



Appendix 2

Knowledge management and commercialization

Réjean Landry

Faculty of Business, Department of Management,
Laval University, Quebec City, QC, Canada



CIHR IRSC

Canada 



- Primary focus of knowledge to action initiatives:
- Building bridges and partnerships between researchers and potential research users;
- Adapting and disseminating research results to potential users in health service organizations.

Can improved the capability of individual health care professionals to integrate research knowledge in their practice, but do not ensure that health service organizations are making the best use of existing knowledge the transformation process to shed new light on how value is created at every stage.





How Does Knowledge Transfer Differ from Knowledge Management?

Knowledge transfer is a process by which knowledge is moved from one party to another to develop or improve products, services, or practices.

Knowledge management involves four complementary organizational processes:

- Recognizing or creating knowledge that carries high potential of application;
- Transforming this potential into actual applications (proving that the knowledge works in the real world and not just in a laboratory);
- Sharing and communicating the proven value of knowledge to other units in the organization or to other organizations (knowledge transfer); and
- Implementing or commercializing the communicated knowledge through the development of new or improved products, services, or practices.





The Knowledge Management Approach

- Organization is the focus of attention.
- Look at the capacity of organizations to acquire, create, share, and apply knowledge to improve services and practices.
- Organizations that rely intensively on research knowledge to develop innovation have superior knowledge transformation processes.
- Focus on:
 - Transformation processes that create value at every stage, and
 - Ways to improve organizational processes that transform knowledge to add value to products, services, and practices.



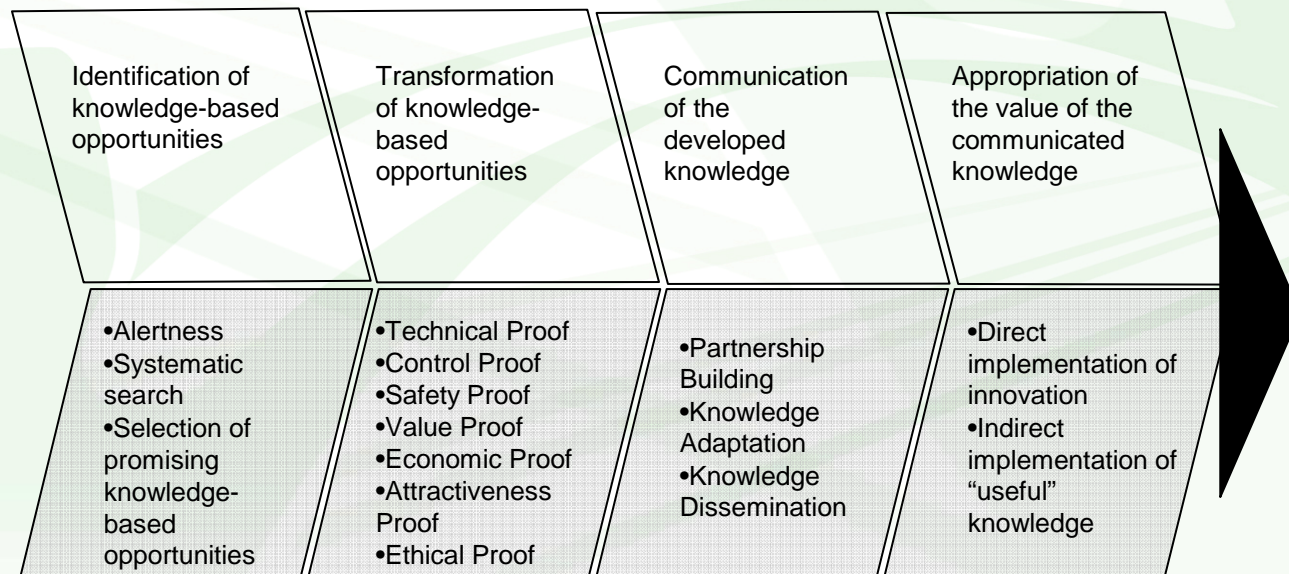


Knowledge Transformation Processes

- Sets of integrated activities undertaken to transform knowledge-based opportunities into new or improved products, services, and practices.
- Organizations that transform knowledge to create value achieve four functions in a sequential process.
- Each stage is made up of activities to convert or transform inputs into outputs.
- Ultimate goal to convert knowledge inputs into new or improved products, services, and practices.



Knowledge Transfer as a Value Creation Process





Identification of Knowledge-Based Opportunities

- Studies of KT tend to assume the existence of knowledge-based opportunities.
- Literature on knowledge management assumes that knowledge-based opportunities need to be highlighted through identification of possibilities of combining, in new ways:
 - Existing knowledge with new scientific knowledge;
 - Internal knowledge with external knowledge;
 - Knowledge sources with other resources.





Two Shortcomings

1. Knowledge-based opportunities tend to focus the search on highly promising research knowledge, whereas studies on the development of new products and services that show the development of such innovations usually require the mobilization of research knowledge in combination with other forms of knowledge.
2. There is a lack of attention to the applicability of knowledge (see Chapter 3.3 on adaptation), more specifically on the transformations required to convert promising knowledge to new or improved products, services and practices.





Converting Promising Research Opportunities

- KT and knowledge management differ with respect to assumptions on the applicability of research knowledge.
- Organizations promoting knowledge-to-action assume that to increase transfer, they need to forge more efficient interactions with users and to more effectively adapt and communicate research knowledge to users.
- The literature on knowledge management assumes that the KT assumption is counterproductive because research knowledge is not ready for application.





Many Studies Confirm this Second Assumption

- A study of the translation of highly promising basic research into clinical applications screened 101 articles published in top, basic science journals between 1979 and 1983.
- “Two decades later, only 5 of these promises were in licensed clinical use and only one of them had a major impact on current medical practices.”
- Three-quarters of the basic science promises had not yet been tested in a randomized trial...promising opportunities are almost never ready for application.
- It is not sufficient to establish an association between BRCA mutations and breast cancer...there is also a need to establish the positive predictive value of BRCA mutations in at-risk women.



Proof

- Gaining support and investment for the application of research knowledge requires proof at many complementary levels:
 1. *Technical proof*: demonstrations that a concept (for a new good, new process, new practice) is technically feasible at each state, from theory through production and delivery to customers.
 2. *Control proof*: demonstration of ownership of the intellectual property of the proven concept.
 3. *Safety proof*: demonstration that the proven concept is safe and that it minimizes liabilities.
 4. *Value proof*: demonstration that enough customers exist and can be served to clearly generate an economic or social value from the proven concept over time.





Proof (cont'd)

5. *Economic proof*: demonstration that a finished product or service based on the proven concept will deliver benefits in excess of their costs.
6. *Attractiveness proof*: demonstration that the current technology and final product, service, or practice fits the mission, goals, and strategy of the organization to which the proven concept is transferred.
7. *Ethical proof*: demonstration that the proven concept meets the organization's ethical criteria.





Judging the Elements of Proof

- Need to judge, on a case-by-case approach, the elements of proof required to ensure that the developed knowledge moves to the next stage in the KT process.
- Demonstrating that research works in clinical practice calls for successful translation from basic science to:
 - Humans (phase 1 and 2 clinical trials);
 - Patients (guideline development, meta-analyses, systematic reviews); and
 - Health care practice (implementation research).





Judging the Elements of Proof (cont'd)

- Demonstrating that promising health service research knowledge works in practice also requires a successful translation from basic science research to:
 - Incubation in pilot projects;
 - Pilot implementation;
 - Project implementation at a larger scale to replace existing services and practices.
- Chapter 3.6.2 describes a framework that can be considered for this approach to KT.





Communication of the Developed Knowledge to Other Individuals or Organizations

- Once the value of promising research results has been established, the next step is to communicate it to end users.
- Knowledge communication is influenced by the relationship between the producers and users of knowledge.
- Given the complexity of knowledge and the variability of receptor capacity of end users, knowledge managers need to answer three complementary sets of questions about partnership building, knowledge adaptation and knowledge dissemination.





Partnership Building

To what extent did we interact, on a frequent and personalized basis, with end users regarding the identification of acceptable knowledge-based opportunities, technical, control, safety, value, economic, attractiveness, and ethical proof to build a strong partnership that is responsive to their needs and opportunities?





Knowledge Adaptation

To what extent was knowledge proposed for transfer adapted for the recipient end user?

To what extent was it presented:

1. In nontechnical language?
2. With examples or demonstrations of how to use it?
3. In documents or products that were appealing (attention to packaging, graphics, color)?
4. In reports on specific topics?
5. During discussions about the implications of the knowledge for use in the development or improvement of products and processes?





Knowledge Dissemination

How did we disseminate the knowledge proposed for transfer? Did we:

1. Identify what (what part of) knowledge we want to disseminate (products)?
2. Identify individuals or organizations that could benefit by applying the knowledge proposed for transfer (end users)?
3. Identify individuals, organizations, or networks through whom we can reach end users of the knowledge proposed for transfer (dissemination partners)?
4. Identify specific communication channels for the dissemination of the knowledge proposed for transfer (e.g., newsletter, Web sites) (communication channels)? This stage also relies on knowledge of what strategies have been found to be effective.
5. Dedicate time and resources to disseminate the knowledge proposed for transfer (resources and work plan)?





Appropriation of the Value of the Communicated Knowledge Through Implementation of Commercialization

- Choosing knowledge-based opportunities is easy.
- Proving that knowledge implementation works is hard.
- Effectively communicating the increased value embodied in new products, services, or practices is very hard.
- Making effective value appropriation by end users is even harder.





Mechanisms for Appropriation

- Direct implementation of knowledge into innovations; and
- Indirect implementation of “useful” knowledge.





Direct Implementation

Knowledge-based opportunities are turned into tangible routine applications.

1. **Trial:** the new product, service, or practice is adopted for trial evaluation. The adopters develop product demonstrators, prototypes, and pilot projects, and undertake pilot production tests or pilot implementation. The product, service or practice is adjusted to the particular requirements and competencies of the receptor organization.
2. **Acceptance:** the new product, service, or practice is accepted and full-scale production and implementation are launched. The product, service, or practice is taken to the market for commercialization or implementation.
3. **Expansion:** the production and implementation of the new product, service or practice are expanded and improved before replacement by another new product, service, or practice that creates more value.





Indirect Implementation of “Useful” Knowledge

- Transferred knowledge contributes to improve access to knowledge-based opportunities that are exploited or implemented below their potential value.
- The knowledge transferred provides new ideas and hypotheses that contribute to improved access to knowledge, influencing future decisions regarding the development or improvement of existing products, services, and practices, but not to actual uptake of knowledge.





Creation and Appropriation of Value

- Organizations that create and transfer value through direct implementation into tangible applications are in a better position to retain the value they have helped create by relying on protection mechanisms such as patents, copyrights, trademarks, and confidentiality agreements.
- In the case of knowledge transfer through indirect implementation of “useful” knowledge, the organization that created the value will lose a more or less large fraction of the value created because of value slippage.
- “Value slippage – that is, when the party creating the value does not retain all the new value that is created – occurs when use value is high while exchange value is low. Slippage obviously provides little incentive for a source to continue creating value in the long run.”
- Value of slippage may be socially desirable in cases involving public goods.





Knowledge Translation and Knowledge Management Strategies

Organizations involved in KT appear to vary greatly on two dimensions:

1. The strength of their capabilities to achieve activities involved in the identification, transformation, communication, and appropriation of value developed from promising knowledge-based opportunities, and
2. The mechanisms and targets of KT.

Every organization has some kind of KT strategy, but they not be explicitly articulated.





Developing KT AND KM Strategies

Three sequential steps:

1. *Positioning*: How is the organization positioned with respect to the identification, transformation, communication, and appropriation of knowledge, and how is the organization positioned with respect to mechanisms and targets of KT?
2. *Comparing*: How are other organizations using these positioning characteristics?
3. *Assessing*: Based on the strengths and weaknesses of other organizations, how can we improve the organizations' KT performance by altering or reinforcing one or more positioning characteristics?





Positioning Organizations- KT Mechanisms

- People-to-document mechanism that involves significant investments in information technologies and focuses on developing information systems that codify, store, disseminate, and allow multiple reuse of knowledge (described in Chapter 3.5.5); and
- Person-to-person mechanisms that involves moderate investments in information technologies but focuses on developing networks to link people to complement the dissemination of codified knowledge with the sharing of tacit knowledge.





Positioning Organizations- KT Targets

- When **individuals** are the targets of KT, the attention of managers is focused on individual attributes such as: level of training, motivation, and networks in relation to the development, improvement, and diffusion of new or improved professional practices.
- The value created from transferred knowledge is predicted from individual attributes and the interactions between individuals and their professional environment.
- When **organizations** are the targets of KT, the organizational attributes, the development and improvement of products or services, and the capabilities of organizations to manage knowledge from the identification of knowledge opportunities to its approximation into product, process, or practice innovations, become the managers' dominant focus of attention.
- This strategy may be more useful for large rather than small organizations.





Four KT Strategies

Applying positioning characteristics to organizations results in four KT interventions:

	TARGETS	
Mechanism	Individual targets	Organizational targets
People-to-document	Evidence-based professional practice strategy	Technology transfer or dissemination strategy
People-to-people	Community of practice strategy	Knowledge management strategy





Distinctive Characteristics of Four KT Strategies

Some distinctive positioning characteristics illustrate how various types of organizations and KT interventions share similarities and differences:

	People-to-document / individuals	People-to-document / organizations	Person-to-person / individuals	Person-to-person / organizations
Dominant knowledge value activity	Strong on knowledge creation and weak on communication	Strong on identification of opportunities and communication	Strong on knowledge creation	Strong on identification and communication
Dominant strategy	Evidence-based professional practice strategy	Technology transfer or dissemination strategy	Community of practice strategy	Knowledge management strategy
Exemplary cases	Institutes of Clinical Evaluation	University Technology Transfer offices National Center of the Dissemination of Disability Research	Cochrane Collaboration	World Health Organization World Bank





- These illustrations suggest that there may be significant strengths and weaknesses differentiating the four strategies portrayed in the first table.
- A more comprehensive diagnosis relies on a systematic benchmarking of all the strengths and weaknesses of an organization in comparison with other organizations for all the tasks involved in each of the four stages of the KT process.
- The results of benchmarking exercises can help managers collect information on the specific strengths and weaknesses of their own organizations and improve the organization's knowledge transfer performance of their strategy by altering or reinforcing one or more positioning characteristics.
- Interviews would show that most organizations rely on a combination of these four strategies.
- However, we hypothesize that health care organizations that are effective in KT predominantly rely on one strategy and use a second or third one to support the first.





Summary

- KT in organizations is a process made up of many characteristics.
- Knowledge managers and policymakers need to invest resources in these characteristics (both strong and weak).
- Failure to improve the weakest activities may compromise overall KT capabilities and organizational performance.
- For knowledge managers, projects involving the identification, transformation, communication, and appropriation of value created through knowledge-based opportunities can be assimilated to experiments in which some projects succeed and others fail.
- Failure provides opportunities for learning.
- KM framework may point to weaknesses in the translation process – leading to strengthening weak links – leading to improved success in other translation projects.





Summary

- Studies on KT and technology transfer rarely focus on activities related to transformation of promising research opportunities into new or improved products, services, or practices that work in the real world.
- Few organizations significantly invest in programs and projects aiming to prove that promising research knowledge works in the real world.
- Until now, most organizations have tended to invest in the creation of knowledge and its communication (adaptation and dissemination).
- Investing more significantly in proof-of-principle programs and projects that will likely receive more attention in the future.





Summary

- The KM framework provides a systematic and customized approach to help managers assess the:
 - KT performance of their organization, and
 - Identify the strengths of other organizations that would attenuate their weaknesses if remedial interventions were implemented.
- Conceptual frameworks always focus on a number of issues at the expense of the complexity of the real world
- The framework developed should there be considered a simplification of reality that calls for future development.

