direct engagement role or power relationship; participant engagement was done by the KM team. Any potential power relationship identified for participants, regardless of their organizational roles, was mitigated through the anonymity of the data collection;
- the researcher primarily played a thought-leadership and coordination role for the for the participating KM team members with respect to the design and execution of the study, and the corresponding data analysis. For example, the researcher provided all of the theoretical concepts and design considerations to the KM team for community development, drafted all of the evaluation instruments for validation by the KM team, and helped prioritize work activities based on community assessments, progress, and design changes within each iteration. Within this context, it was understood that the inherent power relationship between the researcher and the KM team, given his

management role relative to the overall KM function, was a function of their primary work obligations and not attributable to this study. However, the corporate practice for collaborative projects such as this is one of collegial participation, and it was recognized that the researcher was the most knowledgeable and experienced in this area; while the researcher directed the study, and coordinated the efforts of the project team, the team members had a fairly high degree of autonomy relative to their engagements with their respective communities and the study overall; and

- communities within which the researcher might also be a participant, and therefore have a potential influence over their participants, were excluded from the study's data collection pool to prevent any data skewing.

Notwithstanding these points, the study required ethical consideration and continued vigilance throughout its conduct to minimize potential impacts in the following areas:

- The communities were composed of varying job levels of personnel within Cenovus, and membership of the communities was not concealed; as such, there were potential influences of power or position that could impact on participants. This was mitigated by having the contact with the study participants conducted by the KM team, and minimized any direct involvement by the researcher or management personnel;
- High-level internal support for the Cenovus KM program could have impacted both the objectivity and participant support for the study. It was

recognized that high levels of directed activities based on corporate direction versus those driven by the study's findings could prejudice either or both of the iterations. Similarly, participant bias could have also become a factor, given study participants may have had a motivation to make their community appear successful to the sponsoring corporate executives regardless of the actual outcomes. This factor was watched for, and potentially could have been used to disqualify some participant groups from the study if the data became skewed as a result; and

- The principle researcher had a management responsibility for the overall KM team; given the reliance on the researcher to lead and facilitate program design activities within the KM team, a power relationship existed with the potential for researcher bias to influence the study and its outcomes. This was mitigated through the managerial separation of the researcher to the participating KM team members by the KM Group Lead, who is not a direct contributor to the study.

In addition to the mitigations indicated above, the Evaluation Steering Committee acted as an oversight body with a particular focus on these areas of potential concern to ensure that the integrity of the study and interests of the participants remained protected throughout this effort. The participation of the KM Group Lead on the Committee as indicated previously was done to create an oversight buffer between the researcher, who had an overarching managerial accountability for the KM team within his broader position portfolio, and the members of the KM team themselves. This further mitigated

against the potential for power relationship influences within the study, even though the researcher had no direct supervisory responsibilities for any of the KM team members supporting the study, or the participants of the communities themselves.

The Athabasca Research Ethics Board provided a Certification of Ethics Approval on 25 November 2014, and subsequently approved an extension to 30 June 2016 given the delays in the study outlined below. A copy of the certification is enclosed at Appendix O.

Timeline

One of the key challenges in commencing the study was the need to align execution to corporate activities and work patterns. The original timeline for the study was as follows:

- Completion of study / Community model design: October 2014
- Candidacy / study approval November 2014
- Ethics review / approval December 2014
- Iteration One Community implementation December 2014
- Iteration One – Enactment / Evaluation January–April 2015
- Iteration One – Review / Design Changes April 2015
- Iteration Two Community implementation April 2015
- Iteration Two Enactment / Evaluation May–August 2015
- Data analysis August–October 2015
- Presentation of findings November 2015

Due to shifting work priorities within the host organization, the timeline of the study was subsequently adjusted as noted below.

- Completion of study / Community model design: November 2014
- Ethics review / approval December 2014
- Candidacy / study approval February 2015
- Community Enactment / Evaluation Cycles June–December 2015
- Data analysis January-February 2016
- Presentation of findings March 2016

Finally, due to the staff reductions and work stoppages in the summer and autumn of 2015, a third timeframe was established for the conduct of the communities and data collection work:

- Community Enactment / Evaluation Cycles February–April 2016
- Data analysis May 2016
- Presentation of findings July 2016

Ultimately, this work was suspended indefinitely by the host organization in February 2016. These delays are highlighted here simply to demonstrate the fluid nature of the planning and execution of an academic study within a corporate organization, and the inherent need to adapt and evolve the study to fit the availability and access of the participants.

CHAPTER 5 – EXECUTION AND RESULTS

Informed Exploration

As provided earlier in Figure 2, the Informed Exploration stage of design-based research focuses on the analysis of practical problems by researchers and practitioners in collaboration. Within the context of the broader Cenovus initiative, which included not just the elements of this study, but also the broader effort to frame the supporting business and supporting processes, this stage was a blend of activities that occurred during most of 2014. The KM team provided four Learning Advisors (one employee and three contractors) and a *SharePoint* solution specialist to support the initiative (*SharePoint* is a collaboration platform created by Microsoft, and was the tool-of-choice by Cenovus at the time of the study for online collaboration). The team worked through several discussions and design activities to synthesize ideas and concepts from literature, solicited ideas and learnings from peer companies, and engaged external subject matter experts as consultants to frame the new Cenovus practice. As one indicator of the investment by Cenovus in this effort, Étienne Wenger, the author of many of the works referenced above, was engaged for an internal two-day workshop with the KM team in October 2014 during which a wide range of ideas, models, and considerations were discussed. Not surprisingly in hindsight, there was not a great deal of consensus between the team members, or between the team members and the researcher, about the direction that should be taken moving forward. This led to many protracted, non-productive, and periodically negative discussions and project delays as the competing perspectives wrestled to become the predominant voice of the team:

- The senior KM employee on the team frequently argued with other team members that the best solution was not to rely on the academic theory, and base the model on internal business drivers and inputs specific to Cenovus;
- The senior KM contractor on the team, hired specifically in support of this initiative, was a staunch personal supporter of Étienne Wenger and vigorously asserted that Wenger's models and inputs to the discussion should be implemented verbatim, and regularly argued that Cenovus would have to adjust to fit within them;
- The second KM contractor on the team had a range of experience with multiple companies that had tried to establish collaboration communities, and wanted to bring all of those lessons (albeit neither grounded in academic theory nor captured apart from anecdotal / non-rigorous qualitative perspectives) as a foundation of the work. She often acted as a moderator between the two senior team members to try and find compromises within the respective positions;
- The junior KM contractor did not have core knowledge or experience in this area, and limited corporate work experience overall, and was often pressured by the others to become their "swing vote" in trying to influence the team;
- The *SharePoint* specialist looked at every issue only through a technology lens, and did not want to engage on theoretical foundations, frameworks, models, or any community activities that were not online;
- The leader of the KM team was trying to use this initiative as part of a team-building exercise, and would not provide definitive direction or hold the team accountable to the deadlines or the direction given; he wanted them to "work

through the challenges," with the perspective that taking longer and having more discussion would produce a better result; and

- The researcher worked to inject a balance between the existing academic theory, using design-based research to develop a Cenovus-influenced model going forward, and the need to apply academic rigour to their process as part of a formalized study. It must be noted, and will be discussed in greater detail below as a key learning for the researcher, that the ethical consideration of the potential for the inherent power-relationship between the researcher and the KM team did become an issue, but opposite of the original concern: the researcher was so concerned about the potential for a negative power relationship influence on the team and study that he withdrew too far from his managerial accountabilities, and allowed the team too much autonomy. This led to a host of other issues that became apparent as the work progressed.

After eight months of effort between May and December 2014, the KM team had made very little progress towards developing an integrated model for collaboration communities within Cenovus. While there were multiple drafts and dozens of discarded artifacts, which had included many good ideas and opportunities, there was such dissention among the team that no consensus had been reached; ironically, the team established to create cohesive collaboration communities across Cenovus could not even get themselves to work well together. In early 2015, the contractors were removed from the KM team and additional employee support was provided to parse through all of the previous work and synthesize a working model to support the pilot communities that had been scheduled for launch in January 2015, and which now had to be deferred. The

company could not afford any more delays due to differences in personal philosophies or perspectives, as the broader initiative was now behind schedule. The team was given four additional months to get the work resolved such that the initial communities could be launched no later than June 2015.

Enactment

As provided earlier in Figure 2, the Enactment stage of design-based research focuses on the development of solutions informed by existing design principles and technological innovations. With the renewed direction to start deploying solutions to the client groups, the KM team actively engaged with business groups identified in 2014 as potential collaboration communities. As outlined in Appendix B, the 49 stakeholder groups identified were reviewed, engaged, and prioritized based on their business need and readiness / willingness to participate based on the Collaboration Community Suitability Assessment Questionnaire (Appendix C). Based on the information provided from each group, the list was reduced as follows:

- 22 stakeholder groups were de-selected for launch in 2015 due to competing work priorities, low formulation of their business focus for a community, or lack of support from their leaders;
- The Execution Excellence Community elected to proceed on their own without the support of the KM team, given their need to launch early in the year and the inability of the KM team to deliver support as scheduled (i.e. this group was one of the communities originally scheduled for launch in January 2015);

- 16 communities were identified as the first iteration cohort, with launches scheduled to occur prior to the end of July 2015; and
- 11 communities were identified as the second iteration cohort, with launches to be scheduled prior to the end of December 2015.

For the first iteration, seven communities (Automation, Human Resources, Integrity & Containment Collaboration, Learning@Cenovus, Local Community Relations, Senior Leaders Community, and Women@Cenovus) were initiated between February and April 2015 in preparation for launches scheduled in May; the remaining nine were initiated between May and June 2015, with launches scheduled for July. The first seven communities were engaged using a mix of the different artifacts that the KM team had created in 2014, and the participant feedback through this process led to the creation of hybrid documents that were then applied to the remaining communities within the first iteration cohort. The two principle artifacts established through this process were the Community Charter and Community Design Document (Appendices D and E respectively).

Based on both Cenovus' practice for chartering work projects, and the requirement outlined in literature for the need to have clearly articulated goals and objectives, the Community Charter was intended to provide clarifying focus for the community leaders, as well as provide an endorsement / commitment from those leaders to support the effort going forward. The Charter was created as a business artifact for Cenovus to ensure alignment of effort for communities with key business needs, and intended to support the attainment of measurable business results. Notwithstanding the need for the community to produce business results, the more significant section of the

charter from a learning activities perspective was the section on benefits to the members. It was recognized from the literature that a community must provide value to its participants in order to remain viable, and hence a key focus was on identifying how the community would benefit its members. The framing of these benefits was rewritten to resonate with the community leaders and members based on their feedback; in turn, the selection of the respective benefits led to function and design decisions by the KM team on how to structure initial activities and resources for a given community. For example, statements such as *quickly access and leverage knowledge and expertise*, *collaboratively solve business problems*, and *devise creative solutions* all align to activities such as group dialogues and discussions, expertise location / "ask an expert" functions, and support capabilities that bring people together to share knowledge. Alternatively, benefits such as *develop and apply best / proven practices*, *understand and apply standards and processes*, and *reuse and build upon existing knowledge* align to the creation of knowledge stores, content repositories, and document libraries where participants can both store and access key references for the community's work. Based on a given charter, these elements were then carried into the Community Design Document which provided additional discussion on planning considerations for the creation of the community from two perspectives: first, as a new cluster of people-centric activities that may or may not be familiar to participants; and second, the start of a technical design document for a community collaboration site in *SharePoint*. The intent was to frame a common document that would inform both the community leaders and the technical support team so that a common understanding of intent and actions could be established and sustained.

An additional benefit that came out of this engagement process was the clear articulation of standardized roles within a community; these are presented in Appendix F. While not every community was intended to have the same levels of structure and organization, there was a need to define common roles and allow community leaders to decide which ones they wanted to employ as part of their planning. From a people perspective, this allowed the KM team to assess what coaching and mentoring support would be required depending on the choices made, and how the community would operate; from a study perspective, this element was a key variable to evaluate between different communities to assess the implications of independent decisions on this aspect of structure.

Once a community charter and design document had been approved, a KM advisor would meet with a "core team" established for each community. The group was comprised of approximately six to eight people acting on the direction of the community sponsor to support its initial design and development. The communities were each framed by their core team to establish norms, expectations, structure, and activities that form the basis for the launch of a community to the broader audience base. It was found that communities that did not take this approach, and simply went directly to the community participants, generally had difficulties in establishing and retaining interest by the new participants. A specific example of this was the Executional Excellence community, which had opted out of the KM initiative due to the delays as noted earlier, and acted independently to launch their community. Within that effort, they established a core team as a discussion group to talk about the idea of the community, but felt that it would be up to the community itself to determine goals, objectives, and areas of focus.

A *SharePoint* site was created for the community including representative activities and structures designed to illustrate the types of functionality that was available, and some sample content was provided to populate the community site. On 5 March 2015, the core team held a community launch event for over 80 people with an agenda to discuss the following:

- Officially launch the Executional Excellence collaboration community;
- Review the Community's journey to date;
- Propose the purpose of the community and solicit feedback and perspectives;
- Showcase the collaboration site;
- Discuss content ideas for future meetings;
- Discuss our proposal for meeting frequency

The meeting lasted 90 minutes, and was received well by the audience; the need to collaborate, share ideas, and work collectively across team and organizational boundaries was fully appreciated, and most expressed an interest in participating. Following that initial launch and enthusiasm, however, little productive work resulted and the community faltered very quickly. No structure or purpose had been established, there was no focus or management of dialogue, and the absence of direction or commitment created such autonomy that people were not obliged to any actions apart from attending the first meeting. As the group could not sustain any meaningful dialogue or consensus on what the purpose of the community was, or what problem they were trying to solve, it quickly became viewed as unorganized and too immature to be productive, and people quickly turned their attention to more pressing tasks. When the KM team subsequently

reviewed this case to assess why it had not been successful, a number of issues were identified:

- They had solicited support from the senior KM contractor in the latter months of 2014, and had been using the basic templates that had been provided; however, the philosophical / conceptual approach of that KM advisor created intangible and "academic" approaches to creating the community that did not translate well in application;
- The short and long term objectives of the community were concept-based (versus stated as measurable outcomes) and did not relate to actual problems that could be solved. Examples from their charter included:
    - Through incorporating the input of others, members will continue to refine the alignment of their team's plan to organizational strategy;
    - Through interaction with others (simulation activities), members will become more confident in their ability to think critically and make strategic decisions, and understand the impact of decisions;
    - Members develop skill in the area of removing barriers that impact productivity; and
    - Through the sharing of executional excellence challenges and results achieved through application of good practices, members will gain an understanding of how others have applied EE principles and how the successes of others can be replicated in their own situations.

While appropriate in the ideal of what was being sought, none of the objectives had been broken down into discrete pieces of work that could be described,

aligned, or executed. As such, no one knew where they were supposed to focus, or what they were to achieve; and

- Perhaps most telling, they did not actively address two factors that they had identified as critical success factors within their charter: awareness of the benefits of collaboration communities, and focus on culture / behaviours to communicate and build understanding of the benefits of being collaborative and learning together. Although it was indicated in their charter that mitigations for these elements were not in place, the risks were not addressed appropriately within either the community launch or subsequent activities; as such, there was no sense of purpose or benefit established with the participants, and hence eroded their willingness to invest their own time and effort into the initiative.

While this community had not been part of the sample group at their request, there were three positive learning outcomes from this experience that were nonetheless able to be leveraged subsequently in support of the initiative:

- Although not all of the community process templates had been used completely or applied appropriately, this marked the first time that Cenovus had a documented record of actions, decisions, and perspectives from a collaboration community that could serve as a basis for future analysis. Although this may seem like a mild point of success, it validated for subsequent groups why the documents and processes were such an important part of building a community;

- This case highlighted that the focus of a community during initiation had to be tightly scoped and related to identifiable business tasks and objectives, and not conceptual objectives; if people did not understand the direct value of the effort being proposed, and the alignment to actual problems they were facing, they were less likely to become engaged. Following this effort, the charters for the first iteration communities were very focused and crisp, normally identifying no more than one or two discrete tasks to really hone the early objectives, this approach was much more readily received and endorsed by the respective core teams; and
- The Executional Excellence community had been targeted towards more senior leaders in the company (managers, directors, and vice presidents), many of whom attended the community launch, and witnessed the subsequent lack of progress. These leaders were almost all associated with other communities within the initiative, and did not want to have the same results; consequently, they were much more willing to follow the processes and advice of the KM team for their communities going forward, which lowered resistance to change and empowered the KM advisors to keep them on track.

During the enactment phase, a total of 20 collaboration community charters were completed across both cohort groups during the February to June 2015 timeframe (some communities, such as the Downstream Hub, completed their charter early in the year as part of their annual business planning process, even though the implementation was not scheduled until later in the year). *SharePoint* sites were created for 22 of the communities based on common page layouts that were developed for the first seven

communities, and training was conducted for all of the respective core teams on how to use their *SharePoint* site and other collaboration tools depending on their activity design plans. Notwithstanding the progress made in early 2015, the deployment schedule was subsequently amended due to changes in corporate priorities, and the scope of the collaboration community initiative was drastically reduced; the explanation and impacts will be detailed below. Overall, only the initial seven communities listed above completed the initiation stage and conducted launch events to their broader membership in 2015, with most delayed until later in the year.

Evaluation in Local Context

As provided above in Figure 2, the Evaluation in Local Context stage of design-based research focuses on iterative cycles of testing and refinement of solutions in practice. It was in this area that the key differentiation was made between the business processes and artifacts associated with the Cenovus initiative, and the efforts and artifacts associated with the research study. To this point in the process, the documentation and artifacts developed were primarily crafted to standardize the business processes and technical support required to initiate a collaboration community. They were framed around the context of business objectives, member benefits, and technology functions, and not learning theory per se; while the theoretical foundations had been embedded within the process design, it was recognized that the academic foundations of transactional distance, or the alignment of learning theories, were not the focus of the business documentation. At this stage in the design process, it was also not possible to utilize the proposed model and use the transactional distance elements to support activity design beyond a cursory degree, as there were no initial parameters that had been

determined to support targeted design decisions. For example, the KM team would collectively assess the charter for each community and collaboratively develop an activity design. An initial discussion was had for the respective communities as to what degree the elements of structure, dialogue, and autonomy might play in achieving a community's objectives, but this was not yet an integral part of the process given the first research question for the study [W*hen designing collaboration communities, to what extent do the transactional distance elements of structure, dialogue, and autonomy provide a structural base upon which to plan activities, processes, and objectives in order to support the intended business outcomes?*] had not yet been answered. Relatively common activities and structures were planned for most of the communities to form a baseline template from which to initiate both the work and assessment process. Given an absence of an initial direct linkage between specific collaboration activities and their influence on transactional distance, a neutral perspective was maintained in this regard as initiating activities were planned.

As part of the initiation of communities, four instruments were established to support the iterative cycles of evaluation and refinement:

- Appendix G provides the informed consent text that was used to frame the study for participants during data collection;
- Appendix H provides the questions for the Baseline Survey created within *FluidSurveys*, a Canadian-hosted online survey company, to guide pre-launch training activities for a community;

- Appendix J provides the questions for the Iteration Surveys that were created within *FluidSurveys* to support the three data collection cycles for each community; and
- Appendix L provide a representative sample of the database that was created to record outputs of the survey data for each community, decisions and actions taken in response to the data, and changes made to a community in advance of the next iteration.

The baseline survey was not intended to collect data relative to the research questions for the study; it was intended to provide feedback to the community's core team and KM advisor as to the current state of the participants' knowledge and behaviour with respect to existing collaboration practices (both personally and for their team), familiarity with different collaboration technologies, and basic existing practices within their team. This data influenced how much training, orientation, and coaching would be provided to a community as part of their pre-launch preparations. As with all of the surveys, the baseline survey was optional for participants, and only three of the seven communities initiated in 2015 elected to complete the survey; their results are summarized in Appendix I. An analysis of the results provided the following observations:

- Each group predominantly had dispersion within the Likert-type scale across the team for each question, indicating differences in perceptions of how work was being conducted within their team;
- There was broad use of social networking apps outside of work, which indicated that online collaboration / communication tools such as discussion

forums and newsfeeds could likely be leveraged in support of traditional team community methods (i.e. email) as a design consideration;

- The two smaller teams indicated fewer issues with finding resources (content and people) to support their work than the larger team. Although the sample size was too small to validate fully, a deduction was formed that smaller teams were likely better able to manage their content and knowledge capital due to limited staff and close geographic proximity, while larger teams with greater dispersion of people and greater volumes of content likely suffer proportionally increasing challenges with knowledge management and expertise location. A design consideration was created for knowledge mapping when engaging with larger teams;
- There was limited use of online collaboration tools for the sharing of draft work; comments indicated draft documents were emailed for review across the teams, leading to version control issues and inefficient edits as document comments were sent around the teams via email. Collaborative authoring was identified as a key opportunity area, however reflected a change in work patterns that would take time to adopt;
- Desktop conferencing was largely utilized by all groups as a form of synchronous collaboration at a distance to share presentations and review materials;
- The collection and sharing of *Lessons Learned / Best Practices* represented an opportunity to improve for all groups; and

- Storing content with documents was a strong behaviour in all groups, while there was less consistent use of storage outside of documents across the groups. This presented a design consideration on how to support communities with respect to the online tools provided, as well as a future work pattern to enhance over time.

During subsequent design discussions, the KM team utilized this information (along with other anecdotal team knowledge) to develop improvements to the online collaboration site templates, improve existing and develop additional training resources (i.e. quick reference guides for *SharePoint*), and create a "*SharePoint* Users" community as collective learning opportunity. The *SharePoint* Users community was seen as not only a good vehicle to support collective learning and provide self-enablement support, but the opportunity to demonstrate good community behaviours as an additional learning vehicle for all teams.

As will be explained further in the next section, only one of the seven communities initiated completed an iteration survey prior to the communities' work, and hence the study, being suspended by Cenovus; their results have been included at Appendix K. Given the single survey response, with limited participation by the community members and no subsequent iterations against which to compare, these results could not be used to form definitive conclusions relative to the study's questions; however, they did provide participant-validation of the research approach and instruments, and served as a preliminary example with which to demonstrate the change process as designed. They have been provided herein as a representation of the work that was to have occurred to illustrate how the data would have been utilized in making

adjustments within the communities to improve perceptions of efficacy, and determine patterns where possible between changes and the resultant impacts. For example, the consistent positive results for Questions 1 – 4 indicate that the initial structural elements with respect to the *Community Charter*, the business purpose, the assignment of roles, and the initiating activities were all perceived to be appropriate. The responses to Questions 5 and 6, however, regarding the value of synchronous and asynchronous dialogues, respectively reflect far less consistent perceptions of value by the participants, and hence opportunities to improve within the community. Focusing on the asynchronous dialogue responses, for example, the dispersion of responses would have initiated targeted discussion between the community and their Learning Advisor to assess why there were issues for some and not for all, identify causal factors, and determine mitigations for improvement. Examples of these factors and mitigations are:

- Recognizing different participant experience levels with asynchronous collaboration tools and interfaces;
- Level-setting to define common practices, guidelines, and expectations;
- Coaching for the participants and moderators on effective asynchronous collaboration techniques and motivational strategies;
- Changing the nature of the tools or focus of the dialogues to align to participant needs; and
- Assessing change management elements with respect to adoption timelines (i.e. the in-place processes, tools, and activities that may not require changing, but require the provision of additional time for the participants to get comfortable with a new way of working). In this case, the issue may be carried over for

consideration in a subsequent iteration to assess whether time was a contributing factor.

With respect to participant autonomy, the responses to Question 12 show differing perspectives from the participants, potentially indicating individual preferences on how people want to work within the community, which would become a second examination area between the community and the Learning Advisor. Although the "value" question responses are all relatively consistently positive, the dispersion were viewed as a key monitoring activity particularly in light of the "not applicable" responses; these responses may have indicated that participants had not yet seen value, potentially indicating that time and/or maturation may be a factor, or they may have seen no value at all from the effort, which would have represented a potential negative bias or barrier to improvement. Given the sample size was simply too small for any reliable conclusions to be drawn, additional exploration of this response area would have been a focus area within the collective discussion of the survey results with the community members programmed for the end of each assessment cycle. This would have set the stage for adjustments to the community activities and subsequent data comparison following the next iteration cycle. Of note, overall feedback from the survey respondents to their Learning Advisor regarding the survey process was very positive; they very much appreciated the focus the data provided them in terms of what areas to explore (and which to leave alone), and all participants reported that the collection process was both simple and efficient.

Postponement and Subsequent Cancellation of the Initiative

As noted in Chapter 1, the significant collapse in global oil prices starting in 2014 had a profound impact on Cenovus Energy, along with the majority of regional O&G and

supporting organizations. As noted in the timelines within Chapter 4, the study was originally endorsed for execution commencing in January 2015, with the first seven communities launched within the first quarter of that year. Unfortunately, this coincided with acceleration of the economic downturn, with resulting project work stoppages and personnel reductions commencing in March 2015 and continuing into the second quarter of the calendar year. Additional communities originally scheduled to launch in the second and third quarters began to defer their work and were subsequently rescheduled according to the second study timeline. During the summer and fall of 2015, the impact of the personnel reductions and work stoppages were such that the community initiative had stalled; most of the core teams had been effectively disbanded due to reductions and needed to be reformed, work priorities had shifted, and the deployment of the supporting tools (i.e. *SharePoint*) had been halted by the Information Technology group as part of their cost saving measures. Notwithstanding these issues, the work was still regarded as valuable by senior leaders, as indicated by their approval to continue the study and defer the work into 2016 as noted in the third iteration of the study timeline, even though many other parallel business projects were being halted immediately.

Unfortunately, the projected improvements in the economic situation did not arise, and in fact worsened significantly in the first quarter of 2016. All of the broader efforts around organizational learning were suspended as a priority for the company, all of the associated work was halted, and the KM team was deemed non-business critical under the current circumstances. As a result, all but one of the team members were either released from the company or reassigned to other work. Of note, the KM Learning Advisor responsible for the coordination of the community work, including the

production and administration of the surveys, was the one member retained as caretaker of this initiative given the value that this work was seen as providing. As noted in the letter of affirmation provided by Cenovus at Appendix N, the business processes, artifacts, and evaluation strategy and instruments created through this study now form the basis of the Cenovus business practice for communities, which is forecasted to resume once the economic and work situation improves. Although this may occur as early as the fourth quarter of 2016, it is predominantly dependent on circumstances outside of Cenovus' control, and hence cannot be predicted with any degree of certainty to warrant an extension of the academic study within the context of the doctoral program requirements. That said, Cenovus intends to complete the data collection and analysis program established by the study over time as part of their continuous improvement program, and has indicated that they will share any such data as a continuing research effort to this study when it becomes available. This may create the potential to conclude this study through subsequent research effort should the opportunity arise.

CHAPTER 6 – KEY LEARNINGS AND RECOMMENDATIONS

Notwithstanding the circumstances the prevented the study from being completed as designed, there were a number of key learnings and indications that were derived from this work that will be provided in the sections below.

Improvement Opportunities for Corporate Non-formal / Informal Learning

During the initial framing and literature review for this study, models for workplace learning within multiple different O&G companies were considered; these included Cenovus Energy, Husky Energy, Suncor Energy, Nexen, ConocoPhillips, BP, Royal Dutch Shell, and Schlumberger. It was noted that the move towards blended learning programs was well established in all of these organizations from a delivery approach perspective (i.e. multiple modes of delivery such as classroom, e-learning, collaboration communities); however, the predominant focus of workplace learning remained on delivering formal learning programs (i.e. structured e-learning modules, standardized curriculum, content aligned to courses). Particularly evident inside Cenovus through this study was stark absence of process or structure for many non-formal and informal learning programs that were still considered key parts of the broader learning model; these included collaboration communities as detailed in this study, "programs" for coaching and mentoring, on-job-learning, and independent / autonomous learning by individuals. The preliminary effort to create categories for workplace learning and some guiding parameters for those categories was the first step in helping provide deeper context to alternative program development. For example, within the certification program for their SAGD plant operators, there were three distinct phases: training, mentoring, and qualification. The training phase provided formal, structured

learning modules delivered by instructors; the mentoring phase provided on-shift peer mentoring that was semi structured (i.e. a guide was provided to the mentor to track key activities), and the qualification phase completed a formal structured assessment of operator skill and knowledge to support certification. On the surface, this reflected a sound blended learning approach that aligned to corporate pedagogical practice. In looking deeper into the mentoring program, however, as with collaboration communities, the sub-structure of the program was predominantly ad hoc; the mentors were not provided with training on how to be a mentor, they were free to determine their own reference sets and sequence of learning, and most of the knowledge and experience that was passed from one operator to another was not recorded or tracked apart from the final qualification. As such, the program supported the continuation of common work practices without knowing exactly what practices were being shared, or if they reflected the best practice that the company wanted developed (i.e. peer mentors would teach "tricks" and shortcuts that they had learned from others, but were not part of the established operating procedures). The initial effort to categorize their workplace learning activities provided an opportunity to dig much deeper into their core learning models, and identified many such examples where critical learning programs were not well grounded in good learning theory or practice.

Notwithstanding their good intentions and commitment to emerging alternative forms of learning such as "social learning" and "mobile learning," these companies are increasingly limited by an absence of embedded learning knowledge and expertise within their programs and practices. This will likely become an even greater issue following the economic downturn, as many regional companies have cut their training teams and

programs in an effort to reduce operating costs, leaving them with less internal learning expertise to sustain high quality learning programs and outcomes. In some of the cases examined, the topical trends in learning are perceived to be panacea that don't require significant effort on the part of the organization to deploy solutions. For example, "self-enablement" is an increasingly common euphemism in Cenovus that was introduced by a well-intentioned Learning Advisor advocating for social / informal learning. Unfortunately, the initial delivery of the concept simply provided learners access to massive amounts of information via an online repository with a search engine, with no structure for their investigation, no identification of what they researched, and no measure of what (if any) learning outcomes resulted. While the program briefed well to executives in its simplicity, it did not contribute meaningfully to improving the learning experience for their teams.

As companies work towards alternative training delivery programs that increasingly rely less and less on formal instruction, and are increasing deployed with less and less internal learning expertise to guide their implementation, opportunities will increase in critical areas of their business for research projects focused on learning theories and practices. Creating alignment between these corporate needs and emergent learning research can provide opportunities for applied research projects that can not only advance learning theory, but can drive significant value to the host organizations.

Transactional Distance Theory as a Basis for Community Design

The study's first research question asked: *When designing collaboration communities, to what extent do the transactional distance elements of structure, dialogue, and autonomy provide a structural base upon which to plan activities,*

processes, and objectives in order to support the intended business outcomes? Although there was insufficient data collected with which to make a reliable conclusion, there was consensus among the KM team members that the three transactional distance elements provided a foundation for planning and evaluation that addressed the common areas of concern and effort. It was noted that having a defined theoretical model and framework against which to align business practices, evaluation, and improvement opportunities provided both logical planning and rigour that had not been present in previous community implementations in Cenovus. This was particularly evident when working with the stakeholder communities, many of which were comprised of leaders and participants with deep engineering and technical backgrounds; for them, "building" something needed to have a solid practice foundation, alignment to key design principles, and a supporting business process to follow. Unlike previous efforts where communities were created ad hoc, and were not based on documented practices, the communities created during this study were much more robust from the outset, as the communities themselves were able to use the provided templates, self-manage (following initial coaching), and lead the communities internally. Their sense of ownership and authorship from the outset enhanced their perception that the community was their responsibility, and hence they were more willing to invest time and effort to make it successful.

An unanticipated benefit of this work was also noted in discussions with different community leaders, as well as some of the managerial and executive sponsors. In explaining the study, deeper discussions on transactional distance itself often resulted, as communication break-downs between teams, business units, and work sites was a frequently identified cause for incidents and project delays. Viewing transactional

distance theory in the context of the misunderstandings that were frequently observed in their workplace provided a layer of context that was felt could be applied not only to learning programs, but even in defining an alternative leadership approach. For example, reflections on how a leadership team was structured, how communications were cascaded down to the teams, and what levels of autonomy were provided within direction given, were seen as potential means to improve clarity of understanding and operational results. Although not part of the study objectives per se, it was an interesting context of transactional distance theory that may merit future consideration.

Unfortunately, the merits of this framework as compared to other community models (i.e. those provided by Wenger) could not be assessed comparatively given the intended validation of the transactional distance model through the study's second research question (*To what extent do changes in the nature or conduct of specific collaboration community activities and processes aligned with structure, dialogue, and autonomy improve the perception of efficacy relative to intended outcomes to a degree of practical significance, as perceived by the stakeholders?)* was not able to be completed prior to the cessation of the work. The positive preliminary indications from this study do support a continuation of this research direction; however, this will have to be supported through other studies in the future.

Design-based Research Within a Corporate Setting

The dual objectives of development researchers noted earlier by Reeves (2000) (solving human teaching, learning, and performance problems while at the same time constructing a body of design principles), combined with the iterative nature of design-based research, aligned very well within Cenovus' existing business practices for

continuous improvement. Although Cenovus has used similar iterative approaches across its business units (one such model is their "PERI" cycle, reflecting Planning, Execution, Review, and Improve activities, similar to the cyclical "ADDIE" instructional system design model outlined by Glaser [1976]), the design-based research efforts introduced much more rigour and balance to the process than their existing processes. The nature of the study fit very well with Cenovus' corporate efforts to become data- and evidence-based in their business decisions and processes, and this model fit very well into existing yet less well defined practices. For example, Cenovus has routinely used surveys to collect data; however, it has done so as discrete activities that do not persist from one survey to another, hence limiting the ability to do comparative analysis or iterative improvements.

Perhaps most significant to this study, however, was the flexibility of the iterative, cyclical nature of the design-based research process. As noted throughout the study, the fluid and evolving environment within which the study was being conducted was impossible to control and difficult to predict. A more structured or rigid experimental methodology would have likely failed quickly in this setting given the frequent adjustments that were required, whereas the iterative design-based process allowed for tremendous flexibility. Each cycle was short enough to be executed within the broader circumstantial changes, while the need to make adjustments for each iteration was already part of the process design; in this case, situational influences were simply added to identified community design adjustments. Many of the nuances observed in this environment related directly back to most of Collins' (1999) considerations for design-based research for education studies provided in the study design:

- *Laboratory settings vs. messy situations*. The changing corporate priorities, the external influences of the economic downturn, and the lack of cohesion within the KM team all contributed to a messy situation that could not have been anticipated during the study design.
- *A single dependent variable vs. multiple dependent variables*. The different objectives, priorities, and individual participants for each community meant that each community was unique, notwithstanding the standardized approach to their development. In this case, the relevant observations for the study had to be synthesized from the broader activities of the communities themselves.
- *Controlling variables vs. characterizing the situation*. Given the external environment, looking at each community holistically and aligning designs to their business needs first, and the study needs seconds, was a factor of the study.
- *Experimenter vs. co-participant design and analysis*. The nature of the study was such that co-design with both the KM team and the communities was essential; given the culture of Cenovus, this work could not have been successful without the collaboration, contribution, and community ownership of the participants, which would not have resulted from an experimenter-driven design perspective.

The second most significant aspect of design-based research for this study was the exploratory nature of the approach. Given the uncertainly of the outcomes, it was not possible to develop concrete models at the outset of the effort that would have been sustainable throughout the process. The synthesis of the learning through each cycle of the project, and each community engaged, allowed for progressive learning and ideation across a wide number of participants that brought unique perspectives to the process. By

involving the community participants in the process, the groups were much more supportive of the data collection and alignment to action plans than they may have been if following a more rigid experimentation methodology. By executing the study as a collective research activity, and giving voice to the stakeholders in the establishment of the derived frameworks, potential barriers to change and adoption did not arise as previously identified as risk elements of the corporate initiative.

Overall, design-based research proved to be a highly useful and largely familiar process to the corporate participants, and is strongly recommended as a key methodology to consider for similar research efforts within a corporate setting.

Action Research Within a Corporate Setting

While the utilization of academic action research models appeared highly adaptable to a corporate setting, given the subject matter expertise and resources available within a large organization, the researcher underestimated the absence of alignment between members of the project team given their diverse backgrounds, different levels of academic development and professional experience, and the influences of corporate culture on academic research. The inclusion of Cenovus employees and contractors as part of the research effort provided many elements of value and perspective; however, there was significant effort required to align the team to common theories, models, and frameworks before productive work could begin. The researcher had to spend significant time and effort teaching foundational knowledge and practices to people employed as learning practitioners, yet not professionally qualified to fully perform within that designation. In many cases, team members had been put in their learning advisor roles because they knew “the most” about learning practices as

compared to their peers; however, that relative assessment of knowledge and ability did not reflect an ability to perform well in that role from an academic theory or research perspective. To conduct similar research in parallel future settings, additional effort will be required during the establishment of a corporate research project team to standardize understanding and define key roles at the outset based on personal qualifications and abilities in addition to job title and appointment (i.e. ensure a distinction between personal capability versus positional power).

Leading a Research Study When in a Power Relationship

One of the key challenges faced by the researcher in leading this project was the ethical concerns that his organizational role and position would create a "power relationship" that could unfairly influence the study and its outcomes, or unduly influence the participants. As a result, the researcher tried to minimize his influence as a leader so as to preserve the integrity of the study, and empowered the KM team to execute the core of the program relatively independently. This proved to be a detriment to the study to an extent, as the KM team became conflicted between its own members, and dissenting opinions led to delays, re-work, and negative counter-positions that undermined the Cenovus work. In reflection, the researcher noted that any research team could have an inherent power relationship between the research team leader and the team members, and that a more directive leadership approach study would have eliminated most of the executional issues with the study that resulted from the challenges within the KM team. Further, it is unlikely that tightened controls over the execution of the work would have influenced the outcomes of the study, as the research questions were exploration based, and did not have a "right answer" to be chosen. Improving the

execution controls may have accelerated the iteration cycle times and data collection processes, but would not have influenced the results of the study per se; the conclusions would have been drawn from the data, not the execution, and as such playing a stronger leadership role should not have created any ethical concerns in this regard. This insight will enable the research to provide more targeted leadership approaches on research studies in the future, ideally finding a better balance in preserving both the ethics and executional integrity of his research efforts.

The Importance of Perception in Determining Value

Perhaps the most important learning from this study has been regarding the importance of perception in assessing value. This was evidenced not only in the context of the study's conduct, but most importantly in the response to the work by Cenovus. While some business activities allow for very tangible value measures, such as time saved, costs reduced, or outcomes achieved, Cenovus also attributes value to activities with less quantifiable outcomes, but which qualitatively demonstrate a rigour of process and retains the support of the participants (i.e. the participants believe that the activity is worthwhile). It was very rewarding to receive the support of the organization to adopt the outputs of this study even though it was not completed, as value was already assessed from the preliminary assessments and feedback from the participants. Although it would be relatively easy to say that the study did not meet its objectives relative to the stated research questions, the introduction of learning theory into business practice, providing academic rigour into parallel corporate processes, and developing business frameworks and process models for Cenovus' collaboration communities each provided elements of key value to the organization. While the academic objectives were not fully met, the

study accomplished the organizational objectives of establishing a classification taxonomy for workplace learning types, providing a standardized business process and associated artifacts for collaboration community development, and significantly improving the rigour associated with this type of business activity. Perhaps most importantly, given the title of this study, the effort was perceived to have delivered value to the enterprise, as noted by both the survey participants in the initial results received, and the Cenovus Executive Sponsor as stated in the Letter of Affirmation (Appendix N).

This concept will be a point of continued reflection for the researcher with respect to exploring both measured and perceived value in subsequent research efforts. While learning solutions ideally need to provide tangible benefits to a host organization, it should not be overlooked that the conduct of sound research can, in and if itself, provide value even when the stated objectives may not always be met.

Recommendations

As the data collection and validation component of the study could not be completed due to the economically-driven stoppage of work by the host organization, definitive conclusions may not be made relative to many of the specific research questions posed by this study. However, the following recommendations are made confidently for the undertaking of related activities specific to the focus of this study:

- Given the adoption of this work and commitment from Cenovus to continue data collection in the future, this research should be continued within subsequent efforts to answer completely the stated questions and complete the management framework. Collaboration communities will remain a key component of their non-formal learning program going forward, as with other O&G companies, and

it is anticipated that the evolution of associated collaboration community models, practices, and enabling technologies will continue at an accelerated pace. The shifting workforce demographics within O&G companies will require significant knowledge transfer form the retiring workforce to the next generation, and it is unlikely this that can happen effectively through formal training programs alone;

- The initiating processes, templates, and activities for corporate collaboration communities created through this study can be leveraged by other organizations in the absence of their own internal processes. Cenovus has committed to the sharing and publication of this work as it continues to evolve, and values collaboration with other organizations; however, this will require effort and initiative of others parties to implement, as Cenovus does not have the internal resources or external mandate to provide learning services to other companies. Through either parallel research projects or the potential commercialization of this material, opportunities can be established between learning practitioners / researchers and O&G companies to expand upon and apply the research provided by this study. There is an absence of structured research capacity and rigour within many corporate organizations, yet many potential and direct parallels between academic and corporate research outcomes. The structure and processes of academic research can be highly beneficial to corporations that seek higher learning but lack the internal capacity to conduct their research independently; and
- Similar transactional distance research being conducted within academia should consider studies or applied research within a corporate setting. As noted earlier,

the foundational challenge associated with transactional distance theory – the "spaces" that create potential for misunderstanding (or a difference in understanding, as provided above) – may not be limited only to spaces between teachers and learners. In the context of organizational command and control, the consideration of transactional distance theory as applicable to leadership styles and practices, organizational design, and internal communication standards could also prove to be an intriguing research topic. Large corporate organizations face a wide range of challenges in sustaining the right alignment of understanding across their workforce, such as geographical separation, diversity in the workforce of language, culture, gender, and generation, dispersion of communication habits across a range of emergent media, and massive amounts of tacit knowledge across their workforce that remains largely an untapped resource. Leveraging transactional distance theory as a basis for different management models and practices outside of a teaching / learning context may provide a unique application of this work to a new field of endeavour.

Outside of the direct scope of this study, but identified as discrete opportunities during its conduct, two key areas of supporting research are strongly recommended for consideration by others, and will be continued by the researcher as part of a continuation of research within this field:

- *Enhanced process models for non-formal / informal learning.* As outlined earlier, other key areas of non-formal / informal learning frequently present in the O&G corporate environments reviewed for this study (i.e. coaching and mentoring, on-job-learning) have been lacking epistemological and pedagogical rigour. This has

likely resulted from insufficient depth of expertise or significant investment in corporate learning teams, which are commonly seen as a lower priority business need than core operational functions. The creation of a validated body of knowledge that provides not only the practical application of learning theory, but also the templates, tools, and frameworks to adopt standardized learning approaches, would likely provide significant business value for O&G companies; and

- *Expanded Instructional System Design Models for Corporate Environments*. Across the different O&G companies reviewed for this study, adaptations of the ADDIE instructional design process model outlined by Glaser (1976) were prevalent as the foundation for formal learning programs. This model has been adopted by many organizations as the basis for their learning program development, following the high-level process steps of Analyse, Design, Develop, Implement, and Evaluate. The model was originally intended for formal academic programs, and has worked very well in that context; however, it has been the researcher's experience that its application in "operational" organizations such as the O&G companies has led to unanticipated (and frequently unrecognized) gaps in the development and support of their employees. A key distinction between academic and operational training programs is that academic programs generally end a point of competency development, while operational programs need to include competency application. For example, a university program will graduate engineering students once they have met the academic standards for that professional;

however, academic programs do not normally extend learning capacity or support for their students into their post-graduate employment roles, nor do they have accountability for graduate performance outcomes in these roles. As such, the ADDIE model was designed predominantly to address learning programs that focus only on the initial formal learning and training for students. Within operational organizations, however, they are responsible for both initial formal training that provides qualifications for their personnel, and the performance outcomes that result from that training; as such, the continuum of learning activities that they much consider for employee development much consider the complete range of formal, non-formal, and informal learning an employee will undertake throughout their career. While ADDIE remains a viable instructional design approach for formal program development, alternative models are likely required for non-formal and informal learning approaches that support operational performance evaluation and improvement beyond a training and qualification program.

References

Alberta Department of Finance and Enterprise. (2009). *Alberta Industry Sector Performance and Prospects*. Retrieved from http://www.albertacanada.com/ABIndustrySector.pdf

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning Design framework. *Educational Researcher*, 32(1), 21–24.

Bernhard, H.B., and Ingols, C.A. (1988). Six lessons for the corporate classroom. *Harvard Business Review, September-October.*

Billett, S. (2001). *Learning in the workplace: strategies for effective practice*, Sydney: Allen & Unwin.

Boud, D. (1999). Situating academic development in professional work: using peer learning. *International Journal for Academic Development, 4*(1), 3-10.

Cambridge, D., Kaplan, S., & Suter, V. (2005). Community of practice design guide: A step-by- step guide for designing and cultivating communities of practice in higher education. *EDUCAUSE*. Retrieved from http://net.educause.edu/ir/library/pdf/NLI0531.pdf

Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, December 2010

Cappelli, P. (2008). Talent management for the twenty-first century. *Harvard Business Review, March.*

Cleveland-Innes, M. & Ally, M. (2004). Affective learning outcomes in workplace training: A test of synchronous vs. asynchronous online learning environments. *Canadian Journal of University Continuing Education (CJUCE) Journal, Vol 30* (1), 15-35.

Cofer, D.A. (2000). *Informal workplace learning*. Practice Application Brief No. 10, Educational Resources Information Centre. Retrieved from http://www.eric.ed.gov/PDFS/ED442993.pdf

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.* London: Routledge.

Colley, H., Hodkinson, P., & Malcolm, J. (2002). *Non-formal learning: mapping the conceptual terrain.* Leeds: University of Leeds Lifelong Learning Institute. Retrieved from http://youth-partnership-eu.coe.int/export/sites/default/youth-partnership/TALE-Documentation/Documents/Phase_3/ELU_5/Tale_ELU5_NFL_Mapping_the_conceptual_terrain.pdf

Collins, A. (1999). The changing infrastructure of education research. In E. Lagemann & L. Shulman (Eds.), *Issues in education research* (pp. 289–298). San Francisco: Jossey-Bass.

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *The Journal of the Learning Sciences*, *13*(1), 15-42.

CRES. (2008). *Skills shortages in the global oil and gas industry*. Geneva. Retrieved from http://www.cres.ch/Documents/SKILLS%20SHORTAGE%20PART%20I%20pdf.pdf

Dixon, J. and Harding, G. (1990). Delphi Forecasting Methodology. In *Proceedings of the National Conference of the Australian Evaluation Society.* Sydney, pp. 255-8

Education Development Centre. (1998). *The teaching firm: where productive work and learning converge.* Newton, MA: Centre for Workforce Development. Retrieved from http://www.edc.org/sites/edc.org/files/pdfs/teaching_firm.pdf

Efficacy. (2014). In *Merriam-Webster.com*. Retrieved online 24 October 2014 from http://www.merriam-webster.com/dictionary/iteration.

Engestrom, Y. (2001). Expansive learning at work: toward an activity theoretical reconceptualization. *Journal of Education and Work, 14(*1), 133-156.

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology, 70*, 113-136.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education. 26*(2), 247-273.

Galvin, T. (2002). 2002 industry report. *Training, October*. Retrieved from http://econ2.econ.iastate.edu/classes/econ320/orazem/addendums/training%20industry%20report.pdf

Garrison, R. (2000). Theoretical challenges for distance education in the twenty-first century: A shift from structural to transactional issues. *International review of research and open and distance learning, 1*(1) (pp. 1-4).

Giossos, Y., Koutsouba, M., Lionarakis, A., and Skavantzos, K. (2009). Reconsidering Moore's transactional distance theory. *European Journal of Open, Distance and E-Learning, 2*. Retrieved from http://www.eurodl.org/materials/contrib/2009/ Giossos_Koutsouba _Lionarakis_Skavantzos.pdf

Glaser, R. (1976). Components of a psychology of instruction: Toward a science of design. *Review of Educational Research, 46*(1), Winter, pp. 1-24.

Gorsky, P., & Caspi, A. (2005). A critical analysis of transactional distance theory. *The Quarterly Review of Distance Education, 6*(1), 1-11.

Gray, B. (2004). Informal learning in an online community of practice. *Journal of Distance Education, 19*(1), 20-35

Gysel, U., & Krinock, J.A. (2004). Advanced distributed learning and community. *Information & Security: an International Journal, 14*, 145-155

Hansen, M.T. (2009). When internal collaboration is bad for your company. *Harvard Business Review, April*

Henriques, L. (1997). *A study to define and verify a model of interactive-constructive elementary school science teaching*. Unpublished doctoral dissertation, University of Iowa.

Hsu, C. and Sandford, B. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*. 12(10). Retrieved from http://pareonline.net/pdf/v12n10.pdf

Iteration [Def 1]. (2014). In *Merriam-Webster.com*. Retrieved online 12 January 2014 from http://www.merriam-webster.com/dictionary/iteration.

Kleiner, A. and Roth, G. (1997). How to make experience your company's best teacher. *Harvard Business Review, September*.

Le Clus, M. (2011). Informal learning in the workplace: A review of the literature. *Australian Journal of Adult Learning, 51*(2), 355-373.

Mahar, G.J. (2007). Factors affecting participation in online communities of practice. *Dissertation Abstracts International, 71*(01), July 2010. (ProQuest Document ID 305141269)

Marsick, V.J., and Watkins, K.E. (2001). Informal and incidental learning. *New Directions for Adult and Continuing Education, 89,* 25-34

McDermott, R., and Archibald, D. (2010). Harnessing your staff's informal networks. *Harvard Business Review, March.*

Moore, M. G. (1984). On a Theory of Independent Study. In D. Stewart, Keegan, D., & Holmberg, B. (Ed.), *Distance Education: International Perspectives* (pp. 68-94). London: Routledge.

Moore, M. G. (1991). Editorial: Distance education theory. *The American Journal of Distance Education, 5*(3), pp. 1-6. Retrieved from http://www.ajde.com/Contents/vol5_3.htm#editorial

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical Principles of Distance Education* (Vol. 1, pp. 22-38). New York: Routledge.

Moore, M. (1997). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical Principles of Distance Education* (Vol. 1, pp. 22-38). New York: Routledge.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. New York: Wadsworth.

Moore, M., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Toronto: Thompson.

Pruitt, D. (2005). Transactional distance as learner autonomy as predictors of student performance in distance learning courses delivered by three modalities. *Dissertation Abstracts International 66*(04), October 2005. (ProQuest Document ID 305400828)t

Pyron, D. (2008). Solutions to the recruitment and retention challenges in the oil and gas industry. *Talent and Technology, 2*(2)

Rabinovich, T. (2009). Transactional distance in a synchronous web-extended classroom learning environment. *ProQuest Dissertations and Theses.* Retrieved from http://0-search.proquest.com.aupac.lib.athabascau.ca/pqdtft/docview/304845866/fulltextPDF/13A5B80C5D8577C86E6/1?accountid=8408

Reber, A.S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. Oxford: Oxford University Press.

Reeves, T. C. (2000). Enhancing the Worth of Instructional Technology Research through Design Experiments and Other Development Research Strategies, Paper presented on April 27, 2000 at International Perspectives on Instructional Technology Research for the 21st Century, a Symposium sponsored by SIG/Instructional Technology at the Annual Meeting of the American Educational Research Association, New Orleans, LA, USA.

Reeves, T. C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 97-116.

Shearer, R.L. (2009). Transactional distance and dialogue: An exploratory study to refine the theoretical construct of dialogue in online learning. *Dissertation Abstracts International, 71*(03), Sep 2010. (ProQuest Document ID 304983940)

Statistics Canada (2016). Employment by class of worker and industry (based on NAICS) – Seasonally adjusted. Retrieved from http://www.statcan.gc.ca/daily-quotidien/160311/t002a-eng.htm

Strother, J.B. (2002). An assessment of the effectiveness of e-learning in corporate training programs. *The International Review of Research on Open and Distance Learning, 3*(1).

Sunstein, C.R. (2006). When crowds aren't wise. *Harvard Business Review, September.*

Surowiecki, J. (2004). *The wisdom of crowds.* New York: Doubleday

Surowiecki, J. (2012). Mind the gap. *The New Yorker, July.*

The Economist Intelligence Unit. (2012). *Big spenders: The outlook for the oil and gas industry in 2012*. New York: The Economist. Retrieved from http://www.managementthinking.eiu.com/sites/default/files/downloads/Big%20spenders%20-%20GLND.pdf

Training Industry Report. (2011). *Training, November-December.* Retrieved from http://www.trainingmag.com/sites/default/files/trg_2011IR.pdf

Training Industry Report. (2012). *Training, November-December.* Retrieved from http://www.cedma-europe.org/newsletter%20articles/Training%20Magazine/2012%20Training%20Industry%20Report%20%28Nov%2012%29.pdf

Training Industry Report. (2013). *Training, November-December.* Retrieved from https://trainingmag.com/sites/default/files//2013_Training_Industry_Report.pdf

Training Industry Report. (2014). *Training, November-December.* Retrieved from https://trainingmag.com/sites/default/files/magazines/2014_11/2014-Industry-Report.pdf

Training Industry Report. (2015). *Training, November-December.* Retrieved from http://pubs.royle.com/publication/?i=278428&p=22

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development, 53*(4), 5-23.

Wenger, E. (1998). Communities of practice: Learning as a social system. *System Thinker, 9*(5).

Wenger, E. (2000). Communities of practice and social learning systems. *Organization, 7*(2), 225-246.

Wenger, E.C., McDermott, R., & Snyder, W.C. (2002). *Cultivating communities of practice: A guide to managing knowledge.* Cambridge: Harvard Business School Press

Wenger, E., and Snyder, W. (2000). Communities of practice: the organizational frontier. *Harvard Business Review*. January-February 2000, pp. 139-145.

Wenger, E., Trayner, B., & de Laat, R. (2011). *Promoting and assessing value creation in communities and networks: a conceptual framework.* Retrieved from http://www.knowledge-architecture.com/downloads/Wenger_Trayner_DeLaat_Value_creation.pdf

Yaw, D.C., (2005). An evaluation of e-learning in industry at level three based upon the Kirkpatrick model. *Dissertation Abstracts International*, *66*(12), June 2006. (ProQuest Document ID 304988679)

Appendix A -

Graphic Depiction of Study Process Flow and Timeline

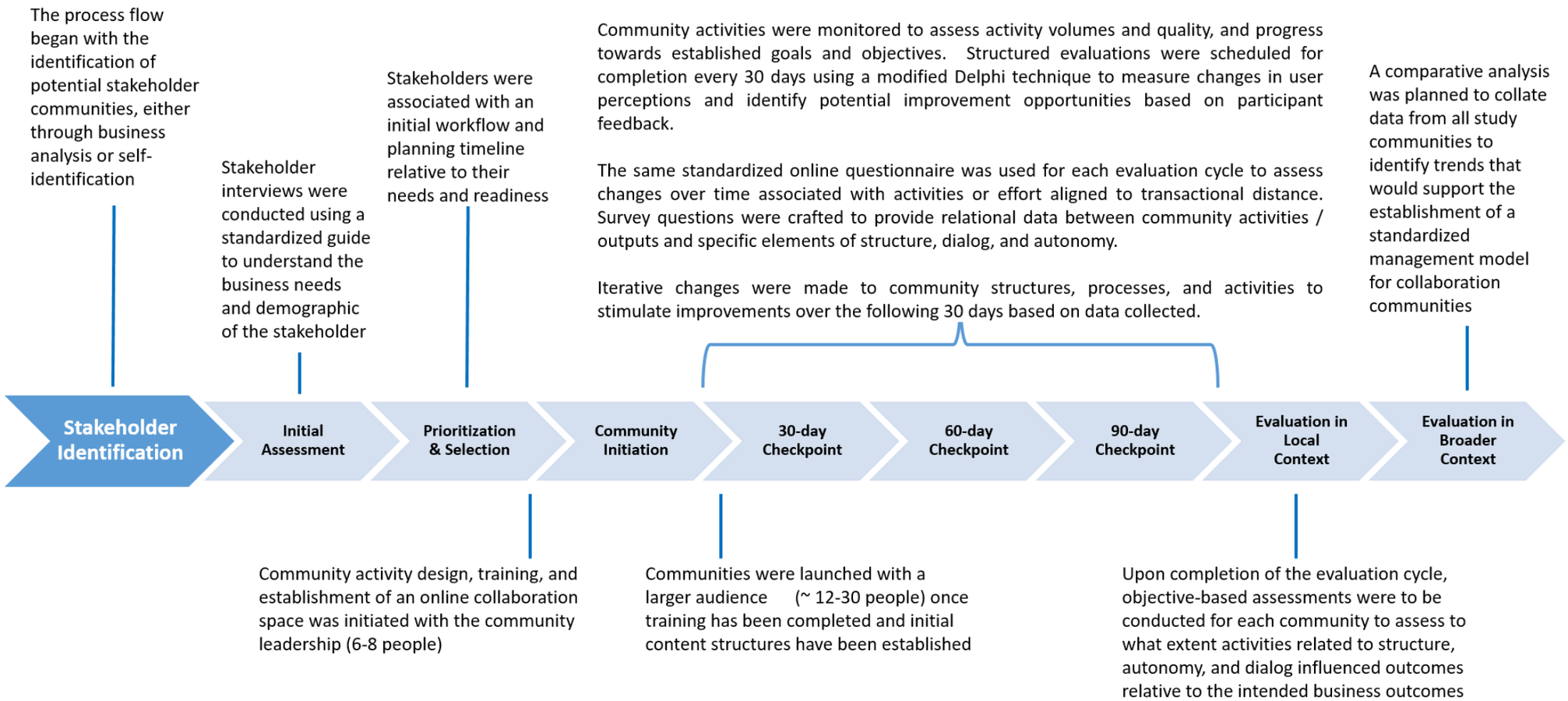

Figure A1. Graphic Depiction of Study Process Flow and Timeline

Appendix B -

Stakeholder List of Potential Collaboration Communities

Table B1. Stakeholder List of Collaboration Communities Within the Study.

Identified Stakeholder Communities (listed alphabetically by inclusion segments)	**Included in Sample**	**Community Initiated**	**Community Launched**
Automation Community	Yes	Yes	Yes
Human Resources (Operations)	Yes	Yes	Yes
Integrity & Containment Collaboration (Subsurface)	Yes	Yes	Yes
Learning@Cenovus	Yes	Yes	Yes
Local Community Relations	Yes	Yes	Yes
Senior Leaders Community	Yes	Yes	Yes
Women@Cenovus	Yes	Yes	Yes
Combustion Technologies	Yes	Yes	No
Completions & Well Servicing	Yes	Yes	No
COMS 5.4 Training & Certification	Yes	Yes	No
Downstream Hub	Yes	Yes	No
Functional Model (FX)	Yes	Yes	No
Functional Model - Process	Yes	Yes	No
Geoscience Community	Yes	Yes	No
IT Project Management Office	Yes	Yes	No
Knowledge@Cenovus	Yes	Yes	No

Identified Stakeholder Communities **(listed alphabetically by inclusion segments)**	**Included in Sample**	**Community Initiated**	**Community Launched**
SAGD Panel Operations	Yes	Yes	No
SAGD Process AWT Network	Yes	Yes	No
SharePoint Users	Yes	Yes	No
Turnarounds	Yes	Yes	No
PMO Focus Group	Yes	No	No
Procedure Management	Yes	No	No
SAGD De-Oiling Network	Yes	No	No
SAGD Field Operations Network	Yes	No	No
SAGD Steam Network	Yes	No	No
SAGD Water Re-Use Network	Yes	No	No
Young Professionals	Yes	No	No
Administrative Assistants	No	No	No
Business Excellence Community	No	No	No
Business Planning	No	No	No
Cenovus Speakers Network	No	No	No
Earthworks	No	No	No
Enabling Functions (FX)	No	No	No
Enhanced Operator Performance	No	No	No
Environmental Sustainment	No	No	No

Identified Stakeholder Communities **(listed alphabetically by inclusion segments)**	**Included in Sample**	**Community Initiated**	**Community Launched**
Executional Excellence	No	No	No
FCCL Partnership	No	No	No
Financial Capacity (FX)	No	No	No
GIS Information	No	No	No
Innovation Summit	No	No	No
IT Help Desk	No	No	No
Leadership Development	No	No	No
Marketing & Logistics, Refining & Upgrading (FX)	No	No	No
Process Safety Management	No	No	No
Production & Operations (FX)	No	No	No
Reservoir Management	No	No	No
Strategy & Integrated Planning (FX)	No	No	No
Supply Chain	No	No	No
Unlock & Develop (FX)	No	No	No

Appendix C -

Collaboration Community Suitability Assessment Questions

The following questions were employed by the KM Team's Learning Advisors to assess both suitability and readiness of potential stakeholder groups after a learning analysis determined that a collaboration community would be an appropriate approach. The standardized responses were used to prioritize stakeholders for engagement and activity initiation, and from which the sample of convenience for the study was derived. Note these assessments were not part of the data collection specific to the research questions, and hence were not coded or included as part of the study results.

I. Business Value

1. Have you identified a clear business need (problem to be solved, risk to be mitigated, or opportunity to be realized) that this community will collective work to solve?
   - ❑ No
   - ❑ Yes, identified need, not yet validated by a business sponsor
   - ❑ Yes, identified need, validated by a business sponsor

2. Have you determined the expected business outcome of developing this community?
   - ❑ No
   - ❑ Yes, determined outcome, not yet validated by a business sponsor
   - ❑ Yes, determined outcome, validated by a business sponsor

3. What is the anticipated business value to be generated by the community, and when do you anticipate this occurring?
   - ❑ [Open question, with value to be provided by the interviewee]

4. Does your business impact/outcome strategically align with the following? *(Check all that apply)*
   - ❑ Improving our performance/effectiveness
   - ❑ Increasing our productivity/efficiency
   - ❑ Improving our safety performance
   - ❑ Attacking cost structure

5. What percentage of your community's potential membership (core team and participants) do you believe are committed to working within the One Cenovus work principles?
    - ❑ [Open question, with value to be provided by the interviewee]

II. Sponsorship

6. Have you been requested by one of the following to form a collaboration community?
    - ❑ CEO/COO/EVP
    - ❑ SVP/VP
    - ❑ Director/Manager
    - ❑ Group Lead/Colleagues
    - ❑ We/I have not been formally asked to form a collaboration community

7. Do you have an engaged senior level sponsor for the community?
    - ❑ No
    - ❑ A sponsor has been identified, but not yet confirmed
    - ❑ A sponsor has been identified and confirmed

8. To what degree do you anticipate obtaining the commitment of operational leaders to allow their direct reports to participate?
    - ❑ Not at all obtainable
    - ❑ Slightly obtainable
    - ❑ Moderately obtainable
    - ❑ Very obtainable
    - ❑ Completely obtainable

III. Readiness

9. Are any of the following activities/resource bases currently in place to help address this issue/opportunity?
    - ❑ No
    - ❑ Ad hoc dialogue
    - ❑ Activities/Events

- ❑ Documented processes
- ❑ Informal network

10. Have you identified a leader for this collaboration community?
    - ❑ No
    - ❑ A leader has been identified, but not yet confirmed
    - ❑ A leader has been identified and confirmed

11. Have you identified a core team for this collaboration community?
    - ❑ No
    - ❑ Core team members have been identified, but not yet confirmed
    - ❑ Core team members have been identified and confirmed

12. Do you expect to have sufficient people resources that are willing participants and committed to the community's intended business outcome?
    - ❑ No
    - ❑ Uncertain at this time
    - ❑ Yes

13. Have you identified how success for this community will be measured?
    - ❑ No
    - ❑ Yes, however not yet validated with the business sponsor
    - ❑ Yes, and validated with the business sponsor

Appendix D -

Sample Community Charter

[Community Name] Collaboration Community Charter

Community Sponsor: **Community Leader:**

Knowledge Management Advisor: **Creation Date:**

Revision Date:

PURPOSE, OBJECTIVES, SCOPE & SUCCESS FACTORS

Purpose Statement (What is the primary purpose/intent of the community? Who are the key stakeholders?)

- **Purpose statement:**

- **Key stakeholders:** (add additional lines as needed)

Name	Interest / Alignment to the Community	Potential Role

A. Community Objectives: What are the ***business*** issues and results that the community will address in the short and long term? Complete all that are relevant.

	Benefits to Cenovus What are the core business objectives / priorities that the community will support?	**Short-term Objective(s)** During the first year, the community will focus on achieving:	**Long-term Objective(s)** Over the longer term (>1 year), the community will focus on achieving:	**Metrics**	
				What measures will be employed to determine success?	**How and when will value realization be reported**?
1.	Improving our performance/ effectiveness				
2.	Increasing our productivity/efficiency				
3.	Improving our safety performance				
4.	Attacking cost structure				
5.	Other [Insert Here]				

B. Benefits to Members: What are the expected benefits to the ***members***? Check all that apply and provide metrics for each.

	Benefit *This community will help members:*	**Metrics**	
		Quantitative (if applicable)	**Qualitative** (if applicable)
☐	Quickly access and leverage knowledge and expertise		
☐	Collaboratively solve business problems		
☐	Devise creative solutions		
☐	Develop and apply best /proven practices		
☐	Understand and apply standards and processes		
☐	Reduce duplication of work and reinvention across the organization		
☐	Reduce repetition of mistakes		
☐	Rapidly transfer and replicate successes		
☐	Reuse and build on existing knowledge		
☐	Make better informed decisions		
☐	Generate and apply innovative ideas		

	Benefit *This community will help members:*	**Metrics**	
		Quantitative (if applicable)	**Qualitative** (if applicable)
☐	Accelerate personal learning		
☐	Foster professional development		
☐	Enhance their professional reputation		
☐	Stay aware of emerging trends and issues in their discipline		
☐	Other:		

C. Scope: What work areas are within the scope of the community and outside of its scope?

In Scope	**Out of Scope**
•	•
•	•

D. Other business areas/groups impacted: What other CVE areas/groups will be connected to, or impacted by, the work of this community?

•	•	•
•	•	•
•	•	•

E. Critical success factors: What are the factors that need to be in place or risks that need to be mitigated for this community to be successful?

Success Factor	Currently in place?				Risk mitigation tactic (if required)	Target achievement date
Engaged sponsor	☐	Yes	☐	No		
Reputable/influential leader	☐	Yes	☐	No		
Participation of experts	☐	Yes	☐	No		
Buy-in of leaders for member participation	☐	Yes	☐	No		
Other:	☐	Yes	☐	No		

CHARTER APPROVAL

By signing this Charter, you agree to your role in the Community and your responsibility to ensure this charter is the guiding document to achieving community objectives.

Community Sponsor Name	Signature	Date
Community Leader Name	Signature	Date
Knowledge Management Advisor Name	Signature	Date

If there are multiple Leads or Sponsors, please add lines for their names and signatures.

Appendix E -

Initial Community Design Document

[Community Name] Collaboration Community Operations & Design Document

This document supplements the community charter and assists the Core Team in governing and guiding the community.

A. Knowledge sharing/collaboration activities: What activities does the community plan to implement prior to the launch? Select all that apply.

☐	Community Meetings	☐	Lunch & Learns	☐	Core Team Meetings *Specify frequency:* _____	☐	Teambuilding
☐	Training Sessions	☐	Lync/Web meeting	☐	Videoconference meetings	☐	Other (please specify):

B. Rewards and recognition: Describe how participation in the Community will be rewarded and recognized (if known).

Activity/Participation	Reward/Recognition	When

C. Behavioural norms and reinforcing factors: List the behaviours that are expected from Community members and how the Community will support/reinforce the behaviours.

Behaviour Norm	Reinforcing Factor(s) (e.g. inclusion in performance objectives, support by management, etc.)
•	•
•	•
•	•

D. Key Community Members: List the key Community members by role.

Role	Name(s)	Business Area
Community Sponsor(s)		
Community Leader		
Local Community Leads (if applicable)		
Site Administrator/Moderator		
Additional Core Team members (add extra lines as needed)		
Knowledge Management Advisor		

E. Collaboration Site Requirements

Community Security: Communities are "open by design, closed by exception."

☐ Community site and its documents are viewable by all Cenovus staff but editable only by members

☐ Parts of the Community site and its documents are restricted to certain people (with site-administered permissions)

Collaboration Site Sections:

Which sections should be included in the community's collaboration site? Please provide examples of content that will be included in each section.

☐	Announcements: _____	☐	Document Library: _____	☐	Discussion (Ask & Discuss): _____	☐	Newsfeed: _____
☐	Links: _____	☐	Member List: _____	☐	Calendar: _____	☐	RSS Viewer: _____
☐	Wiki: _____	☐	Blog: _____	☐	Member Spotlight: _____	☐	Other Needs: _____

Collaboration Site Rollout: What dates are being targeted for the community collaboration site to be available in the test and production environments?

Date for launch to Core Team: _____ Date for launch to Cenovus: _____

F. Site Content

What are the types of content that should be aggregated, validated and shared on the community site? How will content be categorized?

This should include (but may not be limited to) documents directly related to the objectives of the community, such as processes, standards, tools, recommended practices, guidance documents, lessons learned and models.

☐	Processes	☐	Standards	☐	Tools	☐	Templates
☐	Recommended Practices	☐	Guidance Documents	☐	Lessons Learned	☐	Models/Drawings
☐		☐		☐		☐	

G. Change Management Plan Overview

Please note your initial thoughts on the changes that will result from this community and how they should be communicated/ managed.

-
-
-

Community Operations/Design Sign-off

By signing this document, you agree to your role in the Community and your responsibility to ensure the content captured herein, together with the charter, guides the community in achieving community objectives.

Community Leader Name	Signature	Date
Core Team Member Name & Role	Signature	Date
Core Team Member Name & Role	Signature	Date
Core Team Member Name & Role	Signature	Date
Core Team Member Name & Role	Signature	Date
Knowledge Management Advisor	Signature	Date

Appendix F -

Collaboration Community Roles & Responsibilities

A. LEADERSHIP ROLES

Sponsor(s): Sponsorship may be shared by more than one person where community memberships span multiple parts of the organization.

Role Description	❑ Promotes the value of membership across the organization, encouraging community growth and commitment of organizational resources ❑ Believes in the value of knowledge sharing and commends participation in community activities
Responsibilities	❑ Nurtures the relationship between the community and the organization ❑ Makes community participation a priority for its members ❑ Builds support for community with managers ❑ Bolsters community membership – spreads the word ❑ Serves as the community's link to senior level management and provides top-level support ❑ Ties the community and its benefits to business value for the organization ❑ Helps set the organization's purpose for the community ❑ Ensures synergy between the community's purpose and mission and the organization's goals ❑ Identifies key stakeholders and secures buy in ❑ Allocates budget and resources for the community ❑ Advocates acceptance and recognition for the community ❑ Works with community leader to support additional community roles ❑ Acts as a mentor for the leader and core team ❑ Works with community leader to track progress of community

B. Community Lead(s)

Role Description	❑ Provides day-to-day support while serving as an active, contributing member ❑ Energizes and provides continuous motivation to further the community's purpose and achieve its objectives
Responsibilities	❑ Provides overall guidance and leadership to maintain cultural, community and organizational relevance ❑ Builds and maintains relationships with the KM team, sponsor, Core Team, and key stakeholders to identify the SMEs and members to strengthen the community's recognition and support by the organization ❑ Measures and evaluates the community's contributions to the organization ❑ Works with the Core Team to set community purpose, objectives, scope and norms ❑ Leads the development of the community knowledge map ❑ Works with community to make policy/process changes as needed ❑ Manages community budget and finances ❑ Supports, creates, and arranges for financing (if needed) for additional community roles ❑ Regularly assesses the health or status of the community ❑ Ensures community activities support the achievement of the purpose and objectives outlined in the community's charter ❑ Plans, schedules and leads community meetings, activities, discussions, events and conferences ❑ Serves as a subject matter expert on the focus of the community ❑ Connects members with each other ❑ Brings in new ideas if the community starts to lose energy ❑ Bolsters community membership – spreads the word ❑ Acts as liaison with other communities and seeks out appropriate opportunities for cross-community collaboration ❑ Recognizes contributions, makes awards ❑ Manages day-to-day activities of the community ❑ Acts as site owner for the community's collaboration site

C. Core Team

Role Description	❑ Working group that initially performs start-up activities (e.g. planning) ❑ Instrumental in establishing effective work methods for the Community ❑ Made up of active members of the community ❑ Once the community is established, the Core Team will continue to provide ongoing organizational support
Responsibilities	❑ Plays a strong role in the formation of the community, including development of objectives, setting boundaries and norms ❑ Provides the momentum and inertia needed to sustain the community's development and evolution ❑ Supports and advises Community Leader ❑ Attends and actively participates in community events, activities and discussions ❑ Serves as the initial body of decision makers in a community ❑ Works with organization stakeholders to support, recognize, and legitimize the community ❑ Articulates and exemplifies member sentiment in community governance ❑ Gains support of people leaders for member participation ❑ Mentors new members ❑ Ensures the infrastructure is in place to meet the knowledge objectives of the community ❑ Creates collaborative environment ❑ Develops community knowledge map ❑ Harvests/creates new knowledge ❑ Establishes taxonomy, as needed ❑ Prescribes tool usage/functionality

D. Community Members

Role Description	❑ Are the essence of a community ❑ Membership is voluntary rather than prescribed ❑ Members participate because they get value from their participation and understand the benefit to Cenovus
Responsibilities	❑ Participates and engages in community events and activities ❑ Shares knowledge and expertise with colleagues ❑ Takes active ownership of the community ❑ Contributes to community conversations and discussions ❑ Helps set community governance, norms, culture and policies ❑ Maintains the scope of the community as defined by the charter ❑ Enjoys continuous learning as a result of participation ❑ Bolsters community membership; spreads the word ❑ Works in relevant business process; acts as a subject matter expert on data/information ❑ Looks outside Community to identify relevant information ❑ Conducts interviews to capture knowledge ❑ Assists in the determination of the value added by the community

E. Facilitator (May be combined with Leader role)

Role Description	❑ Serves as a resource for a community ❑ Ensure community forums are productive for all members by brokering, networking and connecting community members who need to share tacit knowledge
Responsibilities	❑ Welcomes and nurtures new members ❑ Energizes the community and serves as motivator ❑ Encourages participation in community events, discussions and activities ❑ Works with moderator to keep online discussions engaging, flowing and vibrant ❑ Injects insightful comments and makes provocative points in online discussions ❑ Provides closure when necessary and give constructive feedback ❑ Seeds and feeds discussion topics ❑ Facilitates community meetings & discussion topics ❑ Diagnoses and maintains the health of the online community ❑ Directs knowledge nuggets to the Content Coordinator for capture and reuse ❑ Works to network community members and SMEs ❑ Provides process analysis expertise ❑ Provides tool expertise ❑ Provides expertise about group dynamics and techniques to help the community solve problems and evolve over time

F. Moderator/Site Administrator

Role Description	❑ Plays a valuable intermediary role between the community and its content ❑ Guides members in connecting with the content they need ❑ Plays a central role in the community, providing leadership and guidance in the overall dialogue taking place in the virtual community.
Responsibilities	❑ Ensures site content is current, relevant, and 'the source of truth' ❑ Actively participates in online discussions, engaging appropriate SMEs to answer questions as required and adding questions to stimulate dialogue as needed ❑ *Reviews and moderates all user-generated content and user profiles within forums, comments, images, videos and audio, liaising with the Community's Core Team where required* ❑ *Receives and addresses user feedback, complaints, etc.* ❑ *Produces reports on relevant moderation statistics, issues and outcomes* ❑ *Regularly feeds back insights gained from community moderation to the Community's Core Team* ❑ Facilitates and coordinates the community's knowledge repository ❑ Ensures that the Community's intellectual capital is properly organized and categorized ❑ Archives outdated community knowledge and content ❑ Observes and capture knowledge nuggets, content and information ❑ Determines a "best" answer or creates one from multiple viable options in a discussion forum ❑ Approves people applying to be members (where membership is not set to auto-accept) ❑ Receives and addresses reports from members of offensive material ❑ Manages the configuration and features of the site

G. Mentor (Can be combined with Core Team role or designated to individual members)

Role description	❑ Community members who take a personal stake in helping new members navigate the community, and its norms and policies
Responsibilities	❑ Welcomes and invites new members to the community ❑ Introduces and orients members to the community ❑ Becomes a new member's primary point of contact ❑ Motivates and encourages participation in community events and activities ❑ Acts as a community 'elder' ❑ Engages in storytelling and community history stewardship

H. Admin/Events Coordinator (Can be a rotating role or combined with another role)

Role description	❑ Typically, staff who handle coordination and planning of online or face-to-face Community events or activities
Responsibilities	❑ Coordinates and plans community events or activities ❑ Creates and maintains community PR within the organization ❑ Promotes community events ❑ Works with the community leader to design participation awards (if applicable) ❑ Coordinates the set-up of meetings and distribution of invitations and meeting materials ❑ Collects meeting or conference minutes ❑ Assists the leader with community's budget and finances ❑ Sets up community-wide conference and video calls

Appendix G -

Informed Consent

The following text was included with each online survey and served as informed consent as provided by the acknowledgement below:

Purpose of the Study

This survey is being conducted as part of a research study on collaboration practices being carried out by the Learning Solutions team within Business Performance Solutions. The study will determine how to structure and establish collaboration communities most effectively to achieve different types of business outcomes.

Contact Information

If you have concerns or questions about this study, please contact Tim Workman, Manager, Learning Solutions, at tim.workman@cenovus.com, or 403-766-4223.

What will be Done

You will be asked to complete a periodic survey each month for the next few months, which will take approximately 10 minutes to complete. The survey will include questions regarding activities you have undertaken with your collaboration group, and your perception of improvements or benefits associated with the different activities and components of the collaboration tools provided. The analysis of the survey data will help determine which activities, tools, community structures, etc., provide the best value to participants.

Benefits of this Study

You will be contributing to the development of an optimized business process that will then be rolled out to all of Cenovus in 2016. The resulting collaboration processes will

be specifically designed to help people like you accelerate issue resolution, improve individual and team performance and productivity, and ultimately support enhanced knowledge sharing across Cenovus.

Risks or Discomforts

No risks or discomforts should result from taking part in this study. If you feel uncomfortable with a question, you can simply skip that question or choose not to complete the survey. If you decide not to complete the survey, your answers will NOT be recorded.

Confidentiality

Your individual responses will be made anonymously, and only limited members of the Organizational Learning and Business Performance Solutions teams will see the survey responses to support data analysis. Individual survey results will NOT be provided to the collaboration group leaders or the associated leadership teams UNLESS they clearly breach Cenovus' policies regarding harassment and respectful workplace.

Decision to Withdraw at any Time

Your participation in this survey is voluntary; you are free to withdraw your participation at any time, refuse to answer any question, remove any data from the analysis, or withdraw from any activity without jeopardizing participation in the community itself. If you do not want to continue, you can simply leave this website and not complete the survey. If you do not click on the "submit" button at the end of the survey, your answers and participation will not be recorded. You also may choose to skip any questions that you do not wish to answer.

How the Findings will be Used

The results of the study will be used to create a business process model and practice within Cenovus for the establishment and management of collaboration communities. The results from the study may also be presented in educational settings and at professional conferences, and the results might be published in a professional journal in the field of learning and development. It is anticipated that all of the data will be presented in aggregate forms indicating patterns and trends, and individual contributions will not be highlighted. The data is also being used for an academic research study on corporate collaboration communities, and this study has been reviewed and approved by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, you may also contact the Office of Research Ethics at 1-800-788-9041, ext. 6718, or by e-mail to rebsec@athabascau.ca

Acknowledgement

By beginning the survey, you acknowledge that you have read this information and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.

Appendix H -

Baseline Survey Questions

The following questions were developed in conjunction with the KM team and validated with pilot community participants to ensure clarity of language and value of the responses. Note that this set of questions was for initial community design purposes, based on the experience levels and current practices used by the participants. This data was not related to the measure of perceptions, given none had yet been established within a given community and hence was not part of the Delphi Technique data sets.

Table H1. Baseline Survey Questions and Response Scale

The responses to these questions will provide data to help determine the amount of training or support people may require for different collaboration activities.						
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**
1	Do you use social networking apps outside of work (i.e. Facebook, Linked-in, Drop Box, Skype, etc.)?					
2	Working at Cenovus, are you able to easily find content and people that can help you accomplish your work more efficiently and effectively (i.e. is it easy to find information sources to answer questions or start new work)?					
3	Do you or your team currently share draft work / ideas online (i.e. actively using *SharePoint*, *Content Server*, etc.) for collaborative authoring or review?					

The responses to these questions will provide data to help determine the amount of training or support people may require for different collaboration activities.						
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**
4	Do you / your team use desktop conferencing / sharing (i.e. Microsoft Lync) as part of your normal work practice?					
5	Does your team currently collect and share Lessons Learned and / or Best Practices?					
6	To what extent does your team store or share content WITHIN “documents” (i.e. Word files, PowerPoint slides, Excel spreadsheets, etc.)?					
7	To what extent does your team store or share content OUTSIDE of documents (i.e. Wiki pages, blogs entries, source content objects)?					

Appendix I -

Baseline Survey Results

The table below provides the number and distribution of responses for the three communities that completed the Baseline Survey.

Table I1 – Baseline Survey Results for Community Relations, Human Resources, and Geosciences Communities

Questions			Not at all			Marginally			To a limited extent			To a good extent			To a very great extent			Total responses
		Group Name / # Responses	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	
1	Do you use social networking apps outside of work (i.e. Facebook, Linked-in, Drop Box, Skype, etc.)?		0	1	0	1	4	2	2	1	3	3	9	2	1	5	1	35
			0%	**5%**	**0%**	**14%**	**20%**	**25%**	**29%**	**5%**	**38%**	**43%**	**45%**	**25%**	**14%**	**25%**	**13%**	
2	Working at Cenovus, are you able to easily find content and people that can help you accomplish your work more efficiently and effectively (i.e. is it easy to find information sources to answer questions or start new work)?		0	0	0	1	3	2	1	7	0	5	9	5	0	1	1	35
			0%	**0%**	**0%**	**14%**	**15%**	**25%**	**14%**	**35%**	**0%**	**71%**	**45%**	**63%**	**0%**	**5%**	**13%**	

	Questions	Not at all			Marginally			To a limited extent			To a good extent			To a very great extent			Total responses
	Group Name / # Responses	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	
3	Do you or your team currently share draft work / ideas online (i.e. actively using *SharePoint*, *Content Server*, etc.) for collaborative authoring or review?	0	3	0	2	6	1	3	6	2	2	3	4	0	2	1	35
		0%	**15%**	**0%**	**29%**	**30%**	**13%**	**43%**	**30%**	**25%**	**29%**	**15%**	**50%**	**0%**	**10%**	**13%**	
4	Do you / your team use desktop conferencing / sharing (i.e. Microsoft Lync) as part of your normal work practice?	0	2	0	1	3	1	3	7	2	3	6	4	0	2	1	35
		0%	**10%**	**0%**	**14%**	**15%**	**13%**	**43%**	**35%**	**25%**	**43%**	**30%**	**50%**	**0%**	**10%**	**13%**	
5	Does your team currently collect and share Lessons Learned and / or Best Practices?	0	3	0	0	6	1	4	4	3	3	7	3	0	0	1	35
		0%	**15%**	**0%**	**0%**	**30%**	**13%**	**57%**	**20%**	**38%**	**43%**	**35%**	**38%**	**0%**	**0%**	**13%**	
6	To what extent does your team store or share content WITHIN “documents” (i.e. Word files, PowerPoint slides, Excel spreadsheets, etc.)?	0	0	0	0	1	1	2	4	0	5	8	4	0	7	3	35
		0%	**0%**	**0%**	**0%**	**5%**	**13%**	**29%**	**20%**	**0%**	**71%**	**40%**	**50%**	**0%**	**35%**	**38%**	

Questions			Not at all			Marginally			To a limited extent			To a good extent			To a very great extent			Total responses
		Group Name / # Responses	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	Community Relations / 7	Human Resources / 20	Geosciences / 8	
7	To what extent does your team store or share content OUTSIDE of documents (i.e. Wiki pages, blogs entries, source content objects)?		0	2	1	0	4	3	3	7	1	4	7	3	0	0	0	35
			0%	**10%**	**13 %**	**0%**	**20%**	**38%**	**43%**	**35%**	**13%**	**57%**	**35%**	**38%**	**0%**	**0%**	**0%**	

Appendix J -

Iteration Survey Questions

The following questions were developed in conjunction with the KM team and validated with pilot community participants to ensure clarity of language and value of the responses. These questions formed the basis for the application of the Delphi Technique to assess changes in perception over time, and the same instrument was used for the 30-day, 60-day, and 90-day evaluations. Within the table below, the supplemental two columns on the right were not provided to the participants, however were used by the researcher and the KM team to standardized alignment and intent for interpretation of the question results.

Table J1 – Iteration Survey Questions, Response Scale, and Element Description

Part I - Questions on organization, structure, and collaboration types The responses to these questions will provide data to help determine to what extent effective collaboration is supported by how groups and teams organize. In the questions below, "synchronous" refers to collaboration activities that occur "live" in real time," such as a meeting or telephone conversation. "Asynchronous" refers to activities that do not occur in real-time, where there is a time-gap between one action and the associated response, such as communicating by email.							**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
1	Has a clear understanding of the intent and value proposition of the collaboration effort been articulated?						Structure	Perception of clarity of purpose
2	Do you feel that the collaboration effort participants and activities have been organized appropriately to achieve the intent?						Structure	Perception on structural elements of Community organization
3	Are the roles or expectations of the participants clearly defined, and tasks assigned accordingly?						Structure	Perception on role clarity and alignment to support enhancements

Part I - Questions on organization, structure, and collaboration types The responses to these questions will provide data to help determine to what extent effective collaboration is supported by how groups and teams organize. In the questions below, "synchronous" refers to collaboration activities that occur "live" in real time," such as a meeting or telephone conversation. "Asynchronous" refers to activities that do not occur in real-time, where there is a time-gap between one action and the associated response, such as communicating by email.						**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
4	Do the people in designated roles for your initiative (i.e. Core Team, Moderator, or Administrator) appear to fulfill their duties appropriately?						Structure / Dialogue	Perspective on role fulfilment within the Community to drive potential enhancements
5	Are the SYNCHRONOUS dialogues within the Community (i.e. telephone calls, desktop sharing, meetings, etc.) of value to your work – do they help in the completion of your tasks?						Dialogue	These two questions will be used to determine perspective on which communication types / tools are seen to provide the most value. The expectation is that synchronous dialogue will start out as the preference, with a need to transition that to a balanced positive perspective across multiple types / tools by the end of the study.
6	Are the ASYNCHRONOUS dialogues within the Community (i.e. e-mail, discussion boards, Newsfeed posts, blog posts, etc.) of value to your work – do they help in the completion of your tasks?						Dialogue	
7	Do the collaborative dialogues within your group contribute to identifying good work practices?						Dialogue / Value	Perception of dialogue quality and alignment to objectives

Part I - Questions on organization, structure, and collaboration types The responses to these questions will provide data to help determine to what extent effective collaboration is supported by how groups and teams organize. In the questions below, "synchronous" refers to collaboration activities that occur "live" in real time," such as a meeting or telephone conversation. "Asynchronous" refers to activities that do not occur in real-time, where there is a time-gap between one action and the associated response, such as communicating by email.						**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
8	If designated within your group, to what extent are the collaboration Moderators effective at helping foster productive and timely dialogues?						Structure / Dialogue	Perception on role value and dialogue quality to assess benefits of facilitated dialogue

PART II - Questions on delegation of control and member autonomy within the collaboration group These questions will provide data on to what extent individual autonomy over collaboration activities versus centralized leadership can influence the collaboration outcomes.						**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
9	If a Core Team has been formed, to what extent has their work in setting the context / activities of the collaboration efforts been beneficial / advantageous?						Structure / Autonomy	Perception on effectiveness of the Core Team, as feedback on structural drivers / autonomy (link to Q4)

PART II - Questions on delegation of control and member autonomy within the collaboration group These questions will provide data on to what extent individual autonomy over collaboration activities versus centralized leadership can influence the collaboration outcomes.							**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
10	Do the mandate / activities as assigned by the Core Team LIMIT your ability to get the most personal benefit relative to YOUR needs (i.e. does the work of the team seem to take priority over your needs)?						Autonomy	Link-back question to Q10 to allow for different perspective view of the issue; will provide feedback to the Core Team and may support activity realignment in subsequent cycles
11	Is there sufficient flexibility in the collaboration effort so that you can leverage activities to suit your personal requirements?						Autonomy	Perception on level of autonomy relative to that needed or preferred by a participant
12	Would increased flexibility in the selection of the collaboration mandate and activities improve the value of the effort for you?						Autonomy	Perception as to whether or not changes are required to increase autonomy within the community
13	Do you feel that there is common understanding and purpose of effort within the collaboration effort (i.e. are all of the members on the same page)?						Transactional Distance	Perception on scope of differences of understanding as a general assessment of transactional distance within the community
14	Do you think that the intent of the collaboration effort and the actions of the participants are well aligned, and achieving best effect?						Transactional Distance	Similar to above but worded differently to test the same concept of differences expressed as alignment

PART II - Questions on delegation of control and member autonomy within the collaboration group These questions will provide data on to what extent individual autonomy over collaboration activities versus centralized leadership can influence the collaboration outcomes.							**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
15	Do you think that the collaboration work is TOO aligned, and could be better served by more diverse thinking / different perspectives (i.e. scope to narrow, missed opportunities)?						Transactional Distance	Perception as to whether fostering an increased difference in understanding would be beneficial
16	Have the outputs of any collaboration activities caused you to challenge prior assumptions or past practices (i.e. have you learned from the group)?						Transactional Distance	Perception as to whether collaboration activities are helping to reduce or increase gaps in understanding

Part III - Questions on perceptions of value and benefit These questions will provide data as to what extent the collaboration effort has provide value to you, your team, and / or Cenovus.							**KM Team Use Only**	
	Question	**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
17	Are the collaboration activities relevant / beneficial to the work that you do?						Value	Perception of value aligned to Cycle 1: Immediate Value
18	Do you feel motivated to engage in the collaboration activities with your group?						Value	Perception of value aligned to Cycle 1: Immediate Value
19	To what extent do you have easy access to documents, standardized tools, templates, methods, or other information that you need to do your work better?						Value	Perception of value aligned to Cycle 2: Potential Value
20	To what extent has the collaboration effort improved your access to documents, standardized tools, templates, methods, or other information that you need to do your work?						Value	Perception of value aligned to Cycle 2: Potential Value
21	To what extent has the collaboration / knowledge shared within this effort proven useful in helping you do your work?						Value	Perception of value aligned to Cycle 3: Applied Value
22	To what extent has your performance been improved by your participation in your community?						Value	Perception of value aligned to Cycle 4: Realized Value
23	To what extent have processes been improved or a new process created as a result of collaborative activities?						Value	Perception of value aligned to Cycle 4: Realized Value

Part III - Questions on perceptions of value and benefit These questions will provide data as to what extent the collaboration effort has provide value to you, your team, and / or Cenovus.							**KM Team Use Only**	
Question		**Not at all**	**Marginally**	**To a limited extent**	**To a good extent**	**To a very great extent**	**Element(s)**	**Determining…**
24	To what extent have opportunities to enhance the transfer of learnings and knowledge created from this collaboration been of direct benefit to Cenovus?						Value	Perception of value aligned to Cycle 5: Reframing Value
25	To what extent do you feel the ideas or suggestions resulting from this collaboration will be implemented at any level within Cenovus?						Value	Perception of value aligned to Cycle 5: Reframing Value

Appendix K -

Iteration Survey Results

The table below provides the results from the Local Community Relations community, which was the only community to complete an iteration survey prior to the work being suspended. These results are provided only to demonstrate feedback a very small sample group in validation of the evaluation approach, and not to support any findings. Note the numerical score under each Likert scale elements was used to support the analysis.

Table K1 – Iteration 1 Survey Results for the Community Relations Community

Questions		Not at all (1)	Marginally (2)	To a limited extent (3)	To a good extent (4)	To a very great extent (5)	Not applicable (6)	Total Responses	Mode	Median	Mean	Std Dev
Questions on organization and structure												
1	Has a clear understanding of the intent and value proposition of the collaboration effort been articulated?	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (71.4%)	2 (28.6%)	0 (0.0%)	7	4.00	4.00	4.29	0.49
2	Do you feel that the collaboration effort participants and activities been organized appropriately to achieve the intent?	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (71.4%)	2 (28.6%)	0 (0.0%)	7	4.00	4.00	4.29	0.49
3	Are the roles or expectations of the participants clearly defined, and tasks assigned accordingly?	0 (0.0%)	0 (0.0%)	1 (14.3%)	6 (85.7%)	0 (0.0%)	0 (0.0%)	7	4.00	4.00	3.86	0.38
4	Do the people in designated roles for your initiative (i.e. Core Team, Moderator, or Administrator) appear to fulfill their duties appropriately?	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (85.7%)	1 (14.3%)	0 (0.0%)	7	4.00	4.00	4.14	0.38

	Questions	Not at all (1)	Marginally (2)	To a limited extent (3)	To a good extent (4)	To a very great extent (5)	Not applicable (6)	Total Responses	Mode	Median	Mean	Std Dev
5	Are the SYNCHRONOUS dialogues within the Community (i.e. telephone calls, desktop sharing, meetings, etc) of value to your work – do they help in the completion of your tasks?	0 (0.0%)	0 (0.0%)	2 (28.6%)	2 (28.6%)	2 (28.6%)	1 (14.3%)	7	3.00	4.00	4.29	1.11
6	Are the ASYNCHRONOUS dialogues within the Community (i.e. e-mail, discussion boards, Newsfeed posts, blog posts, etc.) of value to your work – do they help in the completion of your tasks?	1 (14.3%)	0 (0.0%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	1 (14.3%)	7	3.00	4.00	3.86	1.68
7	Do the collaborative dialogues within your group contribute to identifying good work practices?	0 (0.0%)	0 (0.0%)	1 (14.3%)	6 (85.7%)	0 (0.0%)	0 (0.0%)	7	4.00	4.00	3.86	0.38
8	If designated within your group, to what extent are the collaboration Moderators effective at helping foster productive and timely dialogues?	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (57.1%)	1 (14.3%)	2 (28.6%)	7	4.00	4.00	4.71	0.95
Questions on delegation of control and member autonomy within the collaboration group												
9	If a Core Team has been formed, to what extent has their work in setting the context / activities of the collaboration efforts been beneficial / advantageous?	0 (0.0%)	0 (0.0%)	1 (20.0%)	1 (20.0%)	1 (20.0%)	2 (40.0%)	5	6.00	5.00	4.80	1.30
10	Do the mandate / activities as assigned by the Core Team LIMIT your ability to get the most personal benefit relative to YOUR needs (i.e. does the work of the team seem to take priority over your needs)?	1 (20.0%)	1 (20.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	2 (40.0%)	5	6.00	3.00	3.60	2.30

Questions		Not at all (1)	Marginally (2)	To a limited extent (3)	To a good extent (4)	To a very great extent (5)	Not applicable (6)	Total Responses	Mode	Median	Mean	Std Dev
11	Is there sufficient flexibility in the collaboration effort so that you can leverage activities to suit your personal requirements?	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (60.0%)	1 (20.0%)	1 (20.0%)	5	4.00	4.00	4.60	0.89
12	Would increased flexibility in the selection of the collaboration mandate and activities improve the value of the effort for you?	0 (0.0%)	1 (20.0%)	1 (20.0%)	1 (20.0%)	0 (0.0%)	2 (40.0%)	5	6.00	4.00	4.20	1.79
13	Do you feel that there is common understanding and purpose of effort within the collaboration effort (i.e. are all of the members on the same page)?	0 (0.0%)	0 (0.0%)	1 (20.0%)	3 (60.0%)	0 (0.0%)	1 (20.0%)	5	4.00	4.00	4.20	1.10
14	Do you think that the intent of collaboration effort and the actions of the participants are well aligned, and achieving best effect?	0 (0.0%)	0 (0.0%)	2 (40.0%)	2 (40.0%)	0 (0.0%)	1 (20.0%)	5	3.00	4.00	4.00	1.22
15	Do you think that the collaboration work is TOO aligned, and could be better served by more diverse thinking / different perspectives (i.e. scope to narrow, missed opportunities)?	1 (20.0%)	0 (0.0%)	0 (0.0%)	2 (40.0%)	0 (0.0%)	2 (40.0%)	5	4.00	4.00	4.20	2.05
16	Have the outputs of any collaboration activities caused you to challenge prior assumptions or past practices (i.e. have you learned from the group)?	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (60.0%)	0 (0.0%)	2 (40.0%)	5	4.00	4.00	4.80	1.10

	Questions	Not at all (1)	Marginally (2)	To a limited extent (3)	To a good extent (4)	To a very great extent (5)	Not applicable (6)	Total Responses	Mode	Median	Mean	Std Dev
Questions on value and benefit												
17	Are the collaboration activities relevant / beneficial to the work that you do?	0 (0.0%)	0 (0.0%)	1 (20.0%)	4 (80.0%)	0 (0.0%)	0 (0.0%)	5	4.00	4.00	3.80	0.45
18	Do you feel motivated to engage in the collaboration activities with your group?	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	5	4.00	4.00	4.20	0.45
19	To what extent do you have easy access to documents, standardized tools, templates, methods, or other information that you need to do your work better?	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (80.0%)	0 (0.0%)	1 (20.0%)	5	4.00	4.00	4.40	0.89
20	To what extent has the collaboration effort improved your access to documents, standardized tools, templates, methods, or other information that you need to do your work?	0 (0.0%)	1 (20.0%)	0 (0.0%)	3 (60.0%)	0 (0.0%)	1 (20.0%)	5	4.00	4.00	4.00	1.41
21	To what extent has the collaboration / knowledge shared within this effort proven useful in helping you do your work?	0 (0.0%)	0 (0.0%)	1 (20.0%)	3 (60.0%)	0 (0.0%)	1 (20.0%)	5	4.00	4.00	4.20	1.10
22	To what extent has your performance been improved by your participation in your community?	0 (0.0%)	0 (0.0%)	1 (20.0%)	2 (40.0%)	1 (20.0%)	1 (20.0%)	5	4.00	4.00	4.40	1.14
23	To what extent have processes been improved or a new process created as a result of collaborative activities?	0 (0.0%)	0 (0.0%)	1 (20.0%)	1 (20.0%)	1 (20.0%)	2 (40.0%)	5	6.00	5.00	4.80	1.30

Questions		Not at all (1)	Marginally (2)	To a limited extent (3)	To a good extent (4)	To a very great extent (5)	Not applicable (6)	Total Responses	Mode	Median	Mean	Std Dev
24	To what extent have opportunities to enhance the transfer of learnings and knowledge created from this collaboration been of direct benefit to Cenovus?	0 (0.0%)	0 (0.0%)	2 (40.0%)	2 (40.0%)	1 (20.0%)	0 (0.0%)	5	3.00	4.00	3.80	0.84
25	To what extent do you feel the ideas or suggestions resulting from this collaboration will be implemented at any level within Cenovus?	0 (0.0%)	1 (20.0%)	0 (0.0%)	4 (80.0%)	0 (0.0%)	0 (0.0%)	5	4.00	4.00	3.60	0.89

Appendix L -

Community Design Change Record

Table L1 – Community Design Change Record

Community Name:				**Date:**											
Question Series	**Issues/Observations**	**Action**	**Result**	**Element Category**	**KM Advisor Assessment**					**Community Score Mode (Baseline)**	**Community Score Mode (Survey #1)**	**Community Score Mode (Survey #2)**	**Community Score Mode (Survey #3)**	**Community Comments**	**Learning / Decisions**
Series of questions you are evaluating	Document issues and/or observations within that question series	Applicable action taken	Result that came as a result of the action taken	Select which element this pertains to	Select which assessment level reflects the current state										
					1	**2**	**3**	**4**	**5**						
BASELINE	Do you use social networking apps outside of work (i.e. Facebook, Linked-in, Drop Box, Skype, etc)?			Baseline											
	Working at Cenovus, are you able to easily find content and people that can help you accomplish your work more efficiently and effectively (i.e. is it easy to find information sources to answer questions or start new work)?			Baseline											
	Do you or your team currently share draft work / ideas online (i.e. actively using SharePoint, Content Server, etc) for collaborative authoring or review?			Baseline											
	Do you or your team use desktop conferencing / sharing (i.e. Microsoft Lync / Skype) as part of your normal work practice?			Baseline											
	Does your team currently collect and share Lessons Learned and / or Best Practices from completed work or projects?			Baseline											
	Does your team store or share content WITHIN "documents" (i.e. Word files, PowerPoint slides, Excel spreadsheets, etc)?			Baseline											

Community Name: **Date:**

Question Series	Issues/Observations	Action	Result	Element Category	KM Advisor Assessment					Community Score Mode (Baseline)	Community Score Mode (Survey #1)	Community Score Mode (Survey #2)	Community Score Mode (Survey #3)	Community Comments	Learning / Decisions
Series of questions you are evaluating	Document issues and/or observations within that question series	Applicable action taken	Result that came as a result of the action taken	Select which element this pertains to	Select which assessment level reflects the current state										
					1	2	3	4	5						
	Does your team store / share content OUTSIDE of documents (i.e. Wiki pages, SharePoint Sites, INC pages, etc)?			Baseline											
1	Has a clear understanding of the intent and value proposition of the collaboration effort been articulated? | optional			Structure											
	Do you feel that the collaboration effort participants and activities have been organized appropriately to achieve the intent? | optional			Structure											
	Are the roles or expectations of the participants clearly defined, and tasks assigned accordingly? | optional			Structure											
	Do the people in designated roles for your initiative (i.e. Core Team, Moderator, or Committee Member) appear to fulfill their duties appropriately? | optional			Structure											
	Are the SYNCHRONOUS dialogues within the Community (i.e. telephone calls, desktop sharing, meetings, etc) of value to your work – do they help in the completion of your tasks? | optional			Dialogue											
	Are the ASYNCHRONOUS dialogues within the Community (i.e. e-mail, discussion boards, Newsfeed posts, blog posts, etc) of value to your work – do they help in the completion of your tasks? | optional			Dialogue											
	Do the collaborative dialogues within your group contribute to identifying good work practices? | optional			Dialogue											

Community Name: **Date:**

Question Series	Issues/Observations	Action	Result	Element Category	KM Advisor Assessment					Community Score Mode (Baseline)	Community Score Mode (Survey #1)	Community Score Mode (Survey #2)	Community Score Mode (Survey #3)	Community Comments	Learning / Decisions
Series of questions you are evaluating	Document issues and/or observations within that question series	Applicable action taken	Result that came as a result of the action taken	Select which element this pertains to	Select which assessment level reflects the current state										
					1	2	3	4	5						
	If designated within your group, to what extent are the collaboration Moderators effective at helping foster productive and timely dialogues? | optional			Dialogue											
2	If a Core Team has been formed, to what extent has their work in setting the context / activities of the collaboration efforts been beneficial / advantageous? | optional			Structure/ Autonomy											
	Do the mandate / activities as assigned by the Core Team LIMIT your ability to get the most personal benefit relative to YOUR needs (i.e. does the work of the team seem to take priority over your needs)? | optional			Autonomy											
	Is there sufficient flexibility in the collaboration effort so that you can leverage activities to suit your personal requirements? | optional			Autonomy											
	Would increased flexibility in the selection of the collaboration mandate and activities improve the value of the effort for you? | optional			Autonomy											
	Do you feel that there is common understanding and purpose of effort within the collaboration effort (i.e. are all of the members on the same page)? | optional			TD											
	Do you think that the intent of collaboration effort and the actions of the participants are well aligned, and achieving best effect? | optional			TD											
	Do you think that the collaboration work is TOO aligned, and could be better served by more diverse thinking / different perspectives (i.e. scope to narrow, missed opportunities)? | optional			TD											

Community Name: **Date:**

Question Series	Issues/Observations	Action	Result	Element Category	KM Advisor Assessment					Community Score Mode (Baseline)	Community Score Mode (Survey #1)	Community Score Mode (Survey #2)	Community Score Mode (Survey #3)	Community Comments	Learning / Decisions
Series of questions you are evaluating	Document issues and/or observations within that question series	Applicable action taken	Result that came as a result of the action taken	Select which element this pertains to	Select which assessment level reflects the current state										
					1	2	3	4	5						
	Have the outputs of any collaboration activities caused you to challenge prior assumptions or past practices (i.e. have you learned from the group)? | optional			TD											
3	Are the collaboration activities relevant / beneficial to the work that you do? | optional			Value											
	Do you feel motivated to engage in the collaboration activities with your group? | optional			Value											
	To what extent do you have easy access to documents, standardized tools, templates, methods, or other information that you need to do your work better? | optional			Value											
	To what extent has the collaboration effort improved your access to documents, standardized tools, templates, methods, or other information that you need to do your work? | optional			Value											
	To what extent has the collaboration / knowledge shared within this effort proven useful in helping you do your work? | optional			Value											
	To what extent has your performance been improved by your participation in your community? | optional			Value											
	To what extent have processes been improved or a new process created as a result of collaborative activities? | optional			Value											
	To what extent have opportunities to enhance the transfer of learnings and knowledge created from this collaboration been of direct benefit to Cenovus? | optional			Value											

Community Name:				**Date:**											
Question Series	**Issues/Observations**	**Action**	**Result**	**Element Category**	**KM Advisor Assessment**					**Community Score Mode (Baseline)**	**Community Score Mode (Survey #1)**	**Community Score Mode (Survey #2)**	**Community Score Mode (Survey #3)**	**Community Comments**	**Learning / Decisions**
Series of questions you are evaluating	Document issues and/or observations within that question series	Applicable action taken	Result that came as a result of the action taken	Select which element this pertains to	Select which assessment level reflects the current state										
					1	**2**	**3**	**4**	**5**						
	To what extent do you feel the ideas or suggestions resulting from this collaboration will be implemented at any level within Cenovus? | optional			Value											

Appendix M -

Letter of Support from Cenovus Energy

cenovus ENERGY

Cenovus Energy Inc. | 500 Centre Street SE PO Box 766 | Calgary AB T2P 0M5 | 403.766.2000 cenovus.com

Centre for Distance Education
1 University Drive
Athabasca, AB T9S 3A3

LETTER OF SUPPORT FROM CENOVUS ENERGY –
DISSERTATION RESEARCH STUDY BY TIM WORKMAN

To Whom it May Concern,

As part of the Cenovus Knowledge Management strategy, we are developing a network "Collaboration Communities" to support enhanced knowledge sharing, retention, and application within the business. In support of this effort, we are working to develop a scalable and replicable business process for the establishment of these communities, as previous ad-hoc / un-structured efforts to create communities of practice within the company were neffective. Tim Workman's pursuit of his doctorate in Education, and the associated dissertation study related to the development of a management model for high-efficacy corporate collaboration communities, has been endorsed by both myself as his immediate supervisor, and approved by the senior vice-president of his parent business unit. Cenovus is providing funding to offset his Tim's program fees as part of our employee education benefits, and will also support the study through the in-kind provision of related staff support, technical support, and infrastructure.

As a function of the study, I will be acting in an oversight / advisory capacity to ensure that both the corporate business needs and the ethical integrity of the study are maintained. Having completed my own doctorate, I do not anticipate any ethical issues in the conduct of this study, given the manner in which Tim will only lead and coordinate the effort (he will not engage directly with study participants); however, I will be acting as an objective observer of Cenovus to assess both the conduct and findings of the study.

We fully support Tim in his efforts, as this study will result in both personal value for Tim and corporate value for Cenovus if successful. Please do not hesitate to contact me directly if you have any questions regarding Cenovus support to this effort.

Mark Little, PhD
Vice President, Business Excellence
Cenovus Energy

Appendix N -

Letter of Affirmation from Cenovus Energy

cenovus ENERGY

Cenovus Energy Inc | 500 Centre Street SE PO Box 766 | Calgary, AB T2P 1N2 | 403.766.2000 cenovusenergy.com

Centre for Distance Education
1 University Drive
Athabasca, AB T9S 3A3

March 2016

LETTER OF AFFIRMATION FROM CENOVUS ENERGY – DISSERTATION RESEARCH STUDY BY TIM WORKMAN

To Whom It May Concern,

In October 2014, I provided a letter of support on behalf of Cenovus Energy in support of dissertation research being conducted by Tim Workman. His research study on the establishment of high-efficacy corporate collaboration communities aligned with our internal corporate initiatives in the same area of focus, and offered the opportunity to add enhanced rigour to our past efforts.

In support of the study, I acted in an advisory and oversight capacity to ensure that the corporate business needs were achieved, and that the ethical integrity of the study was maintained. Given Tim's leadership role within the company relative to the Knowledge Management team, I was able to be an objective observer within Cenovus to assess both the conduct and findings of the study.

As originally programmed, the bulk of the study's data collection effort was to occur in 2015, with 24 collaboration communities having been identified and screened for inclusion during the early months of that year. Unfortunately, the economic downturn in commodity prices in 2015, and their continuance this year, led to a cancellation of work that was not deemed essential for core business operations; the collaboration communities' initiative was subsequently postponed until circumstance improved. With the continuance of the economic impacts into 2016, this work has now been predominantly suspended, and the Knowledge Management team reassigned to other efforts.

Notwithstanding the lack of implementation due to the operational restrictions, Tim's efforts with the team nonetheless met the intent of the study as proposed: their work has produced work processes, business templates and artifacts, and evaluation strategies and instruments that have now been adopted as our corporate best practice. Although the data collection phase of the study was not completed due to the external circumstances, the rigour of the effort and quality of the outputs have more than met our internal standards for adoption. This work will now form the foundation for implementation once we can return to a more predicable business environment.

From an ongoing research perspective, we expect to collect data from this program over the longer term as part of the continuous improvement cycle that Tim has built into the process. As such, there will likely come a point in the future where a complete data set can be reviewed from a longitudinal perspective to "look back" at this initial framework and artifacts as subsequent research should there be an interest in doing so. However, at this time it is not practical to support any active data collection or furtherance of the study given pressing operational priorities within our company.

We are confident that Tim's effort in this regard will bring value to our company, and I can attest that the outcomes met with the research and ethical parameters of study as detailed in its proposal. Please do not hesitate to contact me directly if you have any questions this matter.

Mark Little, PhD
Vice President, Health & Safety
Cenovus Energy

cenovus ENERGY | www.cenovus.com

Appendix O -

Certification of Ethics Approval

November 25, 2014

Mr. Timothy Workman
Other Academic Centres/Depts\Centre for Distance Education
Athabasca University

File No: 21624

Ethics Expiry Date: November 24, 2015

Dear Mr. Timothy Workman,

Thank you for your recent resubmission to the Centre for Distance Education Departmental Ethics Review Committee, addressing the clarifications and revisions as requested for your research entitled, 'Exploring a Transactional Distance-based Management Model to Create High-efficacy Corporate Collaboration Communities'.

Your application has been **Approved** and this memorandum constitutes a ***Certification of Ethics Approval***. Please note only one change that is required to your Consent form prior to beginning your research:

** Consent letter needs standard REB contact information sentence:

"This study has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, please contact the Office of Research Ethics at 1-800-788-9041, ext. 6718, or by e-mail to rebsec@athabascau.ca"

This REB approval, dated November 25, 2014, is valid for one year less a day.

Throughout the duration of this REB approval, all requests for modifications, ethics approval renewals and serious adverse event reports must be submitted via the Research Portal.

To continue your proposed research beyond November 24, 2015, you must submit an Ethics Renewal Request Form before October 15, 2015.

When your research is concluded, you must submit a Project Completion (Final) Report Form to close out REB approval monitoring efforts.

At any time, you can login to the Research Portal to monitor the workflow status of your application.

If you encounter any issues when working in the Research Portal, please contact the system administrator at research_portal@athabascau.ca.

Sincerely,

Sherri Melrose
Acting Chair, Centre for Distance Education Departmental Ethics Review Committee
Research Ethics Board