Facilitating a Knowledge Translation Process

KNOWLEDGE REVIEW AND FACILITATION TOOL

INSTITUT NATIONAL
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Facilitating a Knowledge Translation Process

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The image on the cover page shows a sailing crew in full action. It illustrates the key elements of knowledge translation: teamwork, collaboration, the sharing and exchange of technical and practical knowledge, as well as management of the unexpected.

TRANSLATION

Nina Gilbert

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CONTEXT

Subsequent to release of the updated Québec Public Health Program (QPHP), the Direction générale de la santé publique of the Ministère de la Santé et des Services sociaux (MSSS) made public its strategy for the development of public health research (*Stratégie pour le développement de la recherche en santé publique*, 2008). This strategy proposes guidelines based on, among other things, the results of a review of public health research in Québec (*Bilan de la recherche en santé publique au Québec*).[1] One of these guidelines calls for strengthening of the capacity to use research results in the health and social services network. Among the priority actions mentioned is the development of various forms of partnership involving funding for the production of knowledge, such as knowledge syntheses, experimental projects or feasibility studies. Another priority is the implementation of effective knowledge translation strategies.

These guidelines are part of a broader movement promoting knowledge translation and use. In fact, numerous policies promoting innovation call for more fruitful dialogue between science and society aimed at increasing the benefits derived from research supported by public funding. In general, there is also a desire among organizations within the government, academic, community and private sectors to foster greater use of the available knowledge so as to bring about changes in practices and in decision making processes. In Québec, as elsewhere, the strengthening of knowledge translation mechanisms is increasingly becoming a priority.

It was within this context that, in 2008, the MSSS mandated the Institut national de santé publique du Québec (INSPQ) to produce a knowledge synthesis on knowledge translation (KT), with a view to supporting action.

[1] Laurendeau, M.-C., M. Hamel, et al. (2007). *Bilan de la recherche en santé publique au Québec (1999-2004).* Ministère de la Santé et des Services sociaux du Québec and Institut national de santé publique du Québec.

1 INTRODUCTION

In public health, as in the field of health in general and in the social sciences, there is a significant gap between the knowledge available and the use of that knowledge. Despite the devotion of considerable effort over the course of recent years to implementing innovative strategies at the central, regional and local levels, there is still much to learn about how to increase knowledge use and there is a great need for tools and training that can further the development of better practices in the area of knowledge translation.

Designed with a view to supporting action, this document first presents an overview of existing knowledge about the translation of knowledge in the health field. On the basis of the available literature, this knowledge review identifies the main elements to consider when attempting to implement more structured knowledge translation practices. This information is synthesized and a dynamic and integrated conceptualization of the knowledge translation process is presented in the next section. The document's annexes include a tool for facilitating a knowledge transfer process and a summary diagram that illustrates at a glance the contents of this publication.

While it is intended for public health actors, the contents of this document can be applied in a variety of contexts. Thus, it is addressed to a broad audience of managers, decision makers, stakeholders and public policy makers working in various activity sectors, as well as to professionals acting as liaison officers, knowledge translation officers, researchers or knowledge brokers in their respective sectors. Nevertheless, for public health actors, this document offers the advantage of using examples drawn from their reality and providing them with points of reference for their practices.

2 METHOD

The production of this document was divided into seven broad steps:

- Identification of the scientific and grey literature on knowledge translation;
- Processing and analysis of the written work on knowledge translation;
- Production of a knowledge review;
- Design of a tool to support facilitation of a dynamic knowledge translation process;
- Development of a summary diagram illustrating all the components of the process;
- Validation of the developed tools by groups of potential users;
- Production of the final documents.

As regards the identification of publications and of the grey literature, a documentary search of various health-related data bases (including Medline and OVID) was carried out using various key words, including "*knowledge transfer,*" "*knowledge translation,*" "*dissemination*" *and* "*knowledge utilization.*" New references extracted from the articles consulted and from subscriptions to scanning newsletters[2] were later added. In all, over 250 documents were consulted.

The method used to carry out the knowledge review resembles what is referred to in the literature as a "*scoping study.*"[3] Particularly useful in helping to limit focus within a vast area of study, this method makes it possible to circumscribe the intersection between a field of study and a set of specific objectives. More realistic than a systematic review when time and budget constraints do not allow for in-depth study of each scientific article, this method is also judged to be more useful when the objective is to support action.

In addition, as part of an integrative and interactive approach to putting knowledge to use,[4] an advisory committee composed of representatives from the MSSS's Direction générale de la santé publique and from the INSPQ was established and consulted several times to ensure that the tools produced successfully met the needs of the MSSS and of the public health network, and to verify the user friendliness of the tools.

[2] These included, among others, the *E-Watch* newsletter published by the knowledge translation and innovation Chair (Chaire sur le transfert des connaissances et l'innovation) at Université Laval (http://www.santepop.qc.ca/en/activites/eveille.html).

[3] Arksey H & L. O'Malley (2005). "Scoping studies: Towards a methodological framework." *International Journal of Social Research Methodology* 8(1): 19-32.

[4] Chunharas, S (2006). "An interactive integrative approach to translating knowledge and building a "learning organisation" in health services management." *Bulletin of the World Health Organization,* 84(8): 652-7.

3 REVIEW OF KNOWLEDGE ON KNOWLEDGE TRANSLATION

Within the context of this document, knowledge translation refers to the group of activities and interaction mechanisms that foster the dissemination, adoption and appropriation of the most up-to-date knowledge possible to allow for its use in professional practice and in health management. These activities and interaction mechanisms are integral to a process that includes the sharing, transfer and transmission of knowledge among several groups of actors working in different organizational environments.

The knowledge translation process comprises several steps, each of which is driven by its own logic and objectives. Breaking down the knowledge translation process into separate steps makes it easier to identify the issues, challenges and strategies most relevant to the objectives targeted and to define the role of each group of actors involved.

Before looking more closely at each of the steps leading to the goal of knowledge use, it is important to first consider the different types of knowledge that may be the focus of transfer activities as well as the various approaches to knowledge translation.

3.1 PUBLIC HEALTH KNOWLEDGE

In the public health field, knowledge translation efforts are focused on three broad categories of knowledge: research-based knowledge, tacit knowledge and knowledge derived from data analysis.

3.1.1 Research-based knowledge

In the field of health, the word “knowledge” often refers to knowledge based on scientific research. This first type of knowledge is extremely useful for guiding public health action. However, there are many types of research-based knowledge.

A primary distinction can be drawn between fundamental research, clinical research and applied research. Fundamental research consists in “experimental or theoretical work undertaken mainly with a view to acquiring new knowledge regarding the underlying foundation of phenomena and observable facts.”[5] The results of such research are not usually directly applicable. For example, the discovery of a virus does not instantly result in a cure to eradicate it. Often initiated by researchers themselves, fundamental research can change the status of acquired knowledge, change our perception of reality or add to our understanding of the world. Based on the results of fundamental research, subsequent research that is more directly useful to practice can be undertaken. Thus, the discovery of a virus inevitably gives rise to research aimed at finding an effective treatment for combating that virus. Clinical studies then evaluate the effectiveness of that treatment. The aim of clinical research is to further understanding of diseases and to develop effective therapeutic treatments. Afterwards, applied research can document obstacles and facilitating factors associated with the adoption of certain types of safe behaviour within specific sub-groups of the population at greater risk of contracting the virus. This type of research can be

[5] Laurendeau, M.C. & P. Joubert (2008). Perspectives de développement de la recherche à l’Institut national de santé publique du Québec, Institut national de santé publique du Québec, 62 pp.

undertaken by actors involved in the development of services or programs for these population sub-groups. Most public health research falls into this category.

A second distinction can be drawn between quantitative and qualitative research. These two types of research often have different objectives. Quantitative studies, based on experimental models, make it possible, among other things, to determine the effectiveness of interventions within a particular context. They attempt to answer the question “what should be done?” Qualitative studies, for their part, focus on another level of concerns, which are usually related to the “why?” “how?” and “with what implications or consequences?” of a given action. They can provide information about the relevance of a program or an intervention for a given population and document the factors that facilitate the implementation of a measure as well as obstacles to be considered.[6] Since they address different questions, these two types of research use different methods. Qualitative and quantitative studies are complementary and are both essential to the development of public health research.

In 2007, the INSPQ, in collaboration with the MSSS, published a portrait of public health research in Québec.[7] In this study, public health research was defined as “all research activities related to the health and well-being of the population and the determinants thereof, which is aimed at the production, integration, dissemination and application of valid scientific knowledge relevant to the exercise of public health functions [Translation].” The determinants of the health and well-being of the population comprise the individual characteristics (demographic, socio-economic, genetic, behavioural, etc.), collective characteristics (social structure, for example), and contextual characteristics (organization of health and social services, living environment, physical, social, cultural, economic and political environment, etc.) that directly or indirectly influence health. According to the same study, public health research can be classified into to five broad non-exclusive topics (see Table 1).

Research-based knowledge can take the form of products such as research reports or scientific articles, when new knowledge is being developed, or it can take the form of synthesis products aimed at integrating the range of research on a given subject, such as literature reviews, systematic reviews and meta-analyses.

[6] Ciliska, D., H. Thomas, et al. (2008). Introduction to Evidence-Informed Public Health and a Compendium of Critical Appraisal Tools for Public Health Evidence, National Collaborating Centre for Methods and Tools: 22 pp.

[7] Laurendeau, M.-C., M. Hamel, et al. (2007). *Bilan de la recherche en santé publique au Québec (1999-2004).* Ministère de la Santé et des Services sociaux du Québec and Institut national de santé publique du Québec.

Table 1 Research topics related to public health

TOPICS	INCLUSION CRITERIA
1 **Health and well-being of the population and their determinants**	→ Research linked to monitoring of the health and well-being of the population (incidence, prevalence and distribution within the population of mortality and morbidity, risk and protection factors). → Research (descriptive, analytic, explanatory, etc.) on relationships between the health and well-being of the population and their determinants.
2 **Interventions and health promotion, prevention and protection programs**	→ Research (evaluative, participative, research-action, etc.) on projects (including pilot and demonstration projects) aimed at maintaining, protecting and improving the health and well-being of groups, living environments or communities. → Evaluative research on the development, establishment, implementation, effects, efficiency, effectiveness, and cost-effectiveness of interventions and programs aimed at health promotion, prevention (including screening and early prevention) and protection.
3 **Organization of health services and social services related to public health**	→ Research (evaluative, descriptive, etc.) that examines the organization and functioning of services and their impact on the health of populations (e.g: preventive, front-line and screening services as well as specialized laboratory services tied to public health) from a populational perspective. → Research that examines the provision, consumption, performance and quality of services, from a populational perspective. → Research on the level of correspondence between the population's needs and services; on the attitudes of the population and of the groups concerned (e.g: users, public health actors) toward the services; and on the communication between the providers and users of services, from a populational perspective.
4 **Public policies linked to the health and well-being of the population**	→ Research on the components of national, regional and local public policies linked to the health and well-being of the population, within and outside of the health and social services network (e.g: policies for combating poverty, social development and sustainable development policies). → Research on the evaluation of the impact of public policies and approaches to risk management (e.g: legislation, regulation). → Research on the attitudes and perceptions of the population toward public and risk management policies. → Research on the underlying values and on the ethical dimension of public health practices (e.g: health equality).
5 **Theories and methods related to public health**	→ Etiological, behavioural, social, systemic, ecological and intervention theories, theories of change, etc. → Methods for analyzing the health and well-being of the population; risk evaluation and mathematical modelling methods, etc.

Source: Laurendeau, M.C., M. Hamel, et al. (2008). "Portrait de la recherche en santé publique au Québec entre 1999 et 2004." *Canadian Journal of Public Health, 99(5): 366-370.*

3.1.2 Tacit knowledge

Tacit knowledge refers to the "know-how" of practitioners, managers, researchers or professionals who have accumulated a substantial amount of theoretical knowledge and practical experience.

Tacit knowledge is the accumulated knowledge and practical experience of a professional who has not converted this know-how into an exportable form. The transfer of tacit knowledge thus requires interaction with the holder of this knowledge and generally takes place in a context where the user can apply what is being conveyed in a concrete manner. When practitioners, professionals or managers participate in research, consultations or expert forums, their tacit knowledge takes objective form and is incorporated into a rigorous process which gives added value to their opinions and perceptions of a situation. Moreover, the tacit or experiential knowledge of users is often indispensable to the apt interpretation of new knowledge production, whence the importance of establishing a true dialogue and exchange between those who produce and those who use knowledge.

In addition, the opinion of experienced decision makers, managers and professionals is of great value in interpreting existing data in a specific context, in forming judgements when there is insufficient data, and also in transferring and applying research data from other sectors. Such persons make use of their accumulated theoretical and practical knowledge, their political judgement, their knowledge of a sector, or any other experience or knowledge they have acquired or learned that can inform decision making or guide action during periods of uncertainty.[8]

Tacit knowledge is the fruit of a rigorous process that often involves the pooling of various points of view originating from many experts. This knowledge can take different forms. Public health-related scientific opinions, for example, are based both on research-based knowledge and on the tacit knowledge of researchers or content experts who issue recommendations based on the available data. Similarly, clinical practice guidelines often represent a consensus that is based on scientific knowledge, experience and clinical judgements. For example, the Canadian Task Force on Preventive Health Care is an independent scientific panel funded by the government and mandated to develop clinical practice guidelines based on clinical experience and intended for preventive health care providers.[9]

3.1.3 Knowledge derived from data analysis

In addition to research-based knowledge and tacit knowledge, there exist multiple sources of data which, once collected, organized and analyzed, are worthy of being transmitted, in an appropriate form, to decision makers, managers and stakeholders at different levels of government as well as to researchers who may be interested in such data. Examples include monitoring data, data derived from management indicators and various types of populational data (sociodemographic data, data on the health and well-being of the population, etc.). We can also point to data related to service use and to evaluation data.

As in the case of tacit knowledge, for knowledge derived from data to be considered useful and relevant, the data must have been organized in some way using a rigorous method and must take into account the needs of potential users. For example, those responsible for monitoring public health collect, analyze and interpret data for the purpose of efficiently

[8] Lomas, J. et al. (2005). *Conceptualizing and Combining Evidence for Health System Guidance*. Ottawa, Canadian Health Services Research Foundation: 48 pp.

[9] Website of the Canadian Task Force on Preventive Health Care: http://www.phac-aspc.gc.ca/cd-mc/ctfphc-gecssp-eng.php.

disseminating it to those who need the data, including, among others, policy and program planners and the population.[10]

As illustrated by the following figure, knowledge based on public health research, tacit knowledge and knowledge derived from data analysis each help guide public health action in a specific, complementary and useful manner.

Figure 1 Various inputs into the production of knowledge relevant and useful for public health action

3.2 APPROACHES TO KNOWLEDGE TRANSLATION

Surrounding the concept of knowledge translation are a number of theoretical propositions, conceptual frameworks or logical models, originating from different disciplines or perspectives. These ideas can be grouped under three main approaches: linear, problem-solving and interactive approaches.[11,12]

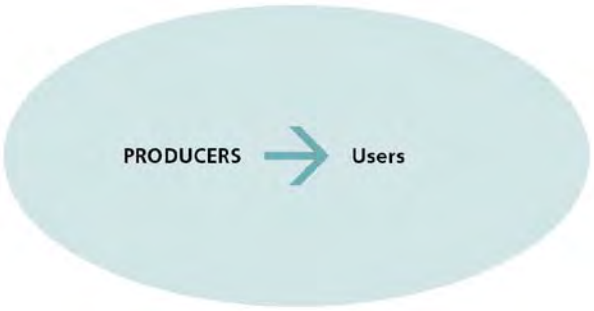
[10] Direction générale de la santé publique (2007). *Cadre d'orientation pour le développement et l'évolution de la fonction de surveillance au Québec*. Québec, MSSS: 51 pp.

[11] Landry, R. et al. (2007). Élaboration d'un outil de transfert de connaissances destiné aux gestionnaires en éducation : rapport de la revue systématique des écrits. Working Paper – Document de travail n° 2007-04. CHSRF/CIHR Chair on Knowledge Transfer and Innovation: 61 pp.

[12] Faye, C., M. Lortie, et al. (2007). *Guide sur le transfert des connaissances à l'intention des chercheurs en santé et sécurité du travail.* Réseau de recherche en santé et en sécurité du travail du Québec.

3.2.1 The knowledge-driven approach

Researchers who use a knowledge-driven approach are working primarily to advance science. Scientific knowledge is primordial and knowledge is generally produced within the context of a specific discipline. This approach can be represented in the following manner:

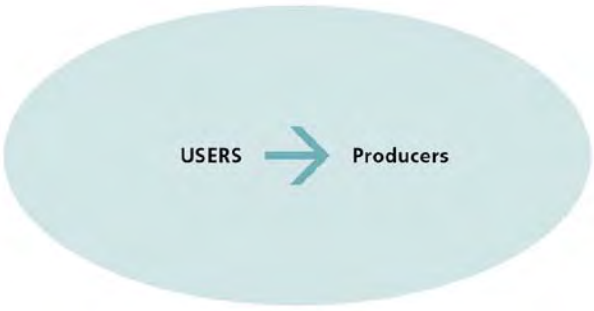


This approach presupposes that the producers of knowledge have the interest, the time and the personal abilities required to effectively communicate their research results to the relevant users or conveyors of knowledge. It also presupposes that potential users will necessarily be interested in the research results of these researchers.

In certain cases and for certain types of research, such as fundamental research, this approach can adequately meet the needs of the actors concerned. In other circumstances, this approach presents certain disadvantages: it assigns a rather passive role to users, it does not take into account their concerns or the various contexts and environments that give rise to these concerns, and it brushes aside their professional and experiential knowledge.[13]

3.2.2 The problem-solving approach

In the problem-solving approach, the knowledge creation process is initiated in response to the specific needs of a group of actors seeking a solution to a concrete problem.



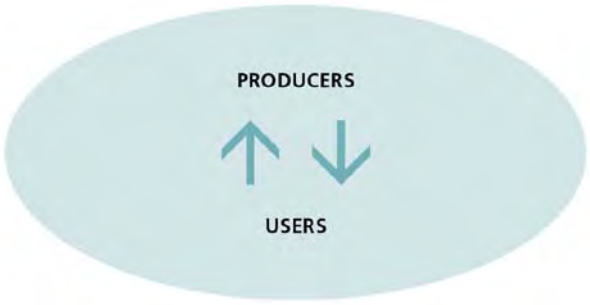
Science, in this approach, plays a more utilitarian role and it is presumed that knowledge translation will be facilitated by the mere fact that the starting point was the needs of users. However, this model does not ensure that research results will be used, especially if these

[13] Roy, M., J.-C. Guindon, et al. (1995). Transfert de connaissances – revue de littérature et proposition d'un modèle. Études et recherches, IRSST: 53 pp.

results run contrary to users' interests, beliefs and ways of doing things.[14] Still, the results of research that was mandated or solicited seem to be taken into consideration more often than the results of research that was not.[15]

3.2.3 Interactive approaches

Interactive approaches propose that more or less frequent exchanges take place between the producers and potential users of knowledge throughout the process. The collaboration and interaction between these actors can take many forms. The bi-directional mode of exchange, which allows for minimal integration of the concerns of future users beginning at the outset of research, can be represented in the following manner:



With this mode of interaction, users play an active role by contributing to one or several stages of research: formulation of the initial question, validation of the data collection tools, interpretation, validation and dissemination of the results, etc. This is referred to as collaborative research.

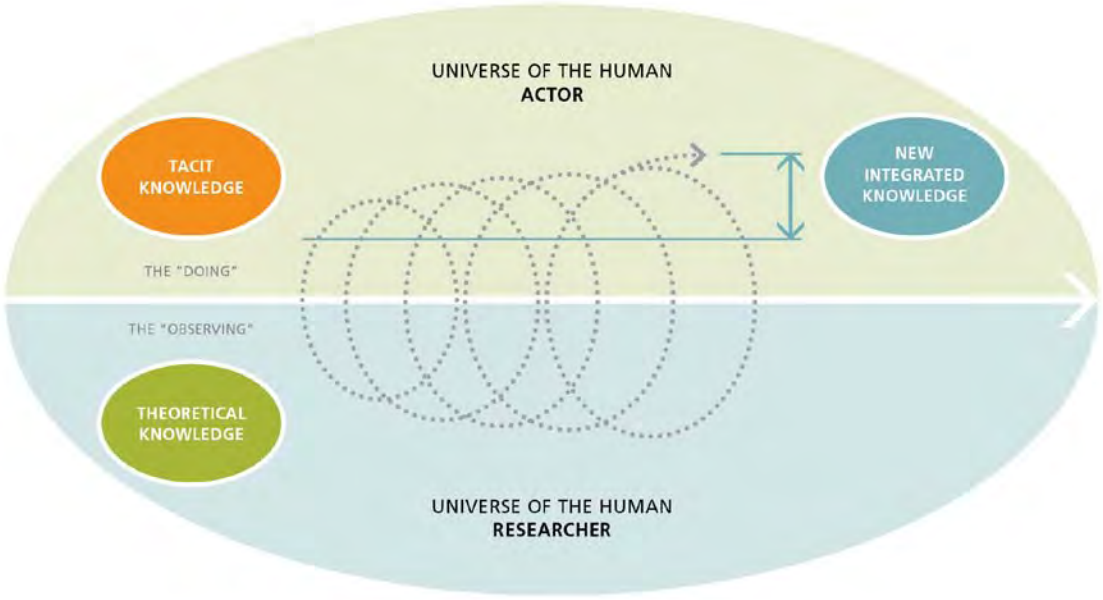
The spiral mode of transfer (Figure 2) goes a little further toward integrating the experiential knowledge of users, who thus become co-producers of the knowledge. The spiral form evokes the continuous give-and-take between researchers and users aimed at redefining, detailing, and improving the project on an ongoing basis. This mode of collaboration between users and researchers is particularly well suited to research in the social and human sciences where experimentation takes place in a given environment and appropriation of the new knowledge by users participating in the research is facilitated.[16] The knowledge acquired can then be disseminated for use in similar contexts. Some organizations or research institutions are able to experiment with this type of approach (university-affiliated centres within a CSSS, for example), but not all researchers are given this opportunity.

[14] Roy, M., J.-C. Guindon, et al. (1995). *Transfert de connaissances – revue de littérature et proposition d'un modèle*. Études et recherches, IRSST: 53 pp.

[15] Hanney, S. R., M. A. Gonzalez-Block, et al. (2002). *The utilisation of health research in policy-making: Concepts, examples and methods of assessment*. Geneva, World Health Organization: 56 pp.

[16] Landry, R., N. Amara, et al. (2000). Évaluation de l'utilisation de la recherche sociale subventionnée par le CQRS. Québec, Université Laval.

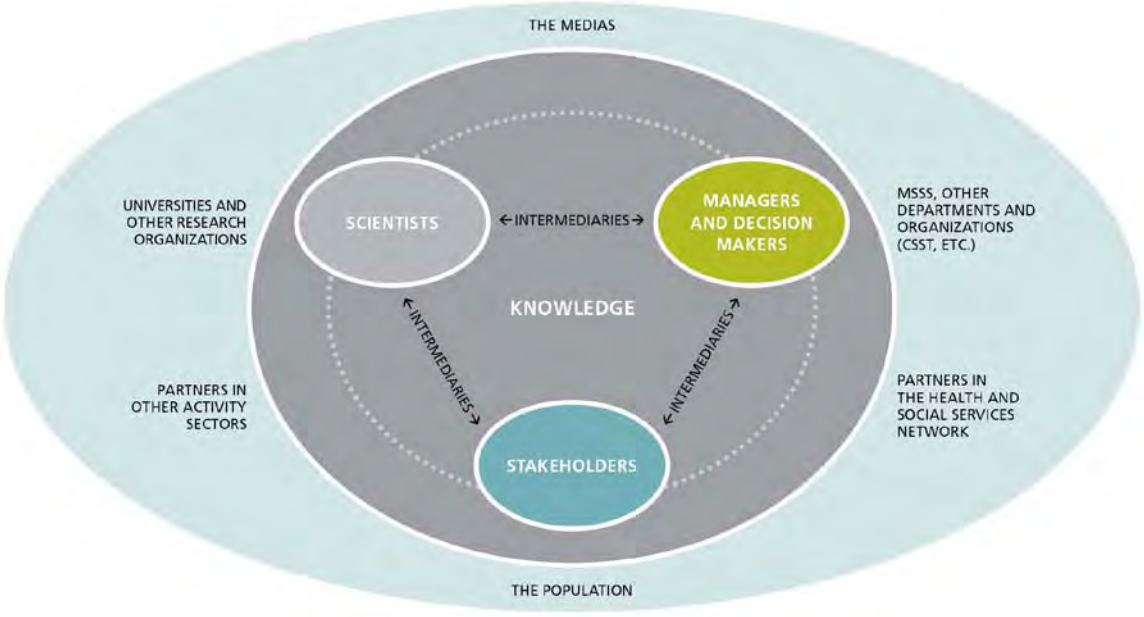
Figure 2 The spiral mode of transfer



Inspired by Bouchard and Gélinas (1990) in Roy M., J.-C. Guindon, et al. (1995). Études et recherches, IRSST. p. 31.

Approaches centered on social interaction, for their part, take into account the complexity of organizations as well as the main issues tied to knowledge use, and focus on continuous interaction among the various groups of actors concerned by a problem, so as to reduce the gap between the world of research and that of practice. Exchange is central and knowledge translation is filtered through a multitude of intermediary actors, such as knowledge brokers, liaison officers, professionals or managers. From this perspective, issues related to knowledge translation are no longer tied only to content, but also to social systems (organizational and sociopolitical) that generate and use knowledge, as well as to interactions among these systems, whence the notion of a network supporting the production and transfer of knowledge. Figure 3 illustrates the network of partners involved, closely or from a distance, in the production, transmittal and use of knowledge helpful for guiding public health action.

Figure 3 Main actors involved in the production, exchange and use of knowledge useful for public health action



This evolution of the concept of knowledge translation explains the appearance over time of a multitude of terms surrounding the concept: some prefer to speak of “knowledge exchange and sharing” to better convey the interactive aspect of the process, others prefer the expression "knowledge mobilization" when the aim is to combine knowledge from different fields so that the optimal decision can be made. Others concentrate more on the ultimate goal and use the terms “knowledge use” or “knowledge application.” For its part, “knowledge valorization” or “research valorization” often refers to the added value derived from the commercialization of research results. According to Graham and colleagues,[17] the term knowledge translation remains the most commonly used term internationally, and this is the case across a range of sectors. According to the same authors, the majority of people using these terms are implicitly referring to some sort of interactive process.

KEY MESSAGE

New approaches to knowledge translation increasingly conceive of knowledge translation as an *ongoing process* involving more or less frequent interactions among several groups of actors working in specific sociopolitical contexts and organizational environments, each in turn playing a role in the production, exchange and use of knowledge.

[17] Graham, I. D., J. Logan, et al. (2006). "Lost in knowledge translation: time for a map?" *Journal of Continuing Education in the Health Professions* 26(1): 13-24.

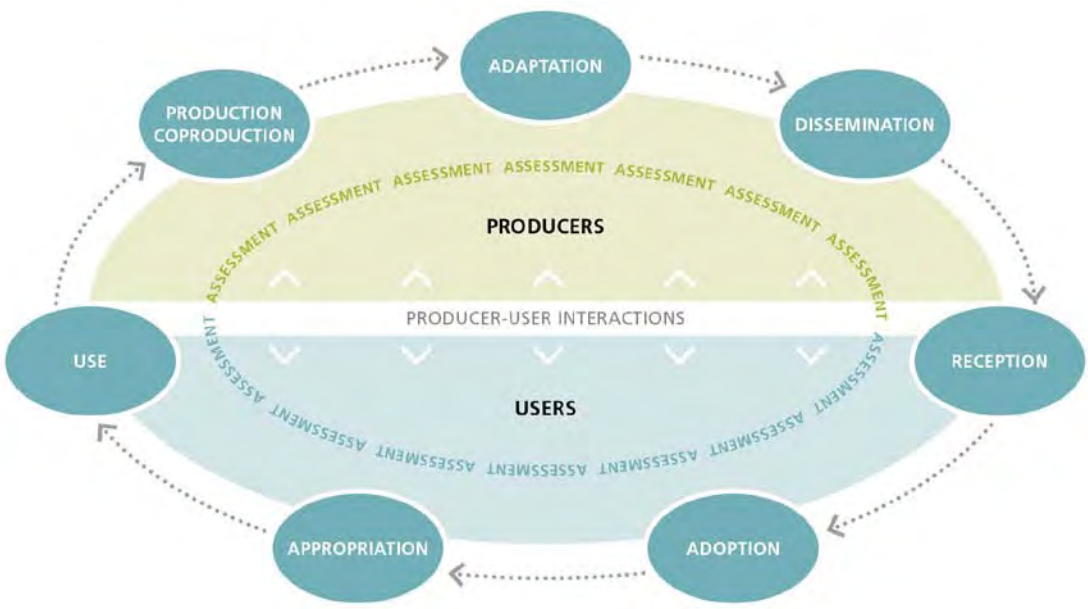
3.3 STEPS IN THE KNOWLEDGE TRANSLATION PROCESS

The introduction of new knowledge into a context where it can be used to inform decision making, change individual or organizational behaviour, develop policies and programs or modify professional practices is a complex process that includes several steps beginning with the production of new knowledge and continuing on to its use in a given context.[18,19,20]

Figure 4 presents seven distinct steps: knowledge production, adaptation, dissemination, reception, adoption, appropriation and use. To these various steps, must be added the assessment as a separate dimension. Because this assessment may be carried out at different times during the process, it is represented in a circular manner in the figure.

Although the number and sequence of steps may vary depending on the knowledge being transferred, on the goals targeted and on the context of the actors involved, this breakdown makes it possible to examine the specific contribution of each of these steps and its influence on the eventual use or non-use of knowledge. This, moreover, is what the assessment attempts to discern. It should be noted that, despite the use of the term “steps,” this is not a linear process, but rather a dynamic one involving much back-and-forth movement. Figure 4 illustrates the importance of interaction between producers and users throughout the process.

Figure 4 The different steps in the knowledge translation process



[18] Dobbins, M., D. Ciliska, et al. (2002). "A framework for the dissemination and utilization of research for health-care policy and practice." *Online Journal of Knowledge Synthesis for Nursing* 9.

[19] Landry, R., N. Amara, et al. (2001). "Utilization of social science research knowledge in Canada." *Research Policy* 30(2): 333-349.

[20] Roy, M., J.-C. Guindon, et al. (1995). *Transfert de connaissances – revue de littérature et proposition d’un modèle*. Études et recherches, IRSST: 53 pp.

3.3.1 Content production

The production step consists of creating, generating, mobilizing or selecting knowledge that is relevant to a specific goal or issue in order to shed light on it. The aim is essentially to create a basic product in the form of useful material. This product can take different forms depending on the type of knowledge it is based on and on the main audience for whom it is intended.

The way knowledge is generated and the actors involved in its production will have an impact on its use. In practice, when the users of knowledge are involved in the production process, the dissemination and reception stages are integrated into the process and the appropriation and use stages are facilitated, at least for the group of users who participated in the knowledge production process.

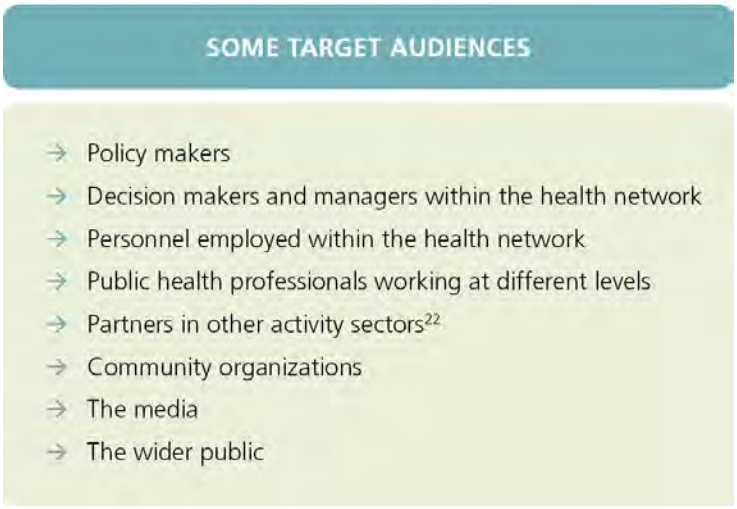
It sometimes occurs that the producers of content are also its principal users, as in the case of certain products based on data analyses or knowledge syntheses produced in response to the concerns of an organization. In such situations, transferring the knowledge outside of the organization is not always part of the plan when the document is initially produced, but this may be envisioned if the product proves to be potentially useful and relevant to other groups of users.

3.3.2 Adaptation of content and format to target audiences

If a knowledge product initially designed for one audience must be transferred to other audiences, the content should be adapted. The purpose of this step is to make the knowledge produced *understandable* to those hoping to access it, by adapting the format and language to the target audiences and to their level of concern.

The adaptation step involves, firstly, not only the identification of potential users, but also, as Lavis and colleagues[21] suggest, the identification of persons who can influence these users. For each audience selected, it is also necessary to specify the objective pursued. Is the purpose to raise an audience's awareness of a new problem, to seek its support, to influence it or rather is the goal to change a professional practice?

[21] Lavis, J. N., D. Robertson, et al. (2003). "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly* 81(2): 221-48, 171-2.



The material to be transferred must be adapted to the needs, concerns, level of knowledge, practices and sociopolitical or organizational context of each of the target audiences, as well as to the purpose of the transfer. The same information will be used differently depending on the role and the decision making level of each group of actors (directors, mid-level managers, professionals) because their sphere of action and their power to act vary. One can, for example, transform research results into a decision-making tool for decision makers and into an intervention grid for health professionals. In all cases, one should highlight the information that is most useful and relevant to the group being addressed.

Ideally, the message conveyed should be clear, concise, consistent, and if possible, be shown to have concrete applications. Certain groups will prefer case histories or anecdotes that illustrate the content well to more theoretical or academic presentations. Memorable stories that bring the information to life are likely to be repeated, which helps the information to circulate.[23]

More specifically, when one is addressing decision makers, it is preferable to summarize the information in one paragraph or less[24] and to present it in the form of ideas rather than as data.[25] However, it is not always easy to extract a clear, concise, easily adapted or immediately transferable message. The difficulty increases when decision makers are working within an evolving context, with change occurring at the level of practices or service organization.[26]

[22] Public health action inevitably requires collaboration among actors in several sectors, including the family and childhood, education, recreation and sports, justice, public safety, employment, revenue, housing, agri-food, environment and transportation sectors (QPHP, p. 22).

[23] Zarinpoush, F., S. Von Sychowski, et al. (2007). Effective Knowledge Transfer & Exchange for Nonprofit Organizations: A Framework, Imagine Canada: 50 pp.

[24] Canadian Health Services Research Foundation (2005). Leveraging Knowledge: Tools and Strategies for Action: Report for the seventh annual CHSRF workshop: 23 pp.

[25] Lavis, J. N., D. Robertson, et al. (2003). "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly* 81(2): 221-48, 171-2.

[26] Brousselle, A., D. Contandriopoulos, et al. (2009). *Why we should use logic analysis for evaluating knowledge transfer interventions*. Montréal, Canada, Groupe de Recherche Interdisciplinaire en Santé (GRIS).

As regards health professionals, studies focused on their preferences report that they desire quick and efficient access to the results of high-quality research in the form of syntheses that clearly explain the implications of those results for action.[27,28,29,30,31]

Communication departments are valued partners during this step, because they know how to adapt products to effectively reach different audiences. Moreover, they are often called upon when there are sensitive files to be handled or to be defended in the media. Thus, regional public health authorities often work to transform complex results into simpler messages directed to the general public.

3.3.3 Knowledge dissemination

Dissemination can be defined as the process through which the content of a knowledge product is communicated, over a certain period of time, through various communication channels, such as the media and interpersonal communication.[32] The aim of this step is to make knowledge products *accessible* to potential users.

Information technologies offer great potential for the dissemination of knowledge products through existing organizations and networks. On the other hand, they require an investment of time, they can exclude certain groups that one might desire to reach, and they do not always allow for the establishment of relationships of trust, which are necessary to the

[27] Dobbins, M., K. DeCorby, et al. (2004). "A knowledge transfer strategy for public health decision makers." *Worldviews on Evidence- Based Nursing* 1(2): 120-8.

[28] Dobbins, M., S. Jack, et al. (2007). "Public health decision-makers' informational needs and preferences for receiving research evidence." *Worldviews on Evidence-Based Nursing* 4(3): 156-63.

[29] Kothari, A., S. Birch, et al. (2005). ""Interaction" and research utilisation in health policies and programs: does it work?" *Health Policy* 71(1): 117-25

[30] LaPelle, N. R., R. Luckmann, et al. (2006). "Identifying strategies to improve access to credible and relevant information for public health professionals: a qualitative study." *BMC Public Health* 6: 89.

[31] Beaudoin, S. & C. Laquerre (2001). *Guide pratique pour structurer le transfert des connaissances,* Centre jeunesse de Québec - Institut universitaire: Direction du développement de la pratique professionnelle: 67 pp.

[32] Roy, M., J.-C. Guindon, et al. (1995). Transfert de connaissances – revue de littérature et proposition d'un modèle. Études et recherches, IRSST: 53 pp.

creation of a climate of sharing and exchange.[33] Personal contact is sometimes required for the creation of mutual trust.

Not all research results need to be widely disseminated. Which dissemination strategies should be adopted depends on the nature of the knowledge to be transferred, the objectives to be attained and the audiences to be reached.

3.3.4 Knowledge reception

Knowledge reception refers to the context in which knowledge is transferred as well as to the interest of potential users in receiving the knowledge and their ability to do so.

Since knowledge is introduced within the context of a dynamic process (professional practice, decision making, etc.), its usefulness at a specific point in time is partly derived from this process. Conclusive data on effectiveness would be very useful when a decision is being made about which intervention to choose, whereas knowledge about facilitating factors and potential obstacles could help guide action during the implementation stage.[34] Maintaining ongoing relationships with the various actors in a network allows one to remain abreast of users' needs and makes it easier to transmit knowledge products that may be of use to them *at the opportune time*.

The person, group or organization that communicates information also plays an important role. In fact, people accept new information more easily when it is conveyed to them by people they trust[35] and people react more positively when the information is presented by one of their peers.[36] The choice of messenger is thus of primary importance: one must know how to choose trusted intermediaries (knowledge brokers or others) who are credible, flexible and in touch with others.[37]

As regards professional practices development, organizations have an important role to play in encouraging the circulation and reception of knowledge and in fostering the capacity to analyze knowledge being produced or developed.[38] For example, having a computer available in the workplace and having access to a documentation centre are conditions that greatly facilitate the reception of new knowledge. The presence of analysts or research officers who critically screen products from outside can also result in more knowledge being received by potential users.

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[33] Crewe, E. & J. Young (2002). *Bridging research and policy: context, evidence and links*. Working Paper 173. Overseas Development Institute: 25 pp.

[34] Dobrow, M. J., V. Goel, et al. (2006). "The impact of context on evidence utilization: a framework for expert groups developing health policy recommendations." *Social Science and Medecine* 63(7): 1811-24.

[35] Crewe, E. & J. Young (2002). *Bridging research and policy: context, evidence and links*. Working Paper 173. Overseas Development Institute: 25 pp.

[36] Abernathey et al., 2000 cited in Zarinpoush, F., S. Von Sychowski, et al. (2007). Effective Knowledge Transfer & Exchange for Nonprofit Organizations: A Framework, Imagine Canada: 50 pp.

[37] Lavis, J. N., D. Robertson, et al. (2003). "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly* 81(2): 221-48.

[38] Beaudoin, S. & C. Laquerre (2001). *Guide pratique pour structurer le transfert des connaissances*, Centre jeunesse de Québec – Institut universitaire: Direction du développement de la pratique professionnelle: 67 pp.

3.3.5 Knowledge adoption

Adoption refers to the process through which a user, after having been exposed to new knowledge, decides whether or not to adopt it. This process may take place at the individual level (a physician, stakeholder or decision maker), the collective level (a professional association introducing a new practice) or the organizational level (implementation of a new program). Because this step involves making a decision, this section presents the essential information from the literature regarding the factors that influence whether or not knowledge is adopted by decision makers.

To explain the under-use of research results during the design of policies and programs, two factors of particular note were identified. The first is the fact that research is just one of the elements taken into consideration. The other elements are as follows: economic circumstances, power relationships between the different groups of actors with an interest in the policy to be implemented, public opinion, lobbying by special interest groups, the media's influence, political feasibility, the ability to implement the required change and the dominant values of the society.[39] Thus, research results can be completely ignored during the decision making process, despite convincing proof, if the latter runs contrary to the position of an influential interest group. Context and dominant values, thus, influence the process that can lead to the adoption of knowledge by potential users.

A second factor explaining the under-use of research results during the design of policies and programs is the fact that there are significant differences between the research and policy-making communities. These differences impede communication between actors in the two communities. The political environment is one in which the short term, influence and power relationships take precedence, whereas the scientific community privileges rationality and the accumulation of knowledge over time. Information is transferred in the political world primarily through oral communication, whereas the scientific world defers more to the tradition of publishing and its rules.[40] In short, the major divides between these two environments are as follows: different relationships to time, different vocabularies, different priorities and a reciprocal lack of understanding of each others' constraints.[41,42,43,44]

[39] Pyra, K. (2003). *Knowledge Translation: A Review of the Literature,* Nova Scotia Health Research Foundation: 29 pp.

[40] Trottier, L. H. & F. Champagne (2006). L'utilisation des connaissances scientifiques : au coeur des relations de coopération entre les acteurs, GRIS, Université de Montréal: 41 pp.

[41] Hanney, S. R., M. A. Gonzalez-Block, et al. (2002). *The utilisation of health research in policy-making: Concepts, examples and methods of assessment*. Geneva, World Health Organization: 56 pp.

[42] Chase, C. & A. Coburn (1998). "The role of health services research in developing state health policy." *Health Affairs*, 12: 139-151

[43] Anderson, M. et al. (1999). "The use of research in local health service agencies." *Social Science and Medecine* 49(8): 1007-19.

[44] Lomas, J. (1997). Improving Research Dissemination and Uptake in the Health Sector: Beyond the Sound of One Hand Clapping, McMaster University: Centre for Health Economics and Policy Analysis 43 pp.

Included among the elements that facilitate the transfer of knowledge between its producers and decision makers are close, ongoing collaborative relationships,[45, 46, 47] reliance on intermediaries such as knowledge brokers to facilitate interaction between the two groups,[48,49] proactive dissemination by researchers, and development of users' abilities to evaluate and assess research results.[50]

In a systematic review, Innvaer noted the three elements most frequently identified as factors that facilitate the use of research by decision makers: 1- personal contact between researchers and decision makers 2- the timing and the relevance of research results, that is, whether knowledge arrives at the right time and can help solve problems, and 3- the inclusion of a summary and clear recommendations.[51]

Finally, it should be noted that it is not always desirable for new knowledge to be adopted from the outset. In the case of research on a new subject, for example, it could be dangerous to adopt the results of an initial study on the subject. Similarly, when the results of several studies on the same subject diverge, it would seem premature to adopt a practice based on one set of results rather than on another. This is why knowledge syntheses that review many studies whose results point mainly in the same direction are thought to provide the type of evidence that is most useful to decision making.[52] However, in reality, decision makers often face time constraints that do not allow them to wait for conclusive research results, which are usually based on many years of study. It can, therefore, be very useful to appeal to tacit knowledge.

3.3.6 Knowledge appropriation

Appropriation refers to the process through which persons assimilate new knowledge or a new way of thinking about a problem and integrate this into their accumulated body of knowledge, expertise and know-how.

[45] Hanney, S. R., M. A. Gonzalez-Block, et al. (2002). *The utilisation of health research in policy-making: Concepts, examples and methods of assessment*. Geneva, World Health Organization: 56 pp.

[46] Lavis, J. N., S. E. Ross, et al. (2002). "Examining the role of health services research in public policymaking." *Milbank Quarterly* 80(1): 125-54.

[47] Elliott, H. & J. Popay (2000). "How are policy makers using evidence? Models of research utilisation and local NHS policy making." *Journal of Epidemiology and Community Health* 54(6): 461-8.

[48] Dobbins, M., P. Robeson, et al. (2009). "A description of a knowledge broker role implemented as part of a randomized controlled trial evaluating three knowledge translation strategies." *Implementation Science*. 4(23): 1-9.

[49] Lefort, L. & M.-C. Laurendeau (2006). Une expérience de courtage des connaissances comme stratégie pour favoriser l'utilisation des données probantes en santé publique : volet francophone d'une étude pancanadienne. Research report submitted to the Ministère de la Santé et des Services sociaux du Québec.

[50] Pyra, K. (2003). *Knowledge Translation: A Review of the Literature*, Nova Scotia Health Research Foundation: 29 pp.

[51] Innvaer, S., G. Vist, et al. (2002). "Health policy-makers' perceptions of their use of evidence: a systematic review." *Journal of Health Services Research and Policy* 7(4): 239-44.

[52] Lavis, J. N., D. Robertson, et al. (2003). "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly* 81(2): 221-48.

The process of appropriation can be accomplished through structured exchanges between the producers of knowledge and its users, through informal exchanges within a community of practice or through participation in concrete activities that allow for experimentation with a new way of doing things. To be effective, such activities must take into account pre-existing knowledge as well as the know-how and experience of users, since new knowledge must, in a sense, be filtered through users' experience.

According to Laquerre,[53] since the goal of structured appropriation activities is to modify behaviour or adapt a practice within a specific context, they must be intended foremost for persons who are motivated and ready to engage in experimentation and in the application of new knowledge. Moreover, when appropriation activities necessitate the acquisition of additional skills, they require a commitment simultaneously from the individual and from the organizational environment[54] and often require the presence of content appropriation facilitators, whose role consists in guiding and supporting users in the application of knowledge that has been conveyed to them.[55]

3.3.7 Knowledge use

Four distinct types of knowledge use are identified in the literature: conceptual use, instrumental use, symbolic use and process use.[56,57,58,59,60]

Conceptual use refers to the use of knowledge that sheds new light on a problem or that furthers understanding of complex problems.

In certain cases, the accumulation of knowledge gradually changes perceptions and leads to deeper understanding of a problem's various facets. Thus, the production of knowledge about suicide prevention brought about, over time, a change in mentality and led decision makers and health professionals to address this problem not only from the perspective of clinical intervention and service organization, but also from the perspective of mental health determinants and preventive action. This was also the case for social and health problems such as poverty and obesity, which are no longer attributed exclusively to individual responsibility, but are also explained through reference to the influence of broader

[53] Laquerre, C. (2000). "Présentation d'un guide pratique pour structurer le transfert de connaissances." Courir deux lièvres dans le champ de l'intervention enfance-famille... ou faire avancer à la fois la science et la pratique. Proceedings of a colloquium held in Ottawa on May 12, 1999 within the context of the 67th ACFAS conference: 31-35.

[54] Beaudoin, S. & C. Laquerre (2001). *Guide pratique pour structurer le transfert des connaissances,* Centre jeunesse de Québec - Institut universitaire: Direction du développement de la pratique professionnelle: 67 pp.

[55] St-Cyr Tribble, D., Lane J., et al. (2008). *Le cadre de référence "trans-action" en transfert de connaissances*, Université de Sherbrooke: 39 pp.

[56] Innvaer, S., G. Vist, et al. (2002). "Health policy-makers' perceptions of their use of evidence: a systematic review." *Journal of Health Services Research and Policy* 7(4): 239-44.

[57] Lavis, J. N., S. E. Ross, et al. (2002). "Examining the role of health services research in public policymaking." *Milbank Quarterly* 80(1): 125-54.

[58] Hanney, S. R., M. A. Gonzalez-Block, et al. (2002). The utilisation of health research in policy-making: concepts, examples and methods of assessment. Geneva, World Health Organization: 56 pp.

[59] Graham, I. D., J. Logan, et al. (2006). "Lost in knowledge translation: time for a map?" *Journal of Continuing Education in the Health Professions* 26(1): 13-24.

[60] Nutley, S. M., I. Walter, et al. (2007). *Using Evidence: How research can inform public services*. Policy Press.

determinants, such as living environment and urban planning. Similarly, research on conjugal violence and psychological harassment at work has made it possible to overcome certain prejudices and taboos.

Conceptual use refers to the indirect and long-term effect of an element of knowledge on the evolution of our understanding of an issue or an aspect of reality. The influence of this knowledge builds over time and it is often difficult to discern exactly when it brought about change. For example, the conceptual framework introduced in the "Lalonde Report,"[61] distributed in 1974, still today allows for a better understanding of the different factors that influence health. The Ottawa Charter,[62] for its part, broadened our understanding of "health" by including the notion of "well-being" and broadly redefined the field of health promotion. As regards the conceptual framework of the Pan American Health Organization[63] (PAHO), it had a direct influence on Québec's vision of public health and, in general, is still having an impact on how the role of public health is conceptualized.

The term **instrumental use** applies when the results of a specific study, the product of a knowledge synthesis or expert recommendations are put to direct use during policy design, decision making or the problem solving process. For example, public health-related scientific opinions and recommendations concerning sensitive issues sometimes have an effect on laws and regulations. One such example, among others, would be a measure proposed by the INSPQ in a knowledge review concerning road speed[64] which helped bring about changes to the Highway Traffic Act, which now requires the use of speed-limiting systems in commercial motor vehicles.[65] The decision to establish the Québec Breast Cancer Screening Program, based partly on the recommendations of the Conseil d'évaluation des technologies de la santé (council for health technology assessment)[66] is another example. One could say that, in general, practice guidelines[67] are designed for the instrumental use of clinicians.

Sometimes a document is used in more than one way. This has been the case for the model developed by the Pan American Health Organization[68] (PAHO) which, in addition to having been of conceptual use, has also been used in an instrumental manner to evaluate the performance of public health systems. It prompted PAHO's member states to adhere to their public health commitments and build capacity nationally in the areas of monitoring and health infrastructure. In Québec, it guided structuring of the basic elements of the QPHP.

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61 Lalonde Report, A new perspective on the health of Canadians, Ottawa, 1974.

62 Ottawa Charter for Health Promotion, 1986.

63 Pan American Health Association (2003). Public health in the Americas: conceptual renewal, performance assessment and bases for action, PAHO Scientific Publications, No. 589.

64 INSPQ (2005). Road speed: Health Impact and Counteractive Measures – Scientific Review, 130 pp.

65 An Act to amend the Highway Traffic Act in relation to the use of speed-limiting systems in commercial motor vehicles, http://www.e-laws.gov.on.ca/html/source/statutes/english/2008/elaws_src_s08008_e.htm.

66 Conseil d'évaluation des technologies de la santé du Québec (1989), *Dépistage du cancer du sein au Québec : Documents de référence 1 et 2,* Montréal. Conseil d'évaluation des technologies de la santé du Québec (1990), *Dépistage du cancer du sein au Québec : estimations des coûts et des effets sur la santé*, Montréal.

67 Those of the Canadian Task Force on Preventive Health Care, for example.

68 Pan American Health Association (2003). Public health in the Americas: Conceptual Renewal Performance Assessment and Bases for Action, PAHO Scientific Publications, No. 589.

Symbolic or strategic use refers to the use (sometimes selective) of research results to support or legitimize a pre-existing stance or to support an argument in favour of action.

The use of populational data (e.g., life expectancy or mortality rate) to justify the relevance of acting on a problem or of establishing new programs constitutes an example of the strategic use of knowledge.

Relying on comparative analyses from other countries to gain support for an idea or to support a budget decision is another form of symbolic use. For example, we made use of data from Germany, the Netherlands, Norway and Sweden to demonstrate that family allocations can help combat childhood poverty.

In cases where the results of research are divergent or inconclusive or in cases where decisions have already been made, presenting only those analyses which support the proposals being advanced is also considered a symbolic use – one that is often contested – of knowledge.

The **process use** refers to the impact of the research process on participants. In reality, the simple fact of being involved in a study or an evaluative project changes how participants (researchers, practitioners or managers) think about and do things. This, in return, can have a positive effect on the study or on the results of the programs evaluated.[69] Evaluation of the QPHP, for example, is based on the participation of public health actors at the national, regional and local levels at different stages of the process (from the collection of data to its analysis and use in regional and local action plans). The results of this work are incorporated into updates to the program. For its part, the Ministère de la Santé et des Services Sociaux has, with increasing frequency, been forming follow-up committees for funded or mandated research projects. These committees are composed of researchers and decision makers who interact and exchange information on an ongoing basis throughout the duration of the research project, so as to make adjustments as needed.

These different types of knowledge use are tied, in part, to the nature of the knowledge produced (more or less theoretical), to the status of knowledge at the time it is used (more or less developed), to whether or not research results converge and to the complexity of the subject being addressed. Knowledge of a more theoretical nature is more likely to be used in a conceptual manner, although it could also be used in an instrumental manner. A simple problem that is considered a priority and for which there exists conclusive and undisputed evidence (e.g., blood screening of newborns for congenital hypothyroidism) is likely to involve the direct use of results. Inversely, a large-scale, complex problem (e.g., the fight against poverty) that has generated divergent or inconclusive research results will require the more comprehensive mobilization of any knowledge that is likely to clarify the situation, including tacit knowledge.

[69] Nutley, S. M., I. Walter, et al. (2007). *Using Evidence: How research can inform public services*, Policy Press.

3.3.8 Assessment

Given the considerable amount of resources and effort that can be invested in planning and executing a knowledge translation process, it seems essential to verify whether these investments have borne fruit. Hence the importance of verifying, throughout the process, whether the knowledge transferred is readily accessible, whether it is well understood by the target audience, whether it was used and, if applicable, if this produced the desired change. However, the answers to these questions are complex. As mentioned, knowledge use is a process that evolves continually and takes place over varying lengths of time. Consequently, the resulting benefits may vary, may be produced at different times during the knowledge translation process, and may even sometimes occur in an unexpected manner.

There is no consensus among researchers as to the best way to assess the benefits of knowledge use. What should be evaluated? Should it be the translation process, that is, the extent to which the objectives, the needs of the target audience and the strategies used are aligned, or the results produced? Should each type of use be considered (conceptual, instrumental, symbolic and process)? And if so, how should this be done and what period of time should be considered?

Thus, although there is consensus as to the relevance of assessing the benefits of knowledge translation, the capacity for doing so remains limited. New studies are needed for the development of rigorous methods for measuring the impacts and benefits of knowledge translation, as well as for evaluating translation strategies.

Despite the absence of proven measurement instruments, it is advisable to regularly verify the effectiveness of the process by questioning the actors involved, gathering their comments through the use of evaluation sheets distributed during translation activities, and by maintaining ongoing communication with the target audience or audiences so as to document reported or observed changes on the level of their knowledge, their attitudes and their practices. In the same vein, specifying the desired benefits at the outset will help define the scope of the knowledge translation process to be carried out, as well as provide indicators of progress and/or results that can serve as a basis for comparison.

KEY MESSAGE

The use of new knowledge is a dynamic and interactive process that is sometimes relatively predictable, but is usually complex, unpredictable and spread out over a more or less long period of time. One can thus understand the challenges involved in evaluating knowledge use and assessing its benefits.

3.4 DETERMINANTS OF THE KNOWLEDGE TRANSLATION PROCESS

A significant number of factors that can influence the knowledge translation process are examined in the literature.

Table 2 presents a primary classification of these factors based on the steps presented in the preceding section. This table assists one in considering, at each step, which actions should be implemented to facilitate the translation of knowledge or to counter potential obstacles.

The determinants of knowledge translation can also be classified according to the type of knowledge transferred, the actors concerned and the organizations involved.

3.4.1 Determinants linked to knowledge

The following characteristics linked to the type of knowledge transferred can facilitate the translation process and foster the use of that knowledge: the extent to which the knowledge produced and the needs of users are aligned, the quality of the knowledge produced and its accessibility, relevance, utility, and applicability, along with the format and level of language used during its transfer.

Table 2 Determinants of the knowledge translation process

STEP	FACTORS FACILITATING KNOWLEDGE TRANSLATION
Production	→ Characteristics of the producer: reputation, experience, credibility, involvement in networks. → Alignment of knowledge produced with users' needs. → Involvement of users and decision makers in the knowledge production process. → Quality of the knowledge produced (rigorous process, valid and reliable). → Resources placed at the producer's disposal (time, equipment, funding). → Production context: policy of supporting research, knowledge translation policy, support of funding organizations and presence of knowledge brokers and organizations.
Adaptation	→ Adaptation of knowledge to characteristics, requirements, levels and profiles of users. → Clarity and accessibility of language. → Policy supporting knowledge vulgarization. → Access to communication resources and vulgarization experts.
Dissemination	→ Platforms used for transfer: nature, attractiveness, user-friendliness (paper, downloadable file, etc.). → Choice of dissemination channels (guides, journals, Internet, etc.) → Development of a dissemination strategy. → Existence of networks (research networks, communities of practice, etc.) → Presence and involvement of knowledge brokers, liaison agents, professional networks and intermediary organizations → Dissemination context: policy of supporting knowledge dissemination, support of funding organizations, access to resources.
Reception	→ Existence of liaison officers and intermediary organizations (choosing the right messenger). → Access to knowledge produced (presence of a documentation centre, Internet access, etc.). → Characteristics of users: short-term interest, age, level of education, motivation.
Adoption	→ Perceived usefulness of knowledge at the time of transfer. → Correspondence between knowledge produced and problems to be resolved. → Interaction (frequency and quality) between the producers and the users of knowledge.
Knowledge appropriation and use	→ Perceived usefulness and credibility of the knowledge produced. → Characteristics of users: level of education, training received, prior experiences with research, positive value assigned to scientific knowledge, personal motivation to appropriate and use knowledge, ability to understand and use knowledge, expected advantages. → Organizational context: support of peers and of one's organization, workload, decisional scope, work environment, presence of champions of change and leaders supporting change, availability of internal resources, etc.

Inspired by Faye C., Lortie M., Desmarais L. (2007). Guide *sur le transfert des connaissances à l'intention des chercheurs en Santé et Sécurité au Travail,* Réseau de recherche en santé et sécurité du travail du Québec.

3.4.2 Determinants linked to actors

At the individual level, the main factors linked to knowledge producers are as follows: their status, their credibility, their reputation, their experience, their involvement in networks, their interest in transfer activities and their ability to interact with different audiences.

Among users, lack of experience in applying knowledge in a professional context, difficulty analyzing transferred knowledge critically and a negative attitude toward change are some of the obstacles to new knowledge use. On the other hand, attributing a positive value to research, a high level of education, having already participated in a scientific process, positive experiences with the use of similar knowledge and a strong motivation to acquire the new knowledge are factors that facilitate the knowledge translation process.

3.4.3 Determinants linked to organizational characteristics

An organizational culture that does not encourage research and innovation, lack of time for reviewing relevant literature, lack of autonomy or of a margin of manoeuvre for adopting new knowledge, lack of resources for applying new knowledge and resistance to change are organizational obstacles that knowledge translation strategies are not always able to surmount.

Within universities, the culture and the system of promotion assign value to the publication of articles in scientific journals and often consider knowledge translation activities occurring outside of the scientific community to be marginal.

KEY MESSAGES

The numerous factors that influence the knowledge translation process interact with each other and the relative weight of each of them depends in large part on the context in which knowledge will be used. For example, presenting research results in a user-friendly manner is certainly an important step toward encouraging reception of the knowledge, but this cannot negate the effect of political issues during the development of public policies.

Knowledge translation strategies cannot by themselves surmount all obstacles to the use of knowledge. Certain solutions are tied instead to the field of knowledge management, an activity that must be carried out within organizations and which involves organizational culture, explicit and tacit knowledge, processes that facilitate the pooling of knowledge and technology essential to the management of data and the sharing of knowledge.[70] Increasing the capacity of personnel to assimilate knowledge or allocating sufficient financial and technological resources to the reduction of problems related to accessing documentation are knowledge management strategies that facilitate knowledge translation.

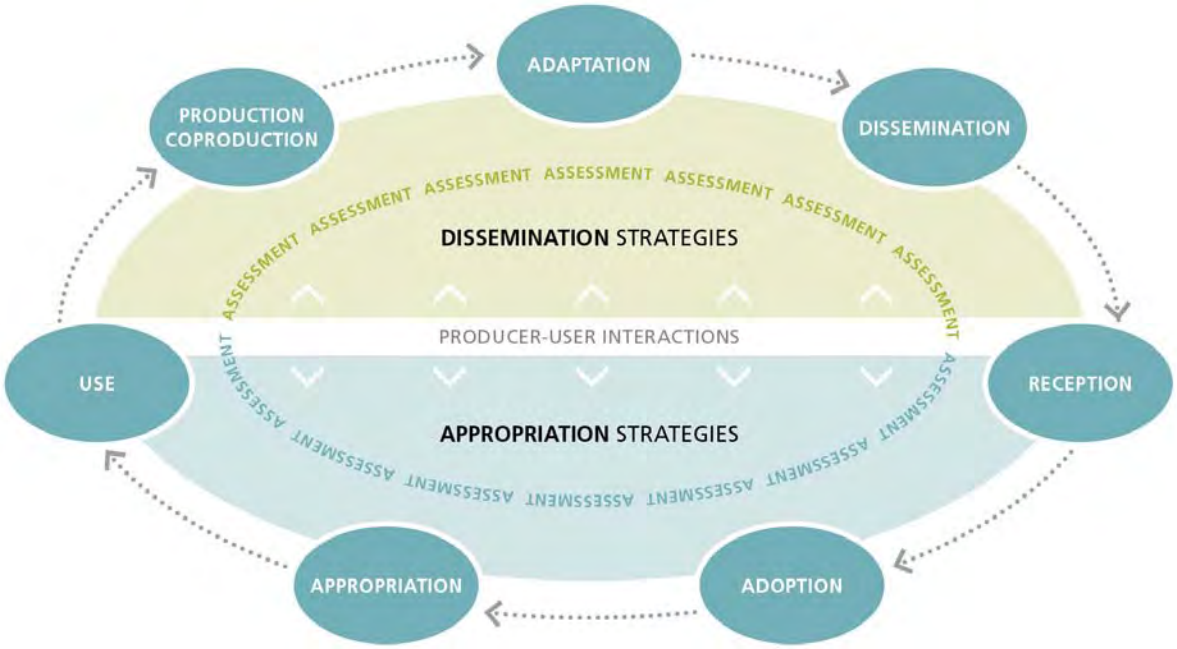
[70] Dubois, N. & T. Wilkerson (2008). Knowledge Management: A Background Paper for the Development of a Knowledge Management Strategy for Public Health in Canada: 54 pp.

3.5 KNOWLEDGE TRANSLATION STRATEGIES

Knowledge translation strategies should be adapted to the type of knowledge to be transferred (research results, expert consensus reports, analyzed data useful for planning, etc.). In addition, they must take into account the targeted objectives (awareness raising, adoption of a new vision, informed decision making, modification of a professional practice, change of lifestyle habits within a population) as well as the obstacles and facilitating factors associated with the use of the knowledge by each of the target audiences one intends to reach (practitioners, managers, decision makers, users, the general public, etc.). Thus, no knowledge translation strategies are proven to be effective in all situations.

This said, breaking down the translation process makes it possible to classify knowledge translation strategies into two broad categories, as illustrated in Figure 5: 1- dissemination strategies whose primary goal is to make new knowledge *understandable* and *accessible* so as to effectively reach the groups of actors concerned, and 2- appropriation strategies whose primary objective is to *facilitate the integration and application* of knowledge in a given context.[71]

Figure 5 The two broad categories of knowledge translation strategies

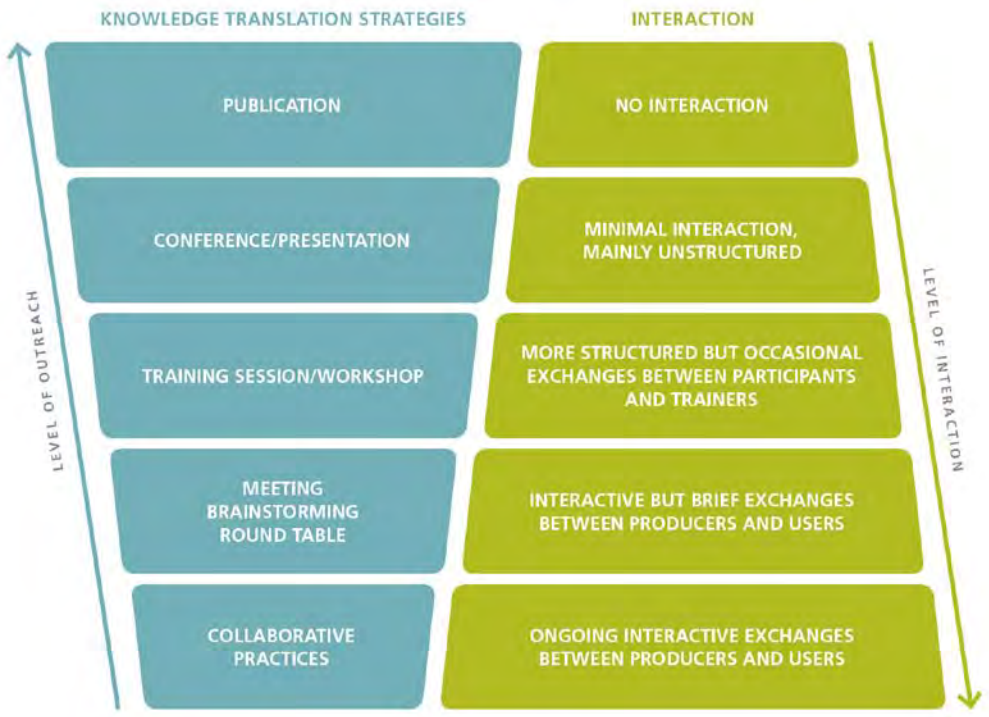


[71] Dissemination strategies call for the services of specialists in communications and vulgarization, whereas appropriation activities call instead for the services of specialists in training and often require the support of content specialists.

Dissemination and appropriation strategies are complementary and differ in scope. The former promote the reception of knowledge, but are recognized as insufficient for prompting the concrete use of knowledge in practice.[72,73,74] Appropriation strategies, for their part, demand a greater commitment on the part of the actors and organizations involved.

Dissemination strategies that are more linear offer the advantage of reaching a very wide audience, whereas more interactive strategies only reach a certain number of people at a time and involve a greater investment of time and money. Figure 6 illustrates this relationship. The higher they are positioned in the pyramid on the left, the more unidirectional the activities and the less time and human resources they require, whereas the closer they are to the bottom of the pyramid, the more involvement in the activities is required of all the participants. Thus, the resources available for knowledge translation activities, the aim of the process, the potential collaborations (with liaison centres, for example), the type of knowledge to be transferred and the target clienteles will guide the choice of activities to be carried out.

Figure 6 Interaction required by different knowledge translation strategies



Inspired by Zarinpoush, F., S. Von Sycowski, et al. (2007). *Effective Knowledge Transfer & Exchange for Nonprofit Organizations:* A Framework, Imagine Canada.

[72] St-Cyr Tribble, D., Lane J., et al. (2008). *Le cadre de référence "trans-action" en transfert de connaissances*, Université de Sherbrooke: 39 pp.

[73] Bero, L. A., R. Grilli, et al. (1998). "Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group." *British Medical Journal* 317(7156): 465-8.

[74] Davis, D. A. & A. Taylor-Vaisey (1997). "Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines." *Canadian Medical Association Journal* 157(4): 408-16.

Nevertheless, in all cases, a minimum amount of interaction with users is recommended because the development of close collaborative relationships between knowledge users and producers is considered to be a factor likely to increase knowledge use.[75,76,77] In fact, collaborative experiences allow knowledge producers to anticipate users' needs, to keep abreast of emerging problems and to take these into account in the development of their research programs or knowledge products.[78]

To promote the development of relationships between producers and users, several strategies can be implemented: involve users in defining the problem, organize frequent and regular meetings, jointly present the results of collaborative work, participate in joint workshops, use knowledge brokers, etc. One of the limitations of a strategy that fosters close and sustained relationships between producers and users is that this is often burdensome and must be accomplished within time constraints that do not allow producers and users to develop interpersonal relationships with a large number of contacts. This approach can, nevertheless, prove highly relevant when the aim is to influence policy makers or decision makers, particularly about issues that concern them or should concern them, or when the aim is to influence researchers studying topics that are linked, for example, to needs within a territory or within specific population sub-groups. However, one study concluded that early and ongoing exchanges between researchers and decision makers are not essential to the application of all research results and that it is sometimes when knowledge production is nearing completion that interaction between producers and users is the most beneficial.[79] This is the case, for example, with studies which will draw the attention of the wider public and the media and which, consequently, will require policy makers to take a stance.

The above observations have led many authors to conclude that an approach to knowledge translation that uses a combination of strategies to reach each target public in the most appropriate manner would, in all likelihood, be the most effective type of approach.[80,81]

[75] Kothari, A., S. Birch, et al. (2005). "Interaction" and research utilisation in health policies and programs: does it work?" *Health Policy* 71(1): 117-25.

[76] Lavis, J. N., D. Robertson, et al. (2003). "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly* 81(2): 221-48.

[77] Innvaer, S., G. Vist, et al. (2002). "Health policy-makers' perceptions of their use of evidence: a systematic review." *Journal of Health Services Research and Policy* 7(4): 239-44.

[78] McBride, T., A. Coburn, et al. (2008). "Bridging health research and policy: effective dissemination strategies." *Journal of Public Health Management and Practice* 14(2): 150-4.

[79] Ginsburg, L. R., S. Lewis, et al. (2007). "Revisiting interaction in knowledge translation." *Implementation Science* 2: 34.

[80] Kothari, A., S. Birch, et al. (2005). "Interaction" and research utilisation in health policies and programs: does it work?" *Health Policy* 71(1): 117-25.

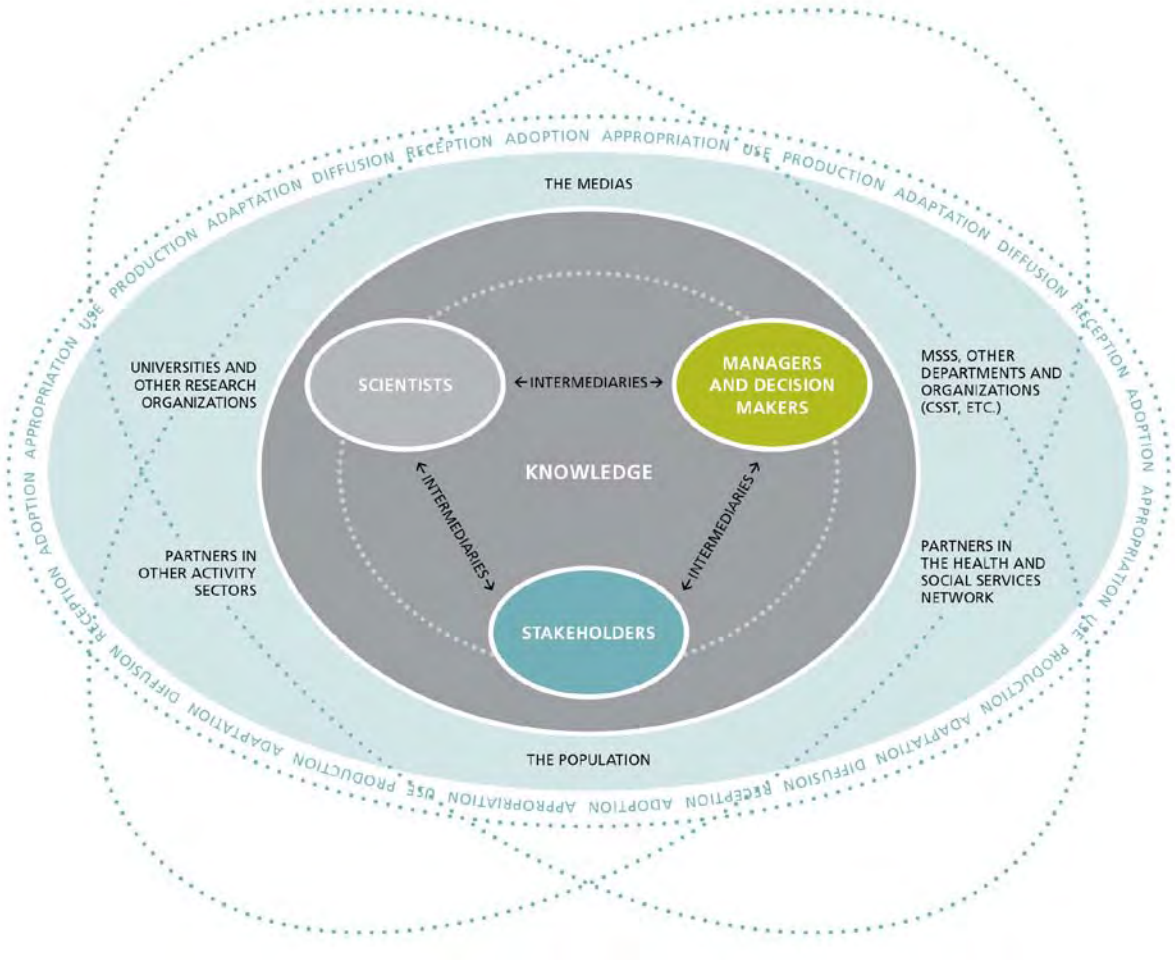
[81] Mueller, N. B., R. C. Burke, et al. (2008). "Getting the word out: multiple methods for disseminating evaluation findings." *Journal of Public Health Management and Practice* 14(2): 170-6.

4 DYNAMICS OF THE KNOWLEDGE TRANSLATION PROCESS

One of the questions related to knowledge management and use is how to combine the different types of knowledge in a judicious and balanced manner to arrive at the best decision, while taking into account the context of the actors involved. And for those responsible for knowledge translation, one of the biggest challenges is to effectively enter into the processes of reflection and action-taking, so as to convey the right knowledge in the right format to the right people at the right time.

Figure 7 depicts the relationships between the different components presented in the previous sections (knowledge useful for public health action, the actors, partners and intermediaries involved, the roles of the main groups of actors, steps in the knowledge translation process) so as to illustrate the dynamic process that characterizes knowledge translation.

Figure 7 Conceptualization of the overall knowledge translation process



At the centre is knowledge that is useful for public health action, namely research-based knowledge, tacit knowledge and knowledge based on data analysis.

Surrounding the knowledge is interaction among the actors who are most directly involved in the production, exchange and use of this knowledge, namely scientists, managers and decision makers and stakeholders, along with the various intermediaries who facilitate relationships and interactions among the three main groups of actors. Slightly on the periphery are positioned partners of the health network and the academic community, partners from other activity sectors, as well as the population and the media.

The interlaced and interconnected rings around the central core represent the different steps in the translation process. Multiple rings are shown to indicate that several translation processes may be underway at the same time, sometimes involving different actors and sometimes the same actors.

Given all the different components to be considered, many authors recommend the use of a grid or a plan to guide the development of a knowledge translation process. It is also very useful to identify, at the outset, who will bear overall responsibility for the process. The establishment of a knowledge translation team responsible for developing an overall work plan and for carrying out ongoing monitoring makes it possible to direct the process effectively, to reorient it as needed and, in general, to ensure the process goes smoothly.

A tool designed to support the facilitation of a dynamic knowledge translation process is proposed in Annex 1. This tool was developed to help individuals and organizations maximize the impact of their knowledge translation strategies. It takes into account all the components of the knowledge translation process presented in the preceding review, and includes a list of questions that allows anyone called on to carry out such a process (producers, those responsible for knowledge translation, communicators and facilitators) to orient themselves and to develop strategies adapted to the different steps. A summary diagram illustrating the whole translation process at a glance is proposed in Annex 2.

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ANNEX 1

TOOL FOR FACILITATING A KNOWLEDGE TRANSLATION PROCESS

Tool for Facilitating a Knowledge Translation Process

This tool is designed as a roadmap that can guide the knowledge translation process and thus allow those responsible for knowledge translation activities to document their actions, share their observations with the users concerned or with their partners and adjust their strategies as they go along, if necessary.

Since knowledge translation is a dynamic process, it is beneficial to begin using this tool as soon as one foresees the possibility of undertaking knowledge translation activities tied to the production of specific content. It is, moreover, preferable to complete the exercise as a team so as to stimulate reflection of greater depth.

Each section of this tool sheds light on a different aspect of the knowledge translation process. The first section focuses on the subject, that is, the knowledge produced or being produced to meet the needs of certain users. The second section serves to identify the main actors involved in the knowledge translation process and, more specifically, those in charge of the process. The third section allows for identification and, if necessary, prioritization of the different audiences one wishes to reach, and specification, for each of these, of the targeted objective. The section on knowledge translation strategies makes it possible to determine whether strategies geared toward dissemination or toward appropriation are more suitable given the audiences previously identified and, thus, to better assess the resources (financial, material and human) required to carry out these strategies. The last section allows for more in-depth reflection on each step in the process. In short, each section of this tool assists in focusing on a group of specific questions:

SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5
What?	Who? With whom? By whom?	For whom? Why?	How? When?	When to enter into the process? Up to what point to continue?

Remember that knowledge translation is often unpredictable. Thus, the effort put into reaching a target audience may yield little result at a particular point in time, within a specific context, whereas another audience, considered a lower priority, may, for various reasons, prove to be more receptive at the same point in time. One must know how to take advantage of opportunities that arise, without losing sight of one's initial objectives.

SECTION 1

What?

1.1 What are the knowledge needs underlying the product to be transferred?

1.2 Is knowledge that can meet these needs already available in one form or another?

yes

Using the figure below, specify the type(s) of knowledge available

Can the available content be adapted?

With whom can we collaborate on adapting this knowledge?

no

Is someone already working on producing similar content? → no → Should we envision new knowledge production (a synthesis, research, data compilation or other)? → no

yes

Could we collaborate on this product or await the results?

yes

Who should we involve in this work? (See the production step in section 5).

SECTION 2

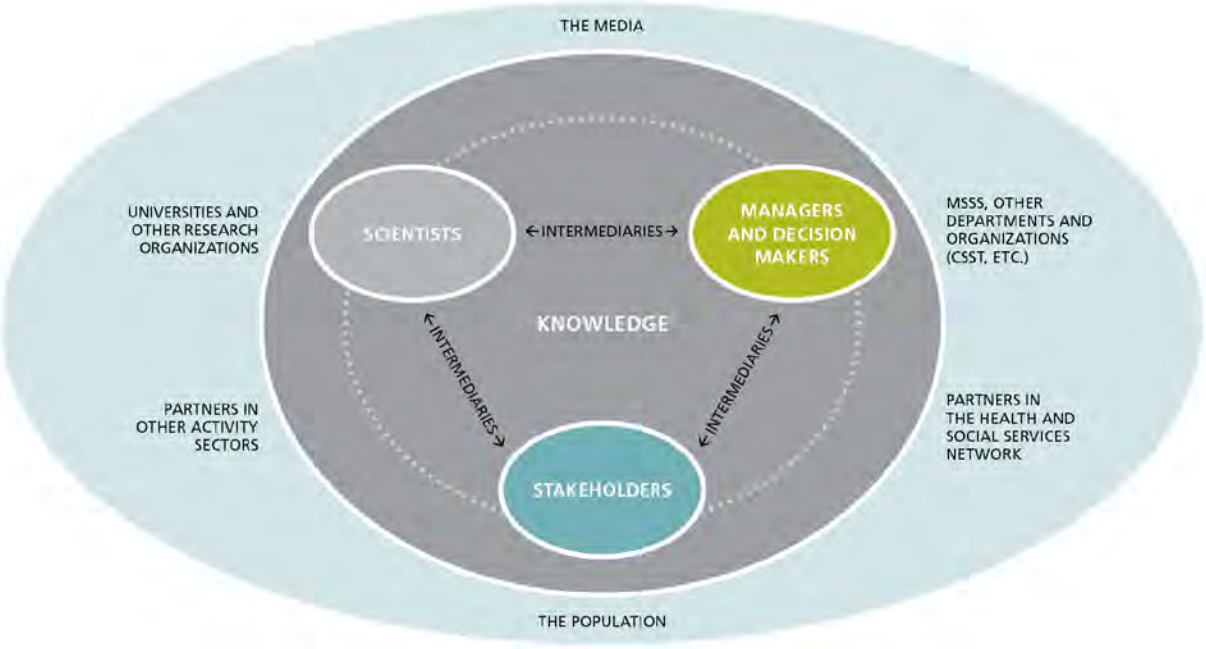
Who? With whom? By whom?

2.1 Who will bear overall responsibility for the process (individual, team or organization)?

2.2 Referring to the diagram below, who are, will be or could be the main actors involved in the knowledge translation process?

- The producers and coproducers of the content to be transferred?
- The main users with an interest in this knowledge (managers, decision makers and stakeholders)?
- The various intermediaries (persons who play a bridging role between producers and users)?
- Key persons, potential messengers, etc.?

2.3 How do we wish to involve each of these groups of actors?



SECTION 3

For whom? Why?

Target audiences may be practitioners, stakeholders, decision makers, managers or public policy makers to whom knowledge is being transferred with a view to its use in their professional or management practices. Target audiences may also be other groups of actors (the media, specific clienteles, the general public) who one wishes to inform or whose awareness one wishes to raise.

3.1 Who are the various audiences we wish to reach?

For example:

- Public policy makers
- Decision makers and managers within the health network
- Personnel within the health network
- Public health professionals working at different levels
- Partners from other activity sectors
- The community sector
- The media
- The general public
- ...

3.2 To meet what objectives?

For each target audience, specify the pursued objective.

For example:

- Inform
- Disseminate new knowledge
- Raise awareness about other cultural values
- Foster a change in perception relative to certain problems
- Prompt a change in lifestyle habits
- Modify a professional practice
- Inform decision making
- ...

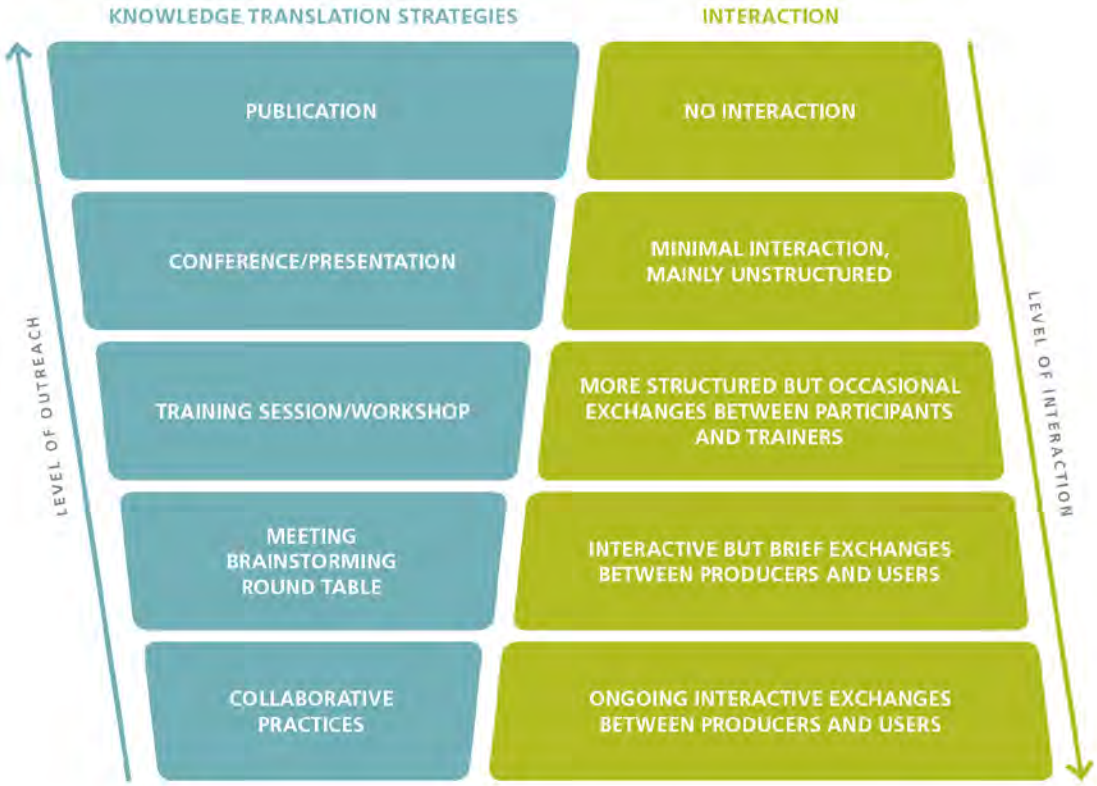
3.3 Should some audiences be contacted before others? Which ones? Why?

SECTION 4

How? When?

4.1 Taking into account the objectives, resources and perceived obstacles, as well as the socio-political or organizational context of target audiences, consider the following questions:

- Which strategy or strategies seem the most appropriate for each of our target audiences?
- What level of interaction would be preferable with each of our target audiences?
- Will we need intermediaries? Which ones? At which points?
- Should we involve partners? Which ones? At which points?



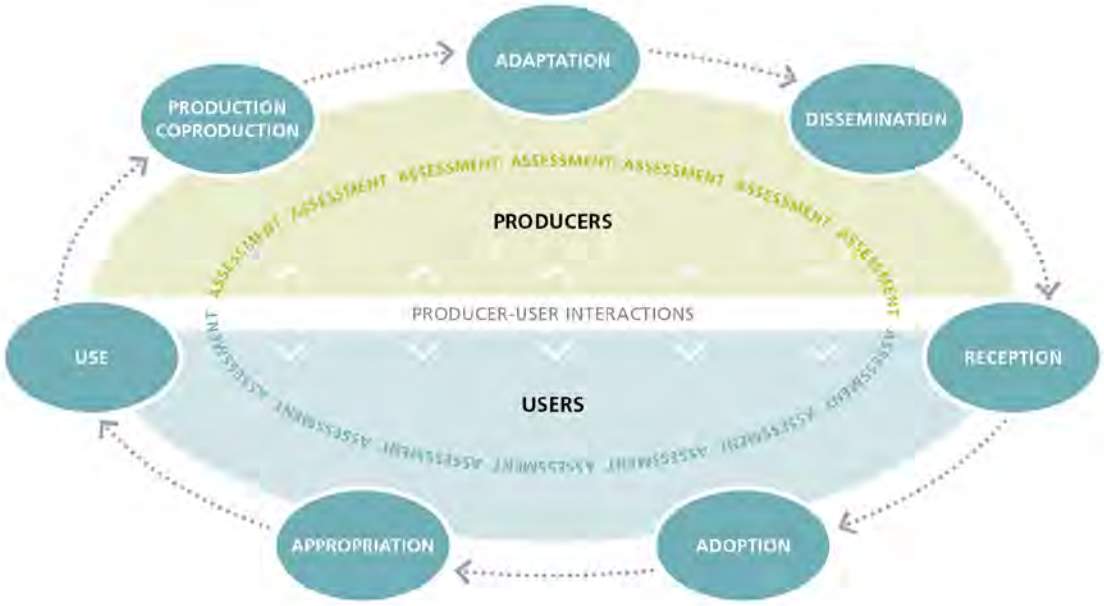
Inspired by Zarinpoush, F., S. Von Sycowski, et al. (2007). *Effective Knowledge Transfer & Exchange for Nonprofit Organizations: A Framework*, Imagine Canada.

SECTION 5

When to enter into the process? Up to what point to continue?

For each target audience, consider each of the following questions:

- What steps will we have to carry out?
- Who will be responsible for each of these steps?
- Which partners should we involve?



Particular challenges can arise at each step in the knowledge translation process. The following questions were formulated to assist those responsible for the knowledge translation process in identifying the challenges specific to each step and the most appropriate strategies for each step.

5.1 Production and coproduction

- Should we produce new knowledge or use existing knowledge as our starting point (refer back to section 1)?
- Which actors (scientists, stakeholders, managers or decision makers) should we involve in the production of content (formulation of the question or the problem to be studied, choice of method, interpretation of results, etc.)?
- Which mechanisms can we put in place to ensure effective interaction between producers and users as early in the process as possible and throughout the process (monitoring committee, periodic or regular meetings, etc.)?
- Do we have need of intermediaries (liaison officers, knowledge brokers or others) to facilitate interaction with the actors who will be involved?
- What benefits do we wish to obtain by producing or mobilizing this knowledge?

5.2 Adaptation

- Who are the priority target audiences?
- For each target audience, identify the most useful and relevant information to be brought to the fore as well as the appropriate format and level of language.
- Do we have need of intermediaries or collaborators (communications officers, experts in vulgarization, knowledge brokers or others) to adapt or transform our products?

5.3 Dissemination

For each target audience, consider each of the following questions:

- Is there a resource person assigned to the issue being addressed?
- Are there other persons who could facilitate our access to the targeted community, in support of our knowledge translation goal?
- What are the best channels of communication (written, verbal, electronic, etc.) for reaching each target audience?
- What are the prevailing organizational conditions in the group of users we are trying to reach (ability or inability to access a computer, degree of autonomy, time at their disposal, openness to change, etc.)?
- What is the level of knowledge and understanding of scientific methods and results within the target audience?
- Are the targeted users involved in networks or communities of practice?
- Do they belong to professional associations?

Do we need partners to reach our objectives and carry out our dissemination activities?
If so, which ones?

5.4 Reception

For each target audience, consider each of the following questions:

- What is the best way to arouse their interest?
- What is the best time to present this knowledge (period of the year, suitable time of the day or week, intensive or brief exchanges, pivotal step in a particular process or program)?
- Who would be the best messenger(s)? How can they be identified?

5.5 Adoption

- Which actors are the most directly or closely involved in decision making (the aim being to foster as much as possible team-oriented reflection and decision making)?
- What issues (political, economic, social, ethical) tied to the knowledge to be transferred need to be taken into account during the decision making process?
- What methods can we propose to encourage decision makers to consider the knowledge to be transferred during the decision making process?

5.6 Appropriation

For each target audience, consider each of the following questions:

- What does this audience already know about the subject and what new knowledge should it acquire through appropriation activities?
- What type of appropriation activities would be most relevant (e.g.: training workshop, coaching) and most appropriate for this audience?
- What pedagogical methods would best support appropriation of the results (e.g.: style of presentation, use of short scenarios, humour, choice of trainer, etc.)?

5.7 Use

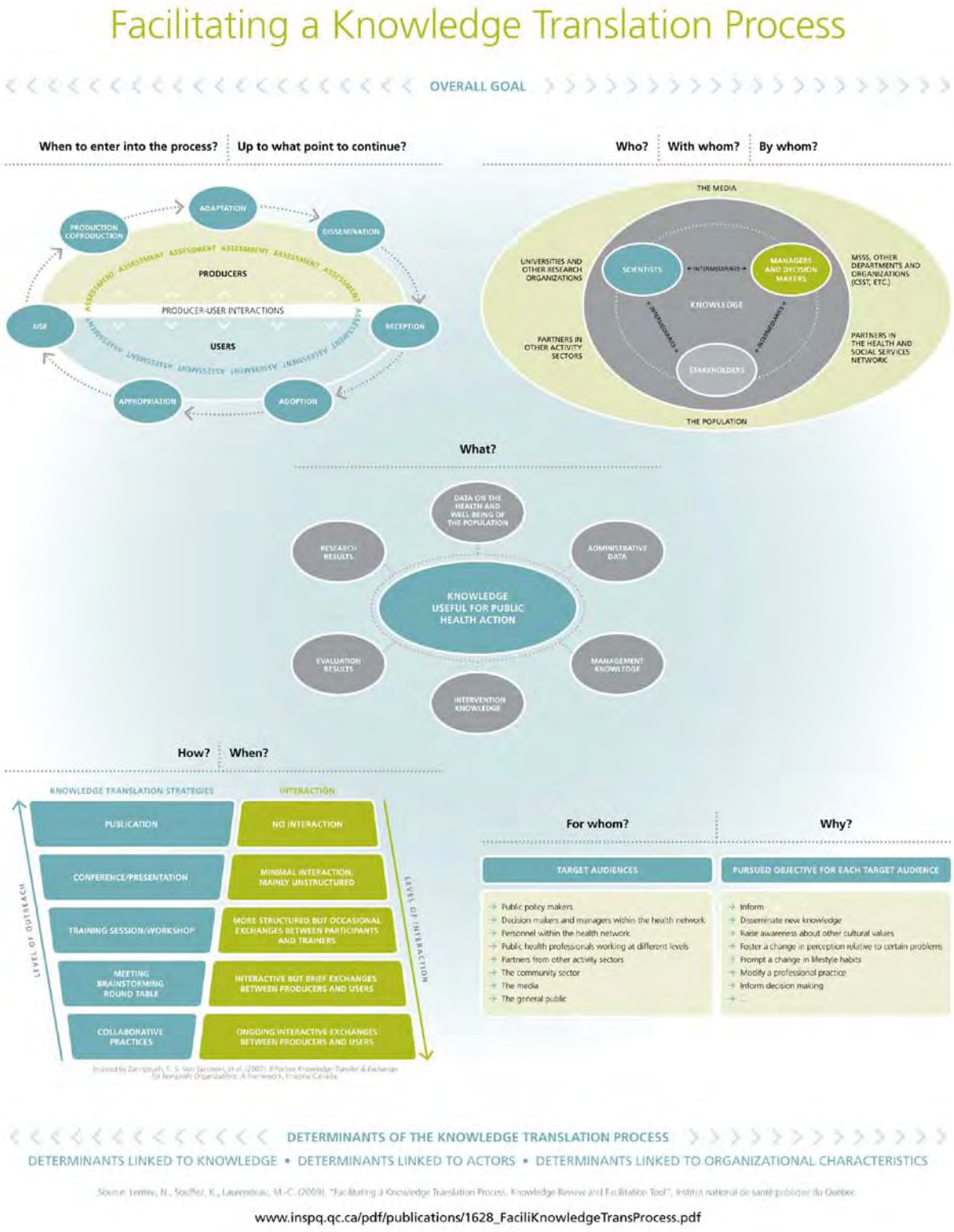
- How can we best support the concrete application of the transferred knowledge? What type of support will be required (e.g.: personalized or group follow-up)? Who will provide this support?
- Are there networks or communities of practice that can support the use of the transferred knowledge and the development of a culture of reflection?
- What are the existing organizational conditions? Do they facilitate use (e.g.: support of management, allowance of time for the application of the knowledge, shared vision) or impede use (e.g.: reluctance to accept scientific knowledge or resistance to change, divergent sources of information and/or visions)?
- Will a monitoring mechanism be necessary? If so, which one(s) can we propose? Who will carry out monitoring? How often? With meetings of what duration? Carried out for how long?

5.8 Assessment

- What method(s) can we use to verify whether or not the knowledge transferred is accessible, has been well understood, has been used and, if applicable, has led to the desired change?
- Have changes been observed (or an absence of change) in the knowledge base, attitudes or practices of our target audiences? How can we take these observations into account as we pursue the knowledge translation process?

ANNEX 2

SUMMARY DIAGRAM



Source: Lemire, N., Souffez, K., Laurendeau, M.-C. (2009). "Facilitating a Knowledge Translation Process. Knowledge Review and Facilitation Tool", Institut national de santé publique du Québec

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