An Analysis of Knowledge Management

at the Foothills Model Forest

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Introduction

Foothills Model Forest (FtMF) is a recognized institute that develops new knowledge and technologies, and facilitates the exchange of ideas and approaches to sustainable forest management with a network of stakeholders and partners. Foothills Model Forest is entering Phase III of its mandate and identifies "Technology and Knowledge Transfer" as a cornerstone of their activities.

This paper will begin by defining knowledge management and providing context regarding the significance of knowledge in today's global economy. A SWOT Analysis (assessment of strengths, weaknesses, opportunities and threats) of knowledge management at the FtMF will be conducted in order to explore the effectiveness of knowledge management activities at the FtMF. From this analysis recommendations will be developed based on an understanding of concepts and research findings discussed in this course (Extension 507). The ability to apply these concepts and ideas to the benefit of an organization such as FtMF will be demonstrated.

Knowledge Management Defined

The topic of knowledge management is vast and subsequently the definitions are extensive. For the purposes of this paper, knowledge management implies "the creation of strategies and processes to move knowledge beyond its natural limits" (Wright, 2001b, p. 6). Additionally, knowledge management is a "set of techniques and practices that facilitate the flow of knowledge into and within the firm" (Birkinshaw, 2001, p. 33, as cited in Wright, 2001b, p. 4). Davenport and Prusak (1998, as cited in Wright, 2001b)
discuss an interrelated process of knowledge generation, knowledge coordination and sharing, which also emphasizes the flow of knowledge (p. 4).

To create new knowledge and/or to ensure there is valuable application of that knowledge, mechanisms to diffuse knowledge must be in place in order for subsequent learning to occur. The transfer of knowledge will be the primary focus of this paper as it relates directly to the primary objectives of the Foothills Model Forest’s mandate of technology and knowledge transfer.

The Significance of Knowledge

The fundamental role knowledge plays in the global economy is apparent across sectors with reference to its significance as a global commodity cited throughout the literature (Druker, 1999; Wolfe & Gertler, 2001; Wright, 2001a, Roberts, 2000). Wright (Dec. 2001a) states that knowledge work exists in all sectors and industries (including traditional industries such as resource extraction and agriculture), and he highlights its importance to the “competitive viability of organizations in a global economy” (p. 13). Additionally, Druker (1999) suggests that knowledge workers and their productivity will be the most valuable asset of institutions in the 21st Century (business or non-business).

Like the majority of industries and organizations, Foothills Model Forest and its multitude of partners and stakeholders operate in an uncertain environment influenced by turbulent change combined with rapid technological advancement. Those who possess the ability to acquire, absorb and disseminate relevant knowledge will be better positioned to adjust, modify practices and prosper in this fast-paced climate of change.
Background on Foothills Model Forest

The Foothills Model Forest, located in Hinton, is one of eleven Model Forests across Canada. Three primary partners sponsor the Foothills Model Forest including Weldwood of Canada Limited (Hinton Division), Alberta Sustainable Resource Development, and Heritage Canada (Parks Canada, Jasper National Park). Natural Resources Canada and the Canadian Forest Service administer and fund the national network, with additional support from other partners interested in the work of the FtMF.

The Vision and Mission of the FtMF will be achieved through a credible and recognized program of science, technology, demonstration and outreach. Four strategic objectives currently direct the Foothills Model Forest including:

- Demonstrate sustainable forest management.
- Develop and implement mechanisms that result in wider understanding and application of accrued knowledge and technology for sustainable forest management.
- Deliver communications and outreach programs that improve understanding of, and support for, sustainable forest management.
- Support and influence policy that improves the practice of sustainable forest management.

(Foothills Model Forest, Phase III Proposal, February 7, 2002)

Foothills Model Forest Vision Statement:
The Foothills Model forest as a member of the Canadian Model Forest Network, will play a key role in establishing Alberta's reputation as a world leader in sustainable forest management.

Mission:
We are a unique partnership dedicated to providing practical solutions for stewardship and sustainability on Alberta forestlands. When we achieve our vision, model forest learnings will be:
- Reflected in on-the-ground practice throughout Alberta and elsewhere in Canada where applicable;
- Incorporated in forest and environmental policy and changes;
- Widely disseminated to and understood by a broad spectrum of society.

(Foothills Model Forest, Phase III Proposal, February 7, 2002)
Six Strategic Program Areas have been identified as the shared values of the FTMF supported by the four strategic objectives noted previously:

- Biological diversity
- Forest Ecosystem Condition and Productivity
- Soil and Water
- Global Ecological Cycles
- Multiple Benefits to Society
- Society's Responsibility for Sustainable Development

Imparting knowledge and generating understanding is fundamental to each of the organizational goals. The Phase III Proposal emphasizes this point, citing technology and knowledge transfer as integral to each of the strategic objectives, reinforcing the importance of knowledge management.

**Current Knowledge Management Initiatives at FTMF**

As FTMF enters Phase III, a higher priority will be placed on the transfer of technology and knowledge with greater focus on demonstration and implementation. The "Technology and Knowledge Transfer" section of the Phase III Proposal outlines five objectives that will facilitate knowledge transfer (see Table 1). This focus is also reflected in the 2003-2004 Draft Communications and Outreach Work Plan.

Communications and Outreach is a key program initiative at the FTMF, which has focused on public relations and technology transfer. Many communication tools and tactics have been developed to disseminate research results and applications (see Appendix A). The primary focus of the 2003-2004 Communications and Outreach Program is knowledge creation, demonstration and transfer, with the following priorities noted:
- generate awareness and understanding of FtMF knowledge and technology
- disseminate results, knowledge and potential applications of FtMF research and sustainable forest management practices
- promote awareness and understanding of FtMF demonstration sites and projects
- facilitate two-way transfer of knowledge
- highlight how research is being applied, or how it can be applied


**Table 1: Foothills Model Forest Phase III Objectives**

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<tr>
<th>Program Implementation Teams:</th>
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<tr>
<td>Team's primary focus will be identification of opportunities and development of action plans for the implementation of knowledge and technology transfer, including on the ground demonstration site development and their interpretation, at the program initiative level.</td>
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<th>Incorporate research into ETC's program development:</th>
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<td>In partnership with the Environmental Training Centre, also located in Hinton, FtMF will work to incorporate its research into ETC's program development. This will become a major delivery mechanism of technology and knowledge transfer, throughout the development of workshops and program courses for specific program initiatives.</td>
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<tr>
<th>Connection to the Alberta Provincial Forest, Lands and Watershed Resource Management Training Advisory Committee:</th>
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<tr>
<td>A multi-partnered committee which will address training needs of forest and resource management practitioners in Alberta. This is considered a tremendous technology and knowledge transfer opportunity for FMF. This will also present an opportunity, with network assistance, for transfer of Canadian Model Forest Network tools, knowledge and technology, where applicable to Alberta forest and resource management practitioners.</td>
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<tr>
<th>FtMF will aid in the finalization of a management plan for the Cache Percotte Forest.</th>
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<tr>
<td>Cache Percotte's guiding principles include:</td>
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<tr>
<td>- demonstration of forest management practices</td>
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<tr>
<td>- education/training</td>
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<tr>
<td>- Sustainable Forest Management research</td>
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Through this partnership, the FtMF may realize other opportunities for education, training, demonstration and communication of FtMF sustainable forest management research results.

<table>
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<tr>
<th>FtMF also intends to seek opportunities, pending network support, for transfer of knowledge, tools and technology at the program initiative level with other model forests conducting similar research.</th>
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Communication initiatives noted in Appendix A will continue to be used throughout the Phase III period, with a greater emphasis on efforts that support technology and knowledge transfer. Additional product development planned for the
2003-2004 includes: (a) a website redesign, (b) partner profiles that feature how research is being applied by partners, and (c) a poster series with accompanying fact sheet that highlights research activities and findings (A. Kauffman, personal communication, Nov. 27/02).

An additional and obvious link to knowledge transfer is the involvement of the primary researcher. Primary researchers from each activity area are responsible for addressing knowledge transfer as outlined in their work plans. This can occur in collaboration with the Communications and Outreach Program; however, there is no strategic plan other than what is outlined in individual work plans. Generally, one to two research/technical transfer sessions are held each year.

**SWOT Analysis**

A SWOT Analysis was conducted to explore the effectiveness of knowledge management efforts at the FtMF (see Appendix B). Identifying strengths, weaknesses, opportunities and threats helps to discover gaps that may impede an efficient and strategic approach for knowledge transfer. An assessment of the findings follows.

**Assessment and Discussion**

**Organizational Mission and Goals**

An organization’s mission and goals must be clearly understood in order to develop a supportive and effective knowledge management approach that supports organizational outcomes (Wright, 2001b). The FtMF clearly identifies technology and knowledge transfer as fundamental to their core business, and identifies it as the
cornerstone of their mandate throughout Phase III. Foothills Model Forest has taken this first step toward defining objectives in support of their organizational mission.

Throughout Phases I and II (first ten years of FtMF mandate), minimal attention was paid to knowledge transfer as strategic goals were broad and general in support of the Vision. As they enter Phase III, the Foothills Model Forest is more focused on technology and knowledge transfer and is better positioned to transfer knowledge. The five objectives of Phase III (see Table 1) pertain specifically to technology and knowledge transfer and offer strategic actions that target audiences who will be receptive to knowledge acquisition.

This same emphasis is not consistently applied at the program level. Although Phase III objectives emphasize a strong organizational commitment to knowledge transfer, a knowledge management strategy that integrates individual program areas with the overall organizational strategy, as well as Phase III goals does not exist.

Zack (1999) refers to traditional organizational roles that typically neglect to address knowledge management strategically. Frequently forgotten is the cross-functional, cross-organizational process that a firm uses to create, share, and apply knowledge. Additionally, the lack of a core program area that addresses knowledge management in a coordinated and integrated manner will make it challenging to deliver a comprehensive and strategic knowledge transfer program.

The Communications and Outreach Program has offered considerable support to disseminate research results. The mechanisms this program area has established to disseminate information are valuable and could augment a knowledge management program. However, it is important that the responsibility for knowledge transfer not rest solely with the Communications and Outreach Program, as communication and
technology/research transfer are two distinct programs, which require targeted resources and strategies.

**Transferring Explicit vs Tacit Knowledge**

Generally, the FtMF has focused more on the transfer of explicit knowledge, versus tacit knowledge. The distinction between these forms of knowledge is important and influences how effectively knowledge is diffused. Explicit knowledge is easily codified, can be readily stored, distributed and retrieved through accessible communication mechanisms. The fundamental property of explicit knowledge is its ease of communication and transfer, as well as its acquisition through logical deduction and formal study (Lam, 2000).

In contrast, tacit knowledge is more difficult to articulate and disseminate; it is contextual, action-oriented with a personal quality that makes it challenging to codify, formalize or communicate. The transfer of tacit knowledge requires greater attention and effort with close interaction in order to increase shared understanding and trust (Lam, 2000). Learning by doing, the informal "take-up of learning behaviour and procedures" is the way to acquire tacit knowledge (Roberts, 2000). Wright (2001b) argues that often, tacit knowledge is more valuable than explicit knowledge as it is comprised of experience, wisdom and intuition.

This is particularly relevant to the FtMF as it is interested in offering insights that will help resolve complex issues. Opportunities for face-to-face contact provide excellent vehicles to diffuse tacit knowledge allowing direct interaction with the primary researcher. Roberts (2000) argues there are elements of tacit knowledge that can only be transferred successfully through a process of demonstration (show-how), facilitated through face-to-face contact between the transmitter (researcher) and the receiver
Hansen and Oetinger (2001) also reinforce the importance of direct, personal contact and believe it is fundamental to transfer tacit knowledge.

Nonaka and Takeuchi (1995, as cited in Lam, 2000) posit that the interaction and exchange of tacit and explicit knowledge is necessary in order to generate new knowledge. Individuals learn through a model of knowledge conversion, which involves a continual process of converting knowledge from tacit to explicit to tacit. The ability of an institution such as FtMF to learn and innovate is dependant on "its capacity to mobilize tacit knowledge and foster its interaction with explicit knowledge" (Lam, p. 491). Therefore, mechanisms to diffuse both explicit and tacit knowledge are important elements of a knowledge management strategy, but it must be implemented strategically.

Simmonds et al (2001) highlight four ways knowledge is transferred including:

1. involvement (participation in learned organizations such as trade societies);
2. association (formal or informal interactions with others in everyday activities);
3. experience (knowledge acquired through implicit [tacit] learning over time); and
4. direct education (public knowledge through codified, accessible knowledge).

A survey conducted of practicing managers revealed some interesting findings. The greatest source of academic knowledge came through experience (49.6%), followed by association (23.2%), then involvement (20.4%), and finally through education (6.6%) (Simmonds et al, 2001, p. 6-7). This further reinforces the importance of tacit knowledge and the critical role it plays in knowledge transfer. It also demonstrates the interchange between tacit and explicit knowledge required for knowledge creation.

Foothills Model Forest attempts to address both tacit and explicit knowledge, however it focuses primarily on direct education (explicit knowledge) and association (deliberate attempt to learn through association). Communication vehicles noted in
Appendix A (e.g. websites, newsletters, quicknotes), as well as the associations with partners and stakeholders are strengths of the FtMF which facilitate the transfer of explicit knowledge.

However, it is the transfer of tacit knowledge through experience that is critical for FtMF and its stakeholders. At FtMF, tacit knowledge is diffused through research forums (one – two times per year), technical transfer sessions, interpretive programs, presentations conducted by researchers, as well as demonstrations that highlight how research findings can be practically applied. These mechanisms are more resource intensive and subsequently implementation has been somewhat limited. FtMF plans to increase the frequency of research forums from two to four times per year, augmented by new and creative means to diffuse knowledge through collaborative forums, committees, and professional organizations, as cited in Table 1. These offer constructive efforts to build experience into the learning potential, which will help to facilitate knowledge creation and transfer.

**Codified and Personalized Strategies**

Hansen et al (1999) present two approaches to manage knowledge effectively, the personalization approach and the codified approach. Those organizations that use knowledge effectively will choose one primary strategy and use the second approach to support it.

The codification strategy focuses on knowledge that is easily expressed, stored and retrieved. This knowledge is captured from many individuals and is carefully codified using a "people-to-documents" approach that facilitates easy diffusion and storage in databases where it is accessible and can be reused by many. Organizations that
are more standardized and knowledge is more static, should consider using the codified approach, which relies heavily on information technology (IT) to facilitate connecting people easily with reusable, codified knowledge (Hansen et al, 1999).

Conversely, if organizations need to customize their product or transfer complex knowledge that requires interaction and discourse, the personalization approach is more appropriate. This approach requires more direct interaction with the person closest to the knowledge (Hansen et al, 1999), which is generally the researcher at FtMF. The personalization strategy is most effective when organizations invest in building networks of people (Hansen et al, 1999). This is a considerable strength of the FtMF, as strong networks of partners, stakeholders and the national Model Forest Network exist locally, regionally, provincially, and nationally. A collaborative and supportive environment facilitates the sharing of knowledge and expertise across diverse boundaries.

When choosing strategies, Hansen et al (1999) refer to an 80-20 split. The primary strategy should receive 80% of the knowledge sharing, supported by 20% of the other (p. 112). At FtMF, previous efforts seem to have focused on 80% codified (explicit knowledge) and 20% personalized (tacit knowledge). The primary means of diffusing knowledge and sharing research results occurred through communication tools and tactics as noted in Appendix A. In comparison, there have been minimal opportunities for face-to-face interaction, which is critical for diffusing tacit knowledge.

Hansen and his colleagues might suggest that FtMF has been on the right track by integrating approaches, but it may need to realign its 80/20 strategy to be more focused on transferring tacit knowledge. If this is their objective, then 80% of their effort should target a personalized strategy, supported by 20% of sharing codified knowledge. A renewed focus on interaction and dialogue, such as demonstrations, technology transfer
sessions, research forums, and injecting knowledge into organized professional associations, suggest that FtMF appears to be shifting to a more personalized approach. This is positive for FtMF and its partners and stakeholders.

Hansen et al (2000) remind managers to use one strategy predominantly and emphasize that "executives who try to excel at both strategies risk failing at both" (p. 112). They caution against trying to convert explicit knowledge (codified approach) into tacit knowledge (personalized approach), and vice versa and warn it can lead to problems (p. 115). Companies with business units tightly aligned and integrated, should choose one strategy, supported by a second; or create units that are less integrated which may not be as relevant for the FtMF (Hansen et al, 2000).

Leadership

Strong leadership is vital in order to provide direction when choosing and implementing the appropriate knowledge management strategy. It is also an ingredient that is necessary to contend with resistance that emerges when implementing a new knowledge management strategy (Hansen et al, 1999).

The collaborative approach that FtMF uses through its Board of Directors allows stakeholders and partners to be involved in determining the priorities and direction of the FtMF. This demonstrates leadership and in itself is an effective means to transfer knowledge from the outside in and out again. This helps to promote trust, mutual understanding as well as gain insights about relevant issues, questions and concerns that require further investigation. A trusting culture where ideas and information can be freely shared is critical in order to cultivate effective knowledge creation (Roberts, 2000).
The FtMF has worked hard over the last ten years to establish a strong base of supportive stakeholders. Dixon (2002) also suggests that effective knowledge sharing can be facilitated through the building of relationships, and that the better a group of people know each other, the more that group will call on each other's knowledge. Strong leadership promotes cross-unit collaboration, which creates significant horizontal value, connecting people and exchanging knowledge across units and beyond organizational boundaries (Hansen et al, 2001). T-shaped managers share knowledge freely across the organization while remaining committed to the performance of individual business units (program areas).

This is perhaps where T-management breaks down at the FtMF. This element could be strengthened by more focused attention on the program areas, and more integration with the knowledge management objectives identified in Phase III. Some suggestions on how to achieve horizontal value are outlined in Table 2.

**Table 2: Methods to Achieve Horizontal Value**

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<tr>
<th>T-shaped managers use the following to create horizontal value:</th>
<th>How to help T-managers flourish:</th>
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<tbody>
<tr>
<td>Increase efficiency through transferring best practices.</td>
<td>Create clear incentives: reward and promote people who share knowledge with others outside their units (not just those who deliver outstanding unit results).</td>
</tr>
<tr>
<td>Improve decision quality through peer advice</td>
<td>Formalize cross-unit interactions: encourage peer group meetings to promote both confrontation and collegial support.</td>
</tr>
<tr>
<td>Grow revenue through shared expertise</td>
<td>Limit cross-unit interactions to those connected to bottom-line results. This leaves managers time to run their own businesses and builds trust as people achieve core goals together.</td>
</tr>
<tr>
<td>Develop new opportunities through cross-pollination of ideas.</td>
<td>Identify and cultivate managers who connect people who need information with those who have it. &quot;Portals&quot; know who knows what and what kind of help is needed.</td>
</tr>
<tr>
<td>Make bold strategic moves through well-coordinated implementation</td>
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Resource Pressures

Finite time and resources limit the number of rich exchanges that are fundamental to the transfer of tacit knowledge. This reality makes it challenging to realize the full potential of knowledge transfer opportunities. As senior management commits to knowledge transfer objectives, resources should also be dedicated to support program delivery.

Technology and knowledge transfer is the most fundamental element of Phase III. The success of Phase III is dependant on how well FtMF can achieve the knowledge transfer objectives laid out in the Phase III proposal. With such significant expectations identified, one might expect sufficient resources also be dedicated to support FtMF in achieving these objectives.

Fiscal realities and securing funds is a challenge that the FtMF contends with on an annual basis. FtMF research staff are occasionally involved with acquiring additional resources, which uses their time and energy that could otherwise be dedicated to research, or teaching and sharing knowledge. The lack of time to share knowledge and the issue of information overload, are two additional factors that can impact knowledge management. Davenport (2001) refers to "attention deficits" which managers and workers increasingly suffer from, as they address information overload, increasing work loads as well as competing priorities.

Knowledge management often promotes overload by offering access to more information as well as adding new work functions, which increases pressure on an individual's work activities. It will become increasingly important for managers to support staff in their efforts to contend with a multitude of factors that impact their ability to manage their workload as well as their time.
**Human Resources:**

The role of human resources (HR) in knowledge management is often overlooked. In only a fifth of corporate knowledge management efforts does HR play a leading role; and of these, only half involve important HR program components such as employee retention, rewards and compensation (Stewart, 2001, p. 111-112).

Hansen et al (1999) emphasize the importance of aligning the human resource policy with the knowledge management strategy. Continuous learning and continuous teaching are fundamental features to both, and necessary to develop a "knowledge-based economy" (Wolfe & Gertler, 2001 as cited in Wright, Dec, 2001a).

Davenport (1999) discusses the importance of building knowledge transfer into the worker's routine, suggesting it be "baked into the job" (p. 2). The responsibility for disseminating knowledge needs to be clearly specified in work plans as a priority; those activities that are less critical may need to fall off the list in order to make room for knowledge transfer activities. FtMF researchers from each activity area are required to build knowledge transfer into their work plan. However, often staff are drawn into other responsibilities (e.g. administrative tasks including seeking/securing research funds).

Managers must be careful not to impose too many additional tasks on knowledge workers/researchers, including those that support knowledge management strategies. If knowledge management initiatives become an imposition on staff routines, or create an added expectation to learn or adapt new technologies or tasks, management may meet with resistance (Wright, 2001b). Motivation and commitment become important considerations and changes implemented should positively reinforce and support researchers ability to teach and transfer knowledge.
Druker (1999, p. 83) discusses three key points regarding the effectiveness and productivity of knowledge workers (researchers).

- With autonomy comes the responsibility for knowledge workers to accept and shoulder the responsibility for their contribution.
- "Continuous innovation" must be incorporated into the knowledge worker’s job
- "Continuous learning and continuous teaching must be built into the worker’s job”.

To be productive, each individual knowledge worker must possess an attitude that will embrace these elements; however, it is equally important for the overall organization to change its attitude in support of these objectives. Management plays a significant leadership role in this regard. Druker (1999) acknowledges that work generally must be restructured and made part of a system, in order to influence the productivity of a knowledge worker. Wright (Dec. 2001a) also suggests that traditional management practices are frequently inadequate.

Parlby (2000) recommends implementing HR practices that support knowledge sharing and creation while empowering staff to do their job well (see Table 3). Parlby also posits that those organizations that invest in the learning potential of its staff, will be more likely to attract and retain staff, as well as maintain a competitive advantage.

**Table 3: HR Practices that Support Knowledge Sharing and Nurture Staff**

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<th>HR Practices that support knowledge sharing and nurture staff:</th>
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<td>- Offer staff stimulating training</td>
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<td>- Implement knowledge policy</td>
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<tr>
<td>- Reward knowledge working</td>
</tr>
<tr>
<td>- Promote personal benefit</td>
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<tr>
<td>- Facilitate communities of practice</td>
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<tr>
<td>- Build knowledge sharing/creation into normal working practice</td>
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Managers focused on diffusing tacit knowledge should establish systems that motivate and reward those involved with transferring knowledge (Leonard & Sensiper, 1998). It is important to differentiate between incentives for codification (explicit) and personalization (tacit). Real incentives must be offered to reward staff for sharing tacit knowledge directly with people. It is less complex for codified knowledge and requires managers to offer systems and rewards that motivate staff to document what they know and enter into an electronic repository (Hansen et al, 1999).

**Knowing-doing gap**

Many organizations have difficulty implementing knowledge management activities into daily routines. Essential knowledge, including technical knowledge, is often transferred by stories, by trial and error, through gossip, by observing each other work and through mentorship (Pfeffer & Sutton, 1999). Shared space, where knowledge is embedded and transferred, is an important element often overlooked in knowledge management programs. Examples of traps that make this knowing-doing gap worse, are outlined in Appendix C.
Recommendations

Organizational Objectives and Management:

Zack (1999, as cited in Wright, 2001b) argues that the most important factor that influences the success of a knowledge management strategy, involves “the degree to which organizational and knowledge strategies are articulated and integrated” (p. 6).

Suggested recommendations:

- Create a sound understanding of the definition of knowledge management as it relates to the FMF, among staff, Board of Directors, partners and stakeholders.

- Develop guidelines that will direct the development of a comprehensive knowledge management strategy. Demonstrate commitment to knowledge management consistently and incorporate knowledge management objectives into each program (activity) area. Ensure knowledge management objectives are integrated with organizational objectives and direction outlined in the Phase III objectives.

- Effective technology and knowledge transfer is fundamental to the success of the FtMF and will affect the viability and longevity of the organization beyond Phase III. An effective knowledge management strategy requires dedicated resources (staff and budget) to focus specifically on knowledge transfer objectives. Avoid dependence on the Communications and Outreach Program to fulfill the requirements of a knowledge management program. The Communications and Outreach Program can support the transfer of explicit knowledge through a number of activities as discussed previously; however, a more strategic approach is needed to implement the transfer of
tacit knowledge in a meaningful way. Build on existing objectives outlined in Phase III Proposal, and ensure sufficient opportunities for face-to-face interaction with primary researchers to facilitate technology and research transfer (minimum quarterly).

- Remove responsibility for securing program funding from the researcher. Dedicate an employee other than researchers to seek additional funds for research programs. This will allow the researcher to focus time and energy on research, and the requirement to teach and transfer knowledge through interactive and meaningful opportunities.

- Monitor the implementation of actions to ensure progress and achievement of objectives, as outlined in the Phase III objectives (and Communications and Outreach Program). Performance measurements should be identified and assessed as part of an annual evaluation to measure success and to identify areas in need of improvement.

**Communication and Information Technology**

The literature repeatedly distinguishes between tacit and explicit knowledge and reinforces the importance of choosing a strategy (personalized or codified) that provides mechanisms to diffuse the different types of knowledge most effectively. The level of communication and information technology (IT) support will depend on the knowledge management strategy chosen. In order for IT to facilitate the transfer of knowledge across distance, a shared cultural and social framework must support the virtual location (Roberts, 2000).
Suggested Recommendations:

- Tacit knowledge is most meaningful for FtMF and its stakeholders, therefore 80% of knowledge sharing activities should focus on the personalized approach, supported by 20% explicit knowledge transfer. Focus resources on meaningful opportunities to diffuse tacit knowledge through rich human interaction between research staff and partners/stakeholders, including: forums, demonstrations, lunch box information sessions, organized committees and other communities of practice. Conduct more joint knowledge transfer sessions with three key partners: Weldwood, Sustainable Resource Development and Jasper National Park. Use other mechanisms that support the personalization approach including: telephone/conference calls, email/groupware use, and video-conferencing when possible.

- The Communications and Outreach Program area is also taxed and is limited in the support it can offer technology and research transfer objectives. Focus efforts strategically and implement 20% explicit knowledge sharing that can be easily codified through the efficiencies of technology.

- Take advantage of the potential of Information Technology. Some suggestions include:
  
  1. Establish a virtual neighborhood as a meeting place for meaningful interaction. Electronic discussion boards offer easy access to expertise through an asynchronous community of practice. Chat rooms offer an option for synchronous communication. For these to be effective, the primary researcher should be involved to moderate discussion and/or to respond to any questions
posted on the discussion board. The challenge is to build this priority into the researcher’s work plan.

2. Integrate the communication products and website more effectively for storing, disseminating summaries and highlights of research findings. Create a databank of codified knowledge on the website. Profile research highlights and link to a directory of experts on related research topics which may facilitate access to knowledge that supports problem resolution.

3. Link web site(s) to a broader repository of knowledge established through the national Model Forest Network.

4. Use the website to demonstrate examples of how research is being applied on the landscape. Offer hyperlinks to the National Model Forest Network, partners and stakeholders and profile their achievements in relation to research application.

Human Resources

As knowledge is created, stored, applied and shared by people, managers must pay attention to the importance of nurturing and supporting knowledge workers in order to facilitate successful knowledge transfer.

Suggested Recommendations:

- Align the Human Resource Policy with the knowledge management strategy and ensure organizational objectives are clearly linked.

- When defining job descriptions and work plans, focus job requirements on research and keep additional tasks to a minimum (for research staff). Continue to ensure
elements of teaching and mentoring are built into researcher's work plan to help facilitate the transfer of tacit knowledge.

- Invest in the learning potential of staff. Offer staff stimulating training that will enhance their skills and encourage them to stay. Not only will this empower staff, it will help create value for the overall organization and its stakeholders.

- Implement a Recognition Program to acknowledge and reward staff for their achievements and contributions to knowledge creation.

- Explore opportunities to hire additional staff to
  1) assist with fundraising to alleviate this task from researchers; and
  2) develop and implement a knowledge management strategy.

  A chief knowledge officer would be a valuable component of the FtMF team. This position would develop and implement a cross-organizational knowledge management strategy, and be responsible for establishing systems that would enable staff to incorporate knowledge management activities into their daily routines. Other responsibilities could include: educating and championing knowledge management throughout the organization (including partners/stakeholders), mapping knowledge and integrating the organizational and technological resources to ensure a comprehensive approach that is effectively used (Zack, 1998).

Organizational Culture

In any organization, "culture" plays a critical function, acting as a symbol and storage of past learning which communicates learning throughout the organization (Normann, 1985, as cited in Weick & Ashford). To be an effective learning organization, the systems and day-to-day management practices need to "create and embody a culture
that values the building and transfer of knowledge and, most important, [act] on that knowledge" (Pfeffer & Sutton, 1999, p. 104).

**Suggested Recommendations:**

- Build knowledge sharing/creation into normal working practice. Create an environment that values and expects knowledge creation and promote action towards achievement of knowledge.
- Encourage people (including partners and stakeholders) to know and do. Identify knowing-doing gaps and act to rectify potential and real problems.
- Encourage employees to be thinking leaders and nurture a forgiving culture where mistakes, trial and error are part of the learning process. Minimize competitive influence among different research activity areas and nurture a collaborative work environment.
- Promote communication across units and create opportunities for shared space. Build on existing communities of practice to enable informal networks of people to engage in meaningful discussions. Membership should cross departmental, functional, and organizational boundaries and managers should avoid the temptation to meddle or manage these groups (Crowe, 1997).

**Conclusion**

There are many things to consider when developing a knowledge management strategy. The most fundamental element is the link to organizational objectives supported by strong leadership. A personalized approach that implements mechanisms to facilitate the transfer of tacit knowledge, supported by a codified approach will help the Foothills Model Forest achieve objectives outlined in the Phase III Proposal.
1. **FtMF Website**: the current website is presently being redesigned. A new and more interactive format will offer more up-to-date information on each of the program areas. This will be an improvement from the previous site, which was viewed as static, dated and inadequately linked to the core program areas.

2. An important element of this website will be partner profiles that explains how partners are applying research results.

3. **Quick Notes**: this product targets the scientific community and highlights technical findings related to specific program areas. This snapshot of current research offers explanations on how findings can be applied in a practical sense.

4. **FtMF Newsletter**: reaches a general audience with general messages on the progress and achievements of the FtMF. The information is less targeted and less technical in nature.

5. **Online Newsletter**: this internal, digital communication tool informs the Model Forest network about corporate direction, accomplishments and offers progress reports on a variety of issues related to its business objectives.

6. **Research Forums**: forums held two to three times per year target two key audiences (technical and general). These sessions provide detailed presentations and discussion on specific research program areas. Question and answer sessions promote direct dialogue between primary researcher(s) and interested stakeholders.
7. **Demonstration Sites:** a number of demonstration sites are being discussed and developed with the intent to show case the application of research findings and demonstrate how implementation can positively influence land and resource management practices.

8. **Annual Report:** summarizes key findings and annual achievements of the FtMF. This report details a broad overview of achievements, with a summary of research highlights, performance measurements and budget realities.

9. **Summer Interpretive Programs:** A seasonal interpretation program works with residents, visitors and school groups within the Hinton and Jasper region. Key concepts and various FtMF program highlights are presented and demonstrated in an educational and entertaining manner.

10. **Education Relations and FEESA Partnership:** FtMF supports a partnership with FEESA, an environmental education society, that assists FtMF in delivering messages and information with a focus on natural resource issues, to Alberta school teachers. FtMF intends to expand its educational program to better reach the rural schools within the FtMF land base.

11. **Ad Hoc Presentations:** FtMF staff/researchers deliver a number of scheduled and unscheduled presentations on FtMF and the various research projects.

12. **Media Relations:** increase awareness and general understanding of FtMF program areas and achievements.

13. **Government and Stakeholder Relations:** nurture relationships with government and stakeholders in order to promote greater understanding and support of FtMF objectives.
Appendix B
SWOT Analysis

Strengths:

- FtMF has an extensive network of partners and stakeholders interested in learning about research findings and receptive to improving landscape management practices based on lessons learned through science.

- The multi-faceted nature of the research occurring at the FtMF attracts many diverse interests in sustainable forest management. The collective knowledge and experience of those involved with the FtMF (including researchers, land managers, policy makers, practitioners), offer a collage of perspectives and ideas about sustainable forest management practices, which can lead to increased understanding, collaboration and innovation.

- Research findings revealed through the FtMF core program areas, are of particular interest to policy makers. Intellectual capital of this kind demands the attention of government, when policy decisions can be enhanced by science based facts. In this regard FtMF has significant potential to influence policy decisions, assuming effective knowledge transfer is implemented and significance of findings is understood.

- The Canadian model forest network serves as a repository of vast knowledge with considerable potential to generate, disseminate and store knowledge.

- Team structure throughout the FtMF support sound consensus based decisions and strong direction from multi partners regarding research outcomes.
• Well-defined, measurable and attainable goals are developed for Phase III. Additionally the requirement of researchers to address knowledge transfer and incorporate into their work plans builds in accountability for delivering knowledge transfer objectives.

• An established and comprehensive Communications and Outreach program is a significant asset, which has generated many initiatives in support of knowledge transfer. The emphasis on knowledge transfer for Phase III will provide strong direction for continued support with a greater focus on meeting knowledge management objectives.

• Research transfer forums generate dialogue between the primary researcher and interested stakeholders, and demonstrations show how research findings can be applied, facilitating effective transfer of tacit knowledge.

Weaknesses:

• Currently, the FtMF has no strategic knowledge management plan to address technology and research transfer. The current approach to transfer knowledge lacks an integrated approach that incorporates organizational objectives with Phase III knowledge transfer objectives, program/activity areas and Communications and Outreach program objectives.

• Lack clear and consistent understanding of what knowledge management means, no clear definition and minimal guidelines for strategic implementation.

• Limited resources to focus on knowledge management. There is no core funding or program area responsible for developing and implementing a strategic plan for knowledge management.
• Many of the communications initiatives in support of knowledge transfer focus on the transfer of explicit knowledge. Limited mechanisms exist to facilitate the transfer of tacit knowledge.

Opportunities:
• Supportive network of partners and significant potential to share meaningful knowledge.
• It is apparent that the research programs are the most fundamental component of the FtMF organization. To ensure support and continued research initiatives, supporters must see value and return on the investment of research. New knowledge or technologies must be transferred and when possible applied in an effort to improve forest management practices. FtMF has the capacity and attention/interest of affected stakeholders to facilitate this exchange.
• There is significant potential to transfer tacit knowledge due to the strong organizational commitment to meet knowledge transfer objectives, supported by the strengths of the existing Communications and Outreach program.

Threats/Challenges:
• Limited resources committed to knowledge management (creation, storage and dissemination of knowledge).
• Organizational objectives of the FtMF are not clearly linked to a comprehensive Knowledge Management strategy. Until this component of program delivery is integrated into the core business and endorsed at the senior level, the commitment to knowledge management will be marginalized.
• Lack of focus in program/activity areas towards knowledge transfer as compared to specific Phase III goals.

• Lack of understanding regarding the depth and breadth of an effective Knowledge management program, minimizes the potential to design and deliver an effective KM strategy.

• Wide distribution of partners and interested stakeholders makes reaching audiences and imparting knowledge challenging. Inventive ways to conduct meaningful engagement, encourage dialogue and ensure access to knowledge is necessary to promote the transfer of knowledge.

• Fiscal realities and securing funds is a challenge that the FtMF contends with on an annual basis. Some research projects require additional funds sought from alternative sources. Research staff are often involved with efforts to acquire these additional resources, which uses their time and energy that could otherwise be dedicated to the research project or teaching and transferring knowledge.

• Retaining intellectual capital (research staff).
Appendix C
Knowing-doing Traps and How to Avoid Them

Management Practices that make the knowing-doing gap worse:

Knowledge management efforts tend to emphasize technology and the transfer of codified information.

Knowledge management tends to treat knowledge as a tangible thing, as a stock or a quantity, and therefore separates knowledge as something from the use of that thing.

Formal systems can't easily store or transfer tacit knowledge.

The people responsible for transferring and implementing knowledge management frequently don't understand the actual work being documented.

Knowledge management tends to focus on specific practices and ignore the importance of philosophy.

How to avoid the knowing doing gap

Understand why before how - know organizational philosophy.

Learn by doing and teaching.

Action-oriented leadership is crucial for success; establish cultural tone that action is valued and that talk/analysis without action is not acceptable.

Nurture a forgiving culture where mistakes, trial and error are part of the learning process.

Encourage risk-taking and empower employees to be "thinking leaders".

People prefer cooperative and collaborative work environments. Improve work relations, morale, and task completion by driving out fear and competition.

Measure outcomes instead of processes. Be aware of the knowing-doing gap and take efforts to monitor, identify and rectify evidence of it.

Pay attention to culture; nurture a culture that values, actively promotes and pursues the creation and diffusion of knowledge.

From: Pfeffer & Sutton, 1999, p. 93-104
Literature Cited


