Knowledge Transfer Community

Guide to Knowledge Transfer

Designed for Researchers in Occupational Health and Safety

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2008
# Knowledge Transfer Community

## Guide to Knowledge Transfer

**Designed for Researchers in Occupational Health and Safety**

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**Acronyms found in this guide**

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<tr>
<td>ASP</td>
<td>Association sectorielle paritaire</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>CIHR</td>
<td>Canadian Institutes of Health Research</td>
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<td></td>
<td>Institut de recherche en santé du Canada (IRSC)</td>
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<td>CHSRF</td>
<td>Canadian Health Services Research Foundation</td>
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<td></td>
<td>Fondation canadienne de la recherche sur les services de santé (FCRSS)</td>
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<td>CQRS</td>
<td>Conseil québécois de la recherche sociale</td>
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<td>CRISES</td>
<td>Centre de recherche sur les innovations sociales</td>
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<td>CSST</td>
<td>Commission de la santé et de la sécurité du travail</td>
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<td>CST</td>
<td>Conseil de la science et de la technologie</td>
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<td>Union Européenne (UE)</td>
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<td>FQRNT</td>
<td>Fonds québécois de la recherche sur la nature et les technologies</td>
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<td>FQRSC</td>
<td>Fonds québécois de la recherche sur la société et la culture</td>
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<td>FRSQ</td>
<td>Fonds de la recherche en santé du Québec</td>
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<td>IRSST</td>
<td>Institut de recherche Robert-Sauvé en santé et en sécurité du travail</td>
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<td>NSERC</td>
<td>Natural Sciences ans Engineering Research Council of Canada</td>
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<td>Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG)</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>Organisation de coopération et de développement économiques (OCDE)</td>
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<td>OHS</td>
<td>Occupational Health and Safety</td>
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<tr>
<td>RRSSTQ</td>
<td>Réseau de recherche en en santé et sécurité au travail du Québec</td>
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<tr>
<td>SSHRC</td>
<td>Social Sciences and Humanities Research Council of Canada</td>
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A knowledge society produces a wealth of knowledge that needs to be transferred for the mutual benefit of all stakeholders. Knowledge transfer (or exchange) is of increasing interest to researchers and calls for input from the various stakeholders. Researchers wonder about the use (or non-use) of knowledge resulting from their research; decision-makers want to know how the knowledge can be useful to them; public organizations want to know how profitable research findings are; and universities are more inclined to focus on research spin-offs in terms of recognition or profitability. Committees are set up, reviews are conducted and more and more papers are written ... all of this at an accelerated pace.

Intrinsically, Occupational Health and Safety (OHS) Research has been concerned with knowledge transfer and exchange for quite some time. Researchers are used to working with a large number of stakeholders, both institutional (CSST, JSA, businesses) and individual:

- decision-makers (administrators, foremen, physicians)
- product and service designs (designers, engineers, manufacturers, computer engineers)
- researchers
- intermediaries (consultants)
- advisors (buyers, ergonomists, physicians)
- initiators (OHS or human resources departments)
- workers.

Concerns about knowledge transfer/exchange occur at many stages of the research process—during needs definition, during knowledge development, during the development of transfer strategies or terms, during the transfer process itself—and in a variety of forms.

OHS researchers come with a vast array of experiences and needs. With this in mind, the Réseau de recherche en santé et sécurité au travail du Québec (RRSSTQ) has set up a strategic group (knowledge transfer community) whose mandate, among other things, is to suggest activities to help reconcile the diversity of interests in knowledge transfer in a multidisciplinary context and through various scientific paradigms.

The uniqueness of this group lies in the fact that it cuts across existing boundaries (groups concerned with occupational MSD, age and inter-generational relations, mental health, work safety, nanotechnology, etc.). It brings together researchers who have a keen interest in issues related to knowledge transfer but for whom knowledge transfer is not necessarily the focus of their research. These researchers have accumulated a considerable amount of experience, understanding, and “know-how,” mostly informal, regarding knowledge transfer. It is plausible to think that in the coming years, researchers will not only become increasingly interested in these issues (i.e. knowledge transfer will become the focus of their research), but that they will also attempt to formalize/model/conceptualize a corpus of knowledge that is specific to OHS.
Guide to knowledge transfer research

We therefore thought it appropriate to create a document, primarily a working tool, to help researchers desirous of focusing on knowledge transfer to become familiar with its broad outlines, its limits, and its subtleties (basic concepts, vocabulary, areas of research, main questions, positions of funding organizations, key literature, etc.). This guide is not an exhaustive review of the literature related to knowledge transfer; it is meant to identify key elements as far as OHS is concerned. Divided into six chapters and three parts, it is a work in progress to be updated and enriched on a regular basis.

The reader will notice that we have used the terms “knowledge transfer” and “knowledge exchange”; others prefer “knowledge sharing and utilization,” while yet others prefer “knowledge exchange and sharing.” Some researchers are more at ease with the concept of valorization of knowledge and research findings, or knowledge translation and knowledge mobilization. We thus found it necessary to begin with a review of knowledge transfer concepts and areas (Chapter 1), as well as related vocabulary (Chapter 2).

As we will see, each term reflects different needs and perspectives. No term is superior to another. This diversity of terminology posed a problem for us, however, in terms of choosing a title for the guide. “Knowledge transfer”? “Knowledge sharing and utilization” (as used by the Réseau de recherche en santé des populations)? “Knowledge exchange and sharing”? Suffice it to say, that for the purposes of this guide, we have chosen the term “knowledge transfer” in its broadest and most non-exclusive sense.

The second part of the guide explores the tools designed to study knowledge transfer, that is, theoretical models (Chapter 3), stages of knowledge transfer, and related strategies (Chapter 4). The third part deals with the main areas of study relating to knowledge transfer—factors in favour of or against knowledge transfer (Chapter 5), and the spin-offs and impacts of knowledge transfer (Chapter 6). In these two chapters, we propose a detailed categorization of the variables and determinants that are explored.
Three terms are commonly used to describe the transfer of knowledge: knowledge transfer *per se*, knowledge exchange and sharing, and knowledge sharing and utilization. They all refer to the notion of “transfer” but relate to different perspectives, objectives, and interests. Each has been the subject of numerous papers, theoretical propositions, and models. Consequently, the first chapter will be devoted to examining their similarities and differences.

A second source of differentiation relates to the areas in which “transfer” takes place. We have identified four areas: transfer of research findings, transfer of technology, transfer of learning, and organizational transfer. As we will see, the models, the type of investigation, and the concepts used are, in part, specific to each area.

In fact, in some areas, researchers use additional transfer-related terms such as “valorization of results” or “knowledge translation.” We have decided to focus on these only in Chapter 2, since their use is limited or specific to their field of application. Many believe that such terms should be included in the first three terms. As well, they are used more frequently by institutions than by researchers.

Whichever the term used, two main approaches prevail in the literature, that of knowledge development and knowledge dissemination. The latter is generally the basis for classifying linear, bidirectional, and interactive approaches and models.

In the linear approach, researchers and experts generate knowledge that is passed on to users unidirectionally. This approach is criticized, however, for not taking into account user concerns. The valorization of research findings generally tries to remedy this shortcoming. This is especially important for universities and public administrations. In essence, it involves translating research findings into innovative tools, processes, and services that contribute significantly to the development of the organizations in particular and the nation's economy in general.

In the bidirectional approach, the process of exchanges between researchers and users gains importance, especially regarding identifying needs and taking into account the concerns of future users.

In the interactive approach, the process of exchange becomes central, and knowledge transfer takes place through a wide range of intermediaries such as knowledge brokers or various professionals. Exchanges under this approach are complex and characterized by relationships determined by the context and objectives of ever-changing interactions. These exchanges are associated with knowledge sharing and exchange. The approach is often associated with the terms “exchange and sharing” and “sharing and utilization.”

The development of these different approaches has given birth to vocabulary such as “knowledge brokerage” and “evidence-based data.” The second chapter of this guide presents a brief lexicon of key vocabulary related to knowledge transfer.
Chapter 1: Definitions and areas of knowledge transfer

In this chapter, we will specify what is meant, from an etymological point of view, by knowledge transfer, exchange, sharing, and utilization. We will present etymological markers and suggest one or two key definitions. These definitions are used by major organizations, cited by several authors, and include specific elements.

In the second section, we will explore how these concepts are used in four knowledge transfer areas, corresponding to four disciplines.

1.1 Definitions

1.1.1 Knowledge transfer

a) Etymology

The noun “transfer” comes from the verb “to transfer,” which is composed of the prefix “trans,” a Latin word meaning “to the other side or beyond, and a stem “ferre,” a Latin verb meaning “to carry.” Etymologically, “to transfer” means “to carry to the other side” or “to carry beyond.” It can be knowledge, people, goods, etc.

b) Definitions

The concept of transfer is characterized by the impreciseness and vagueness of its semantic boundaries (Tardif, 1999). In sports, transfer means a change of clubs, while in law it refers to the transmission of a good or a right between people. In the economic field, it evokes the displacement of resources (financial, human, material) from one sector to another.

In psychoanalysis, transfer represents the extension of an affective state from one person to another or to an object, while education specialists consider it as a displacement of knowledge from a source context (learning) to a target context (utilization). Since the concept of transfer varies depending on the discipline, we have selected four definitions corresponding to four disciplines related to occupational health and safety: health, humanities and social sciences, management, and education.

Box 1: What does “knowledge” mean?

Definitions

Knowledge is available information that is new to the people or organizations for whom it is intended; it includes research findings, prevention guides, manufacturing processes, work methods, and innovations (Roy et al., 1995).

Knowledge comes from perception or from experience—acquired in circumstances and by various means—that is kept in memory (Piaget, 1970). “It can include—from the most concrete to the most abstract—objects and facts; categories of objects or facts, characterized by their properties and relationships; ideas, notion, and concepts that help define or make these categories easy to understand” (Teiger and Laville, 1989).

Typology

There are three main categories of knowledge:

- Declaratory knowledge. This concerns the objects to which the knowledge relates (concepts, laws, rules, facts, etc.)
- Procedural knowledge. This relates to the manner in which the knowledge is used.
- Conditional knowledge. This facilitates the application of declaratory and procedural knowledge in various contexts.
Part I: Concepts, vocabulary and areas of transfer

i. Health: “A structured process that uses scientific research findings to improve the effects of professional practice” (Gupta et al., 2006). It is understood as being a continuous process of exchanges punctuated by two-way exchanges between two communities: researchers and potential users (Clark and Kelly, 2005).

ii. Education: “A process by which knowledge developed in a particular context is applied to another context, to build new knowledge or to develop new skills, or to accomplish new tasks” (Presseau, 2000).

iii. Management: “A mechanism for disseminating, appropriating, and utilizing new knowledge for adopting new individual and organizational behaviours” (Roy et al., 1995).

iv. Humanities and social sciences: “A systematic approach to obtain, gather, and share tacit knowledge and convert it into explicit knowledge. It is thus a process that facilitates access by individuals and/or organizations to essential information that has up until now been the preserve of just one person or a small group of persons” (Government of Alberta, cited by Graham et al., 2006). Knowledge transfer is considered as a social process (Rynes et al., 2001).

The majority of these definitions depict transfer as a process, i.e. the mechanisms through which scientific knowledge is developed by researchers and provided to users (see Box 1, p. 12). Knowledge is also viewed as a product, which implies its transformation, i.e. its translation into an accessible language and into tools that are usable in actual situations and for various purposes (clarifying decision-making, changing individual or organizational behaviour, developing policies or programs, problem solving, etc.) (Amara et al., 2004).

Box 2: Transfer in the work environment

Knowledge transfer is often associated with the application of knowledge or skills to solve a particular problem. This knowledge or these skills are generally acquired through training (considered as the first mechanism of knowledge transfer). For example, Baldwin and Ford (1988) define knowledge transfer as “the generalization to the work situation of knowledge, competence, and attitudes acquired during training,” and Taylor (1997) states that in the professional world, knowledge transfer refers to a situation where a worker who has participated in a training program “succeeds in applying in his work the knowledge and skills acquired.”

This demonstrates the informal nature of knowledge transfer, especially through social networks in the workplace. Interactions between actors, the contextual environment, available equipment, and existing standards can also be sources of knowledge/skills transfer and sharing within an organization.

Box 3: Transfer as seen by funding organizations

NSERC: « outreach activities, including the practical application of research ».

SSHRC: « bringing the knowledge gained from both basic and applied research to families, community groups, policy-makers, legislators, business leaders and the media ».

CHSRF: it's a process that can take place « in many situations and around various issues, [...] In specific research collaborations, it involves planning, producing, and disseminating research, as well as applying research findings in decision-making processes ».

In general, these definitions place emphasis on the formal nature of knowledge and knowledge
Guide to knowledge transfer research

transfer. They also recognize that the inventory of knowledge and skills in organizations can also result from practices and interactions. Knowledge transfer can therefore also occur on an informal basis through social networks in the workplace (Argote and Ingram, 2000; Lahti et al., 2002).

The particularities of knowledge transfer in the work environment (and points often discussed), are shown in Box 2 (p. 13). Box 3 (p. 13) presents the definitions used by various funding organizations.

1.1.2 Knowledge Exchange and Sharing

This term refers implicitly to the bidirectional relations between researchers/knowledge producers and users. It also refers to the collaborative links between two sides, two cultures, or two communities.

a) Etymology

The word “exchange” has its origin in economics (referring to barter, giving something in return for something else). Later, it was used in the legal field (mutual concession of rights) before it was adopted in the social world (e.g. circulation of established information in a reciprocal manner).

b) Definitions

The CHSRF prefers this term to “knowledge transfer,” which it considers too limited, (see Box 4), especially with regard to interactions. The CHSRF (2005) defines knowledge exchange and sharing as a “collaborative problem-solving between researchers and decision makers that happens through linkage and exchange.” It is through interactions between researchers and decision makers that “the process of planning, producing, disseminating, and applying existing or new research in decision-making.” More specifically, the CHSRF defines the decision maker as the user, and problem resolution as the outcome.

This definition implies that exchange takes place both ways: researchers place knowledge they have developed at the disposal of users and, in return, users transmit practical knowledge and “contexts of use” back to researchers.

1.1.3 Knowledge sharing and utilization

Access to knowledge does not guarantee its utilization or effective application (Trottier et al., 2006; Landry et al., 2001). The term “knowledge sharing and utilization” thus presents knowledge transfer as an outcome.

a) Etymology

The noun “utilization” originates from the Latin word “utilis,” meaning, “that which serves,” which is itself derived from the Latin verb “uti,” which means “make useful” or “use.” The concept of “utilization” is still used today for anything that serves a purpose or is beneficial.

b) Definition

The utilization of research findings is defined as the process through which knowledge drawn from research is actually put in practice (Graham et al., 2006) or transformed into interventions (Estabrooks, 1999).

Some authors associate it directly with problem solving (e.g. knowledge translation for solving problems in the real world; Roy et al., 1995)

These authors identify three kinds of utilization:

• instrumental (to modify an action or make a decision)
• conceptual (knowledge brings new ideas that influence understanding; it does not necessarily lead to short-term actions or decisions; such use is more informative than prescriptive)
• symbolic or strategic (knowledge is used as an authoritative argument to legitimize or justify positions or decisions).
1.2 Areas of knowledge transfer

Here, we will summarize the points of view based on the type of knowledge transfer considered. The four types identified below are extensively covered in the literature.

1.2.1 Transfer of research findings

This is a process through which relevant information drawn from research findings is made available strategically for practice, planning, or political decision-making (Lavis et al., 2003). It has two dimensions: knowledge availability and knowledge appropriation by possible users (Roy et al., 1995). This is the preferred term of funding organizations.

1.2.2 Technology transfer

This refers either to the “transfer to industry of university research findings with the aim of marketing new products and services” (CST, 2005) or to the application of new technologies or ideas in the workplace (Argabright, 1999). The concept of technology can be divided into two separate yet inter-connected components: the “hardware,” made up of equipment and machines, and the “software,” that includes training programs, administrative practices, methods, etc. (Roy et al., 1995). As a result, the term can refer to the transfer of a “product” (knowledge), or the transfer of skills (know-how) for utilization and application (Conseil des Sciences et Technologies, 2005).

1.2.3 Transfer of learning

This term “brings into play psychological processes and mechanisms concerning memorizing, comprehension (or apprehension), assimilation, and utilization of acquired knowledge” (Orléon, 1971). In this sense, cognitive processes are emphasized since the purpose of knowledge transfer is “to identify the manner in which knowledge to be transferred is encoded, organized, even automated, then recalled and activated” (Presseau et al., 2004). Focus is on the mechanisms through which knowledge or skills acquired in a source activity are transferred to a target activity (Tardif, 1999). Hence, transfer refers to the “displacement” of the acquired knowledge between two different situations: the learning context (the source) and the application context (the target).

Finally, the purpose of transfer can also be centered on the mechanisms through which resources acquired previously are mobilized to solve a problem in a new context.

1.2.4 Organizational transfer

Organizational transfer refers to acquired knowledge or skills that are regarded as a resource to be shared and applied within an organization in order to improve performance. There are two kinds of organizational transfer: intra-organizational and inter-organizational.

The former refers to a “displacement” of knowledge within the same organization. It is the “process through which one unit (e.g., group, department, or division) is affected by the experience of another” (Argote and Ingram, 2000). Here, we are interested in “all interactions between individuals of the same organization who participate in constructing collective knowledge by pooling ways of thinking or other cognitive concepts (beliefs, ideologies, paradigms, etc.)” (Berthon, 2003). Transfer is referred to as inter-organizational when it is centered on knowledge dissemination within a pool of companies through various methods (alliances, joint ventures, networks, etc.).
Key Readings


Box 4: Terminology favoured by funding organizations.

CIHR (2004) uses the term “knowledge translation,” which they define as «a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge».

NSERCC (2007) uses the term “knowledge transfer,” which includes the transfer of skills to end users. It also uses the terms “transfer of research results” and “transfer of technology” with specifically defining them.

SSHRC (2005) prefers the term “knowledge sharing,” which consists of making knowledge from basic and applied research accessible “to families, community groups, policy makers, legislators, and the media.”

CHSRF (2007) uses “knowledge exchange”, which it defines as a process that «can happen in many situations and around various issues [...] it involves planning, producing, and disseminating research, as well as applying research findings in decision-making processes».

FRSQ (2002) has adopted the terms “science dissemination” (diffusion in French) and “knowledge transfer” without specifically defining them.

One of the four components of FQRSC programming relates to the “valorization” and “dissemination of research.” These two concepts are not specifically defined by the organization.

The FQRNT (2005) also uses the term “knowledge transfer” and stresses the concept of “valorization” and especially that of “innovation,” which it defines as a result “of synergy between researchers who develop knowledge and technology (technology push) and users who transform this knowledge into marketable products and processes (market pull), as well as policies and rules.”
Various other terms are used, such as “valorization” and “knowledge translation.” These can be seen as stemming from or included in the above terms and are thus treated separately. They are more specific and place emphasis on the application and utilization of research findings. The actual outcomes and impact of research findings are important aspects. In the second part of this chapter, we will re-examine common terminology related to knowledge transfer.

### 2.1 Related knowledge transfer concepts

#### 2.1. Knowledge translation

The CIHR (2004) defines this as being “a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge” between researchers and users. It is a vast concept that ranges from the creation of new knowledge—through its dissemination, exchange, transfer, management, and utilization—to its translation. According to the CIHR, this distinguishes it from the concept “knowledge transfer,” which refers rather to a one-way transfer of knowledge from researchers to users. It involves the “dissemination and experimentation of the most innovative practices, their utilization, and their development within a variety of contexts” (European Union, 2005).

Valorization is aimed at “operationalizing” research findings. It constitutes a response to the need to make them useful, applicable, beneficial, or profitable.

#### 2.1.2 Knowledge valorization

It's « a process [...] which consists in adding value to results of search, to knowledge, to an invention or to an existing technology in order to transform them into products, processes, services or technologies with innovative and economically profitable aspects (Baudry et al., 2006).

**Box 5: Knowledge translation**

The CIHR’s lexicon translates “knowledge translation” (KT) as application des connaissances.

Translation is the process of putting research findings and the products of research into the hands of key audiences. KT is about using research knowledge to inspire people to think and/or act differently. (Canadian Institutes of Health [CIHR] in Lyons & Warner, 2005).

Knowledge translation is the exchange, synthesis, and ethically-sound application of knowledge—within a complex system of interactions among researchers and users—to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system. CIHR, in Graham et al. (2006).

**Box 6: CIHR’s English-French lexicon**

A French/English lexicon is available at http://www.cihr.ca/f/2168.html

Some concepts and their subtleties belong to one language or the other. Several words used in the French version could not be found in the
Guide to knowledge transfer research

CIHR lexicon.

French and English etymologies are often similar (English borrowed from French, which was derived from Latin) but the words have evolved in different ways. A good example is the word “translation,” which had the same meaning in French and English during the middle ages. It is still used today in French but not in the same way. However, French historians continue to use the word translation in their writings about the middle ages.

2.2 Related vocabulary

In this section, we review some commonly used terms related to knowledge transfer and according to the objects they refer to, be they transfer methods or the knowledge or intermediaries involved in the transfer.

2.2.1 Transfer modes

a) Diffusion

This term originates from the Latin diffusio or diffusium, meaning “act of spreading,” which itself comes from the verb to “scatter,” that is, to spread or cause a literary work to spread over a wide area or among a large number of people. It is a process by which knowledge is spread through certain channels over a period of time among members of a social system (Roy et al., 1995). It exceeds the notion of knowledge transfer or the communication of research findings and derives from Roger’s theory of diffusion (1995).

b) Dissemination

From the Latin disseminatio meaning “act of scattering,” this term comes from the verb disseminare, i.e. “propagate, scatter.” It is a planned process by which information and results about a program or an initiative are delivered to key actors (European Community, 2005).

c) Transmission

From Latin transmissio, which itself comes from transmittere, meaning “to send to the other side, deliver.”

d) Translation / to translate

From the Latin translatio, -onis, originally used in the sense of rendering from one language to another. In French, though superseded and replaced by the word traduction, it has retained its use in law (in the sense of transfer) and in science (displacement of an object). English has retained the word “translation” and “to translate” and lost the term traduction. In English, “translation” is also defined as “rewording something into less technical terminology.”

e) Knowledge mobilization

This implies a certain number of actions and complex mental operations (adaptation, differentiation, integration, combination, coordination) in a determined context, in order to transform knowledge. The concept of mobilization is broader than “transfer” and is more extensive than “utilization” or “application” (Perrenoud, 1999).

f) Use / utilize / useful

Defined as an action or manner of using. Use means “the action of using something or the state of being used for some purpose.”

Utilization is defined as “to put to use, especially to find a profitable or practical use for”; it therefore has a narrower sense than “use.”

Useful is akin to “advantageous”; it is an adjective that means “able to be used for a practical purpose or in several ways.”
Borrowed from the French in the 19th century, "Utilization" means "the action of using something or the state of being used for some purpose". The verb, «to use» has then become very usual whereas «Utilization» is defined as «to put to use, especially to find a profitable or practical use for», therefore it has a narrower meaning than «to use».

Useful, from Latin utilis ("that is useful"), derivative from the verb uti ("to use") is an adjective that means "able to be used for a practical purpose or in several ways".

2.2.2 Nature / transformation of Knowledge

a) Evidence-based datas

Lomas et al. (2005) define evidence-based data as “anything that establishes a fact or gives reason for believing in something.” From a scientific viewpoint, evidence-based data is that which is “explicit (i.e. coded and propositional), systemic (using clear and explicit coding methods), and repeatable (i.e. by applying the same methods to the same samples, one obtains the same results).”

b) Innovation

Innovation is about bringing changes in a product, a process, an organization, a practice, etc. In a technical process, we talk of “technological innovation,” meaning “technologically new products and processes as well as important technological improvements applied to products and processes” (CE, 1997). From a social standpoint, innovation is defined as “an entirely new approach, practice, or intervention, or a new product used by institutes, organizations, and communities for improving a situation or solving a social problem” (Bouchard, 1999).

2.2.3 Intermediaries

Intermediaries are agents who have a specific profile (credibility, ability to influence, presence in the community, etc.) and are responsible for disseminating the knowledge to be transferred (Bourdouxhe et Gratton, 2003). Three types of intermediaries are cited: knowledge brokers, liaison officers, and gatekeepers.

The word “intermediary” refers to an active role in knowledge transmission between knowledge producers and users.

a) Knowledge broker

Higgins (2000) defines knowledge brokers as persons who facilitate communication, access to information, and exchange of information among members of a network. Brokers “search out knowledge, synthesize research and scan for best practices, useful experiences, and examples from outside their own organization” (CHSRF, 2003) which they then try to promote to ensure their application.

b) Liaison officer

A liaison officer is a person who is in contact with both researchers and knowledge users. He or she is a sort of facilitator between researchers and users, enabling them to interact and make knowledge transfer possible. The role of a liaison officer can be formal (recognized) or informal. In occupational health and safety, the liaison officer can be an individual or an institution.

c) Gatekeeper

According to Roy et al. (1995), a gatekeeper is at the leading edge of a company and plays a key role in its communication network; a gatekeeper is usually a member of a trade or scientific association. A gatekeeper can act in a formal or informal way and is in charge of relaying information from the outside to the inside of the work environment.
# Key readings


2. CHSRF (2003). La théorie et la pratique du courtage de connaissances dans le système de santé canadien. Rapport


Depending on the approaches and definitions adopted, the various models have specific data structures, stages, and ways to describe transfer processes. The main (typical) models are summarized in Chapter 3. Their differences lie in their representation of exchange flows between knowledge producers and users, either in linear fashion or through many interactions. As well, each model emphasizes a particular dimension. For example, intra-organizational models emphasize factors and mechanisms that determine knowledge use. Information creation and dissemination models emphasize the information per se. For example, Nonaka and Takeuchi’s model (1995) is based on the distinction between tacit and explicit knowledge, implying different methods of transfer. Researches may adopt a dimension that best suits their own perspectives or objectives.

The development of increasingly complex models with multiple levels of analysis has encouraged researchers to divide the knowledge transfer process into various levels (individual, group, organization) and stages (transformation, dissemination, reception, etc.), which enables them to more clearly define the purpose of their research (see Chapter 4).

Secondly, since the knowledge transfer strategies cited by authors are partially linked to knowledge transfer stages, we will also review the former in this chapter. These strategies reflect the relative importance given to some stages.

Thirdly, some authors provide data and discussion on intervention methods to foster knowledge transfer. This is an important research area, but since it is mainly linked to the field of education, we have decided not to include it here.
Models are classified according to three main categories described in Chapter 1. Models referring to knowledge transfer (Section 3.1) are generally developed around the flow of exchanges. These exchanges are increasingly complex from one category of model to another as user role increases. Interactions are central in exchange and sharing models, but the identification and organization of exchange groups is more prominent. Knowledge production is represented here as being diffuse. In the last group (3.3), utilization is central to the models. Suggested classifications are built on the “who” and “why” dimensions.

Models presented in the literature are increasingly complex. User role is becoming the primary factor. Users can be involved in many stages of the process: knowledge creation, dissemination, adoption, appropriation, and utilization.

In the end, the model selected as a working tool depends on the discipline and purpose of study. We have also thus included a summary of model characteristics based on discipline (Box 6, p.18) since this helps explain the viewpoints and expectations of “assessors” and the various research organizations.

3.1 Knowledge transfer

Models are generally focussed on the knowledge transfer process between producers and users.

This transfer is represented by linear/unidirectional, bidirectional, or interactive flows. These exchange flows become collaboration bonds that intensify from one model to another, leading to the introduction of “mediators” such as knowledge brokers. User role evolves and many elements are introduced, ranging from the definition of problems and needs to the contribution and production of knowledge.

3.1.1 Linear (unidirectional) models

Knowledge is passed unidirectionally from researchers (producers) to users (receivers), either directly (Figure 1) or through translating agents responsible for disseminating the knowledge (Figure 2).

Figure 1: Boggs’ model of knowledge linear transfer (1992).

![Figure 1: Boggs’ model of knowledge linear transfer (1992).](image1)

Figure 2: Model of knowledge linear transfer through translators (Dissanayake, 1986 in Roy et al., 1995).

![Figure 2: Model of knowledge linear transfer through translators (Dissanayake, 1986 in Roy et al., 1995).](image2)

These translators are located at several levels and come from various sources: employers (administrators, human resource managers training managers, etc.), trade unionists (delegates, health and safety committee representatives, etc.) public or parapublic institutions (CSST inspectors, advisors from JSAs, etc.), or the private sector (ergonomists, hygienists, prevention experts, etc.). Their role remains quite limited in these models.
The dynamic aspect of these models is generally represented by the knowledge producers, while users have a more passive role. This is the basis of the criticism against these transfer models, in that the roles of researchers and users are compartmentalized into two distinct communities and limited to “one-way” exchanges. User concerns and realities are barely taken into account, if at all. The influence of context and individual characteristics (level, experience, etc.) on the process or on the purpose of the transfer is absent (Lyons and Warner, 2005). In short, this type of model is criticized for being applied in unsuitable contexts.

### 3.1.2 Collaborative models

These models introduce the idea of regular interactions between knowledge producers and users. Exchanges are specifically aimed at integrating user concerns when defining the purpose of the research. Depending on the complexity of the suggested model, these exchanges also take place in the various stages of research, e.g. results validation and utilization (Lyons & Warner, 2005). The role of the user thus becomes more important. At its basic level, the exchange flow is bidirectional (Figure 3, below).

**Figure 3: Boggs' bidirectional transfer model (1992).**

These collaborative models are also used to show relationships that exist between the two knowledge creation centres, namely, research and action. These relationships are characterized by an alternative, continuous, and progressive flow that can take the form of a spiral, for example (Figure 4).

**Figure 4: Bouchard and Gélinas’ spiral transfer model (Gélinas, 1990).**

These relationships do not change the specificities of each community (e.g. research and practice).

### 3.1.3 Interactionist models

Interactionist models depict exchange flows more elaborately; here, the exchange is usually circular. These models involve, on one hand, the existence of collaborative relations between a set of actors, and on the other hand, a consideration of the context in which researchers and users operate and in which knowledge transfer takes place. An example is the model proposed by Roy et al. (1995), describing a network of actors involved in the knowledge creation, diffusion, and utilization process (Figure 5, p.23). In this model, knowledge is the result of interactions between actors from different systems (workplace, supporting organizations, trade associations, universities, entrepreneurs, CSST, IRSST, etc.).

**Figure 5: Transfer model according to the knowledge support network of Roy et al. (1995).**
Guide to knowledge transfer research

This model has since evolved with the integration of the systemic aspect of knowledge transfer (Figure 6, below), that is, by relying on generation, diffusion, absorption, and adaptation abilities.

Figure 6: Ability-based knowledge transfer dynamics (Parent, Roy, St-Jacques, 2007).

This model was initially derived from an examination of needs and existing knowledge.

3.2 Knowledge exchange and sharing

In knowledge exchange and sharing models, the interaction process between various social groups such as researchers, decision makers, and users is central (Figure 7, below) and results in exchange networks. Researchers produce knowledge that can be improved by feedback from users through exchange channels.

Figure 7: Boggs’ knowledge exchange and sharing model (1992).

3.3 Knowledge sharing and utilization

Central to these models are the end product, i.e. the utilization of findings (e.g. Weiss, 1979; Landry et al., 1998; Hanney et al., 2003), the assessment of the extent to which objectives are attained, and the influence and impact of results through their application and utilization. These models are notably used in political decision-making and policy formulation.

We use the classification proposed by Trottier & Champagne (2006), which is similar to that of Weiss (1979) (to be explored in the next section), but in which the five classes are defined more broadly:

- Expert models (knowledge-driven). Knowledge is a means of achieving change and innovation; it is transmitted unidirectionally.
- Problem solving models. Knowledge is made accessible and easy to use in order to facilitate decision-making or solving a particular problem.
- Conceptual models. The application of produced knowledge is not immediate but requires a longer and more intensive dissemination period.
- Strategic models. Knowledge utilization is the result of power plays among actors.
- Interactive models. Only interactive and multidimensional exchanges among actors ensure the application of the knowledge produced.

Other interesting classifications are suggested, two of which are summarized in Box 7 below. That of Landry et al. (1999) is focused on the “decision” and/or utilization (or non-utilization) of knowledge and research findings, while that of Lavis et al. (2003) is centered on the process initiator.
Part II: Tools used to study the transfer: Models and structural organization

Box 7: Classification of research utilization models according to Landry et al. (1999) and Lomas et al. (2003).

Landry et al. (1999). Four categories based on the nature and determining factors of utilization:

- Technological (the utilization of research findings is based on how researchers make them available to users)
- Economic (knowledge utilization is mainly explained by user need and contexts)
- Institutional (knowledge utilization is driven by the adaptation of research findings to user need and on efforts made for their dissemination)
- Social interaction (knowledge utilization depends on the level of interaction between researchers and users)

Lavis et al. (2003). Three categories based on who initiates the transfer process:

- Producer-push model (researchers initiate knowledge transfer and place their research findings at the disposal of users)
- User-pull model (users initiate the identification and utilization of knowledge produced by researchers)
- Exchange model (initiatives related to the utilization of research findings are taken by both researchers and users based on interaction).

3.4 Other proposed model classifications

Weiss (1979) proposes six categories defined by context and, above all, intended purpose:

- Knowledge-driven models (knowledge is used to define new policies)
- Problem-solving models (knowledge is used to solve problems)
- Interactive models (based on exchanges between the parties involved)
- Political model (knowledge is used for justification and legitimization)
- Tactical model (knowledge is used as a pretext)
- Enlightenment model (knowledge is used as an input to build more knowledge).

3.5 Models and disciplines

Models reflect the various perspectives and needs of the disciplines and applications they represent. This is the case for models relating to the transfer of learning, which is a broad area beyond the scope of this guide. It is worth noting, however, that these models are linked to three lines of thought: 1) empiricist (task characteristics are crucial), 2) rationalist (based on cognitive processes), and 3) contextualist/interactionist (characteristics of the environment in which knowledge transfer takes place are central).

Box 8 summarizes the key differences between the models according to discipline.
Guide to knowledge transfer research

Box 8: Characteristics of theoretical models based on discipline.

The purpose and orientation of theoretical models vary according to discipline. The models of four disciplines—management, social sciences, health, and education—are summarized below.

The theoretical models developed in management sciences are aimed at describing the mechanisms through which certain measure, e.g. training activities, produce effects on individual/organizational performance, behavioural changes, and problematic situations (problem solving).

In the social sciences, the main theoretical models describe processes inherent in knowledge transfer in the framework of a particular social system. These models take into account aspects such as the specificities of the social system, and the exchanges and interactions created by transfers between several actors.

Theoretical models in the health sciences emphasize a global approach (dissemination, sharing, exchange, interactions, etc.) whose purpose is to identify mechanisms related to knowledge transfer that ensure good professional practice and facilitate decision-making and policy formulation.

Theoretical models in the education sciences focus on the transfer of learning. Usually, these models adopt a cognitive information-processing approach. They are generally centered on transfer dynamics by paying more attention to the cognitive processes used during knowledge transfer and for strategies related to these processes.

Key readings

Stages of the knowledge transfer process are described differently from one author to another and from one discipline to another. These stages can be divided and described in different ways. In the first section, we will present the main stages from three perspectives: knowledge dissemination, transfer process management, and knowledge utilization. In the second section, we will summarize the main strategies described to achieve knowledge utilization.

4.1 Knowledge transfer steps

4.1.1 Stages in communication models (dissemination)

For many years, issues related to knowledge transfer were reduced to the notion of knowledge accessibility and approached from a communication perspective. As a result, Rogers’ (1995) communication model, developed from analyzing over 3,000 studies on technological innovation, influenced many theoretical models regarding knowledge transfer. A good example is Szulanski’s (2000) transfer process model (Figure 8), which is divided into four stages: initiation, implementation, ramp-up, and integration.

The initiation stage is used to identify the problem to be solved as well as the corresponding knowledge. During the second stage, the identified knowledge is modified to adapt to the problem. The third stage tackles knowledge translation and its difficulties. Finally, the last stage deals with the institutionalization of the knowledge that is actually transferred, in other words, its appropriation.

4.1.2 Stages in management models (process management)

Management models describe knowledge transfer as a process with multiple interactions beginning with knowledge creation and ending with utilization. The model proposed by Roy et al. (1995) describes six stages:

- Creation (knowledge development, including the creation of new knowledge, the redefinition of existing knowledge, and the establishment of distinctions and relationships within existing knowledge)
- Transformation (knowledge is re-organized, processed, and adapted to facilitate its diffusion, accessibility and transferability)
- Diffusion (knowledge is transmitted through specific channels, over a certain period of time, and between members of a social system)
- Reception (the willingness to familiarize oneself with knowledge)
- Adoption (the attitude or decision for rejecting or accepting knowledge)
- Utilization (knowledge translation and implementation in real situations)

Even when the organization of transfer stages is linear, it is generally agreed that the process can involve iteration resulting in the repetition of previous stages.
4.1.3 Stages from health models: knowledge utilization

From a review of 60 transfer theories and conceptual frameworks, Graham et al. (2006) attempted to highlight commonalities regarding the action cycle, i.e. all actions likely leading to the implementation of knowledge that is developed. The eight stages identified are:

- identification of the problem that needs to be solved
- identification, review and choice of appropriate knowledge
- knowledge adaptation to the local context
- assessment of obstacles likely to impede its utilization
- selection, adaptation, and implementation of interventions likely to favour knowledge utilization
- monitoring knowledge utilization
- assessment of results obtained after knowledge utilization
- continuous knowledge utilization support.

4.2 Transfer strategies

A wide range of strategies to ensure the effective utilization of knowledge transfer is cited in the literature. They differ according to many factors, particularly the intended objectives and the context. Taking into account the utilization of results or transferred knowledge is important both in terms of opportunities (matching user need with developed knowledge), and means (possibility of transforming knowledge into appropriate and easy-to-use tools).

4.2.1 Dissemination strategies

An important part of strategies that are developed is based on communication by favouring knowledge dissemination among actual and potential users. In fact, transfer strategy is often confused with dissemination strategy. Nonetheless, the intended goal of developing dissemination strategies is also to favour discussion and sharing between researchers and users.

4.2.2 Planning for transfer prior to the research project

These strategies are aimed at planning for or integrating the transfer aspect prior to starting the research. This involves drawing up a plan in which a number of items are outlined, for example, research justification and objectives, potential users, messages to be disseminated, and appropriate supports.

Box 9: Transfer strategies of federal funding organizations.

For the CIHR, the strategy for fostering knowledge translation consists in developing partnerships between actors such as decision makers, health planners and administrators, healthcare providers, the general public (especially patient groups), and those in the private sector.

The NSERC develops its strategy for transferring research findings and technological innovations through partnerships with universities, governments, and private business, and through advanced training of highly qualified personnel.

In addition to measures aimed at encouraging interaction and establishing links between researchers and users by setting up partnerships (such as Community-University Research Alliances) to promote knowledge transfer, the SSHRC has opted to develop systemic mechanisms that facilitate contact
among players, provide access to pertinent research findings, and promote an understanding of the applicability and the implications of knowledge to be transferred.

As for the CHSRF, the recommended strategy is more developed. It can be summarized in the following eight points:

• highlight the main messages and implications of research findings in clear, simple, active terms;
• designate credible “messengers”;
• identify key audience of decision makers for whom the messages are intended;
• develop means of transmitting the messages to the targeted audiences and encourage them to integrate research implications in their work;
• facilitate access to information;
• promote the development and establishment of practice communities;
• ensure collaboration between researchers and users;
• evaluate the results of knowledge transfer.

4.2.3 Turning knowledge into tools

These strategies emphasize the transformation of knowledge or research findings into adapted and usable tools (e.g. decision-making tools or tools to help solve a problem situation). For example, user guides are created to promote good practices. This strategy is particularly encouraged for the prevention, diagnosis, treatment, and management of occupational MSDs (Harris, 1997). In occupational health and safety, user guides (design, analysis, assessment) are an important part of knowledge transfer strategy.

4.2.4 Preferred strategies of funding organizations

Some research institutes, through their documentation, specify their preferred strategies (see Box 9). With only one exception (CHSRF), most deal with the issue of strategy very briefly and focus mainly on the development of partnerships.

Key readings

In Part III, we discuss knowledge transfer as an object of study or research topic.

It is understood that the intended goals of knowledge transfer activities (problem solving, decision-making, “best practices,” innovation, etc.) require that progress be assessed at every stage, from knowledge production to its effective implementation. Indeed, this aspect has been included in several models. For example, most models used for the application of research findings include an assessment of the influence and impact of such findings.

We thus felt it appropriate to start with a chapter dealing with transfer assessment that proposes a conceptual framework for assessment and that clarifies certain concepts (e.g. differences between results, effects, and impacts).

Assessment also enables one to question the many factors that determine efficient and effective knowledge transfer (adopted strategies, the roles and levels of involvement of all parties, their relationships, the degree of implementation of knowledge transfer actions, the nature of effected changes, etc.). In the end, the aim is to identify factors that foster knowledge transfer as well as those that must be considered in a particular transfer project. This will be covered in Chapter 6. The last chapter deals with impacts and consequences, the goal being to identify the direct and indirect effect (intended or not) of transfer actions.
Chapter 5: Assessing transfers: conceptual framework

An assessment consists of forming a judgment on an intervention (Patton, 2002). The term “assessment” also refers to a process, as systematic and objective as possible, by which the value and extent of an intended intervention is determined, whether it is in progress or completed (OECD, 2002). Since there is still some confusion regarding the term, the following section is intended to clarify certain notions.

Knowledge transfer assessment can focus on different aspects depending on several factors, including the objectives of the assessment, the context, or the means at one’s disposal. These are reviewed in Section 5.2.

5.1 Semantic clarifications regarding assessment

The assessment of knowledge transfer or the transfer of research findings can be performed by using the transfer process itself or by focussing on the results obtained.

In transfer, process assessment is important, given that the various actors involved in transfer have numerous and complex interactions. From an assessment standpoint, the process can be defined as “all the internal operations, both formal and informal, of an intervention that enable us to attain desired objectives” (Rondot and Bouchard, 2003). It involves identifying all mechanisms through which a transfer of knowledge or research findings takes place.

Assessing transfer by its results involves verifying if the intended effects match those determined at the outset. This often takes place within the framework of a normative assessment in which the original intention is compared to what was actually accomplished. This is explained by the need to verify whether the objectives of a knowledge transfer decision were attained from the point of view of both users and researchers. However, this does not preclude the use of evaluative research.

The results include concepts such as “effects,” “results,” and “impacts” (see Box 8), which are interconnected but have different meanings in terms of purpose, range, and outcome. These conceptual differences are shown in Table 1 based on four items: purpose (what the assessment relates to), range (scope of the assessment), temporal aspects (the stage or period in which the assessment must be carried out), and outcome (what is expected from the assessment).

### Box 10: Effect vs result vs impact

**Effect**

An effect can be defined as an «intended or unintended change due directly or indirectly to an intervention» (OECD, 2002).

**Results**

The notion of “results” can be defined as changes caused by an intervention and resulting in direct effects. Thus, results constitute all the effects expected from research findings or from knowledge transfer.

**Impact**

The notion of impact can be defined as «positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended» (OECD, 2002). It goes beyond the definition of “results” and includes indirect effects (positive and negative).
5.2 The components of knowledge transfer assessment

Faced with the plethora of items to which an assessment can relate, we have decided to group them into six main points based on a time criterion (from knowledge creation to the actual effects of transfer).

- **The knowledge creation process** aims at indentify and analyzing the relationships, interactions, and contexts in which knowledge is developed by researchers in relation to real or potential users.

- **The knowledge provision process.** The assessment aims, on one hand, to identify the mechanisms of knowledge transformation created to facilitate their accessibility and transferability, and on the other hand, to support the processes by which this knowledge is propagated to reach real or potential users.

- **Knowledge appropriation** accounts for the level of acquisition, integration, and consolidation of the knowledge transferred by real or potential users (persons or entities).

- **Knowledge utilization** involves verifying the extent to which transferred knowledge is actually applied by users.

- **Transfer results** involves measuring the extent to which the implicit or explicit objectives outlined at the outset have been attained, as well as the changes, decisions, and policies that result from a knowledge transfer action. It consists in verifying whether the results match those initially expected.

- **Impacts.** This involves measuring the indirect or unexpected effects of knowledge transfer. It also involves verifying whether the effective application of the transferred knowledge results in effects other than those initially expected or desired.

### Key readings


Table 1: Main differences between concepts: Effects, results and impacts.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Effects</th>
<th>Results</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>The assessment centers on changes that result or could result from a transfer action.</td>
<td>The assessment consists in comparing changes resulting directly from a transfer action with those initially expected.</td>
<td>The assessment usually identifies and analyzes the possible consequences of the changes (intended or not; positive or negative), directly or indirectly related to a transfer action.</td>
</tr>
</tbody>
</table>
| Scope         | Changes that are included are those that were anticipated and those that actually took place. The assessment of these changes (expected or not) is restricted to those that result directly or indirectly from the transfer action. | The expected changes (initially anticipated) are the standards on which analyses are based. All effects (or results) obtained and directly due to the transfer action are compared to these standards. | Impacts include both:  
  - Changes obtained that result directly from the transfer action (results);  
  - Changes obtained that result indirectly from the transfer action (external influences). |
| Temporal perspective | Changes can occur at every stage of the transfer action (immediate, intermediate, short-term, or long-term effects). | Same as above. | The impacts of a transfer action cannot be assessed in the long term. |
| Outcome       | Verify the presence of variations following the implementation of a transfer action.  
  Check and explain how these variations came about (influences and interactions among all elements involved, especially given the context). | Verify whether the objectives (intermediate or final, specific or general) intended at the outset have been attained and, if possible, to what extent.  
  Examine the relationship between the results obtained, the various aspects of the transfer action (processes, means, etc.), and the context. | Measure the results obtained; identify and analyze all interactions that may have influenced the results.  
  Check if there are effects indirectly linked to the application of a transfer action, and whether there are possible links between the various elements involved. |
Chapter 6: Factors that foster transfer

Many studies focus on factors that facilitate knowledge transfer. Although these factors may vary depending on the intended objectives, strategy, or context, some have gained general acceptance. For example, most of us would agree that the implementation of research findings is made easier, as noted by the Joseph Rowntree Foundation (2000), by:

- providing solutions on issues of concern to users in a timely manner;
- defining a clear strategy for disseminating findings from the outset;
- combining several methods for disseminating findings;
- ensuring that officials of user organizations play a leadership role, and that there are credible knowledge relayers within these organizations.

The potential factors are numerous. They have been identified and classified into four sections. The first section (6.1) examines the factors identified and attempts to establish a link with theoretical models. In the second section (6.2), factors are classified according to whether they belong to a national or an organizational intervention level. To avoid redundancy, we have limited ourselves to identifying factors that are specific or new to a stage. The third section (6.3) deals with factors related to the classifications presented in the last section (6.4) based on purpose.

6.1 Factors related to theoretical models

These factors serve to feed and validate the suggested theoretical models.

6.1.1 Linear transfer models

We present here the list established by Gélinas and Pilon (1994). This list gives prominence to the origin and perception of knowledge and presents positive factors as follows:

- researcher credibility determines the credibility of the results
- researcher trustworthiness
- scientific quality of the research
- clarity, accessibility, and comprehension of researcher discourse
- perception of the usefulness of research findings
- timeliness of results dissemination
- quality and relevance of the media used to carry out the transfer
- influence (social, normative, and affective) of the social network on the behaviour of users
- support of the hierarchy and of peers
- context of utilization (working conditions, working atmosphere, organizational culture, etc.).

6.1.2 Collaborative models

Indeed, many of the facilitating factors deal with the collaboration process. We have used the list drawn up by Duperré (2006):

- establishment of links between researchers and user communities from the project’s outset
- users participation and interaction
- user concerns
- supplying suitable transfer tools
- presenting research results in a clear, concise, user-friendly, and attractive manner.
Guide to knowledge transfer research

6.1.3 Interaction models

Landry et al. (1998) insist on:

• the nature of research results
• user organizational interests
• dissemination efforts and mechanisms.

6.2 Factors connected with the level of intervention

6.2.1 Organizational level

We have selected the five factors suggested by Jacobson et al. (2004):

• preparation and promotion of guides
• existence of resources and financial means to carry out the research
• existence of internal structures that support and foster the transfer
• development of an orientation plan prior to carrying out the research
• preparing the documentation.

6.2.2 National level

We found it useful to present here the viewpoint of a national organization (CHSRF, 1999) regarding factors that foster knowledge exchange and sharing:

• involvement of funding organizations that are invited to head actions aiming at instilling an environment favourable to exchange and sharing
• resource allocation (all parties should supply resources and/or identify costs related to exchange and sharing)
• role of decision-makers (they must get involved at an early stage and participate in the preparation and reception of research results to be used in the decision-making process)
• development by all the parties of an infrastructure aiming at supporting exchange and sharing.

6.3 Factors related to categories

Laroche (2006) suggests factors that are grouped into six categories:

• knowledge (nature, adaptation, and relevance of the knowledge produced)
• accessibility of knowledge and means of dissemination
• social relations in knowledge acquisition
• dissemination
• nature and context of the source (researcher)
• nature and context of the user.

6.4 Synthesis of the factors based on their purpose

Table 2 contextualizes factors based on each stage of the transfer process. We have used the classification by Roy et al. (4.1) to which we have added a stage—appropriation (knowledge acquisition and integration in view of utilization). The categories described in Section 6.3 are repeated here but in stepwise fashion. For example, the notion of context is used repeatedly.

Key readings

### Table 2: Main transfer factors or determinants.

<table>
<thead>
<tr>
<th>Step</th>
<th>Transfer factors and determinants</th>
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<tbody>
<tr>
<td><strong>Creation</strong></td>
<td></td>
</tr>
<tr>
<td>Researcher’s characteristics</td>
<td>• The researcher’s reputation, experience, and credibility</td>
</tr>
<tr>
<td></td>
<td>• The researcher’s availability and commitment</td>
</tr>
<tr>
<td></td>
<td>• The researcher’s involvement in networks</td>
</tr>
<tr>
<td>Relevance of the research to needs</td>
<td>• The relevance, utility, and appropriateness of the research</td>
</tr>
<tr>
<td></td>
<td>• Taking user concerns into account</td>
</tr>
<tr>
<td>Resources</td>
<td>• Means (equipment) at the researcher’s disposal</td>
</tr>
<tr>
<td></td>
<td>• Amount of financing allotted</td>
</tr>
<tr>
<td>Involvement of users</td>
<td>• Participation of users in the research</td>
</tr>
<tr>
<td></td>
<td>• Participation of decision-makers in the research</td>
</tr>
<tr>
<td>Context of the research</td>
<td>• Research support policies</td>
</tr>
<tr>
<td></td>
<td>• Support from funding organizations</td>
</tr>
<tr>
<td></td>
<td>• Existence of persons and organizations as intermediaries</td>
</tr>
<tr>
<td><strong>Transformation</strong></td>
<td></td>
</tr>
<tr>
<td>Transformation context</td>
<td>• Adapting knowledge to users’ characteristics, requirements, levels, and profile</td>
</tr>
<tr>
<td></td>
<td>• Clarity and accessibility of the language</td>
</tr>
<tr>
<td></td>
<td>• Policies that support the dissemination of research findings</td>
</tr>
<tr>
<td><strong>Dissemination</strong></td>
<td></td>
</tr>
<tr>
<td>Supports and channels used for transfer</td>
<td>• Type, attractiveness, user friendliness of the supports used (paper, downloadable document)</td>
</tr>
<tr>
<td></td>
<td>• Selection of suitable dissemination channels: guides, periodicals, Internet</td>
</tr>
<tr>
<td></td>
<td>• Information meetings about the knowledge to be transferred</td>
</tr>
<tr>
<td></td>
<td>• Existence of a dissemination strategy</td>
</tr>
<tr>
<td>Knowledge dissemination context</td>
<td>• Existence of networks, research communities, etc.</td>
</tr>
<tr>
<td></td>
<td>• Existence and involvement of relaying people and organizations</td>
</tr>
<tr>
<td></td>
<td>• Policies supporting the dissemination of research findings</td>
</tr>
<tr>
<td></td>
<td>• Support by funding organizations</td>
</tr>
<tr>
<td><strong>Reception</strong></td>
<td></td>
</tr>
<tr>
<td>Context</td>
<td>• Existence of intermediaries</td>
</tr>
<tr>
<td></td>
<td>• Access to results</td>
</tr>
<tr>
<td>User characteristics</td>
<td>• Short-term benefits</td>
</tr>
<tr>
<td></td>
<td>• Users’ level of education</td>
</tr>
<tr>
<td></td>
<td>• Users’ motivation</td>
</tr>
<tr>
<td><strong>Adoption</strong></td>
<td></td>
</tr>
<tr>
<td>Knowledge usefulness</td>
<td>• Perceived usefulness of the knowledge to be transferred</td>
</tr>
<tr>
<td></td>
<td>• Conformity between knowledge and problems to be solved</td>
</tr>
<tr>
<td></td>
<td>• Interactions between knowledge producers and users</td>
</tr>
<tr>
<td>Support received by users</td>
<td>• Availability of internal resources (key persons, committees, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Information meetings</td>
</tr>
<tr>
<td>Appropriation context</td>
<td>• Organizational context: learning organization, organizational learning, Interactions</td>
</tr>
<tr>
<td>User characteristics</td>
<td>• Users’ level of education</td>
</tr>
<tr>
<td></td>
<td>• Users’ motivation</td>
</tr>
<tr>
<td><strong>Knowledge appropriation</strong></td>
<td>• Motivations to adapt and utilize knowledge</td>
</tr>
<tr>
<td></td>
<td>• Perception of the usefulness of knowledge</td>
</tr>
<tr>
<td></td>
<td>• Perception of the credibility of possible results</td>
</tr>
<tr>
<td></td>
<td>• Confidence to utilize the knowledge</td>
</tr>
<tr>
<td></td>
<td>• Expected benefits</td>
</tr>
<tr>
<td>User attitudes</td>
<td>• Users’ qualifications</td>
</tr>
<tr>
<td></td>
<td>• Ability to understand and utilize knowledge</td>
</tr>
<tr>
<td></td>
<td>• Training received</td>
</tr>
<tr>
<td></td>
<td>• Earlier experiences of similar knowledge utilization</td>
</tr>
<tr>
<td><strong>Knowledge utilization</strong></td>
<td>• Support (peers, hierarchy/organization, advisors from a JSA or the CSST, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Internal resources (meetings and information meetings, internal committees, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Organizational factors (workload, decision latitudes, climate, etc.)</td>
</tr>
</tbody>
</table>
Impact assessment can be justified by the need to understand the effects (direct and indirect, intended or not) of a transfer action. The multiplicity of actors, the existence of interactions, and the influence of the context make impact assessment relevant or even necessary because, in some circumstances, it is difficult or even impossible to isolate the expected effects of a transfer from all the effects realized. Thus, after specifying what we mean by impact assessment (7.1), we will discuss the various other levels of assessment by specifying each of their purposes (7.2).

7.1 Impact assessment of knowledge transfer

Assessing the impact of knowledge transfer focuses on whether the effective implementation of the transferred knowledge produced certain effects (expected, unexpected, positive, negative). The complexity of the impact assessment process is strongly linked to the multiplicity of factors that come into play in producing the direct and indirect results throughout the knowledge transfer process.

Factors to be taken into account depend on the branches of industry (health, education, management, engineers, etc.) or on the kind of activities within an organization in which the transfer takes place. Specificities must be considered in every instance in the evaluation. However, beyond these specificities, some of the factors to be considered include the following:

- decisions made based on the transferred knowledge;
- problems solved in whole or in part based on the transferred knowledge;
- contribution of the transferred knowledge to human capital (skills/performance improvement, etc.) and to technical capital.

7.2 Levels of transfer assessment

Several actors are needed to carry out a knowledge transfer, including researchers, users, officials, intermediaries. Considering such this variety of actors, the objectives, the contexts involved in the transfer, and the assessment of transfer can be divided into the following four levels: individual, organizational, sectorial, and national. Among these levels, the factors to be considered and the intended objectives can be very different.

However, before proceeding, we will summarize three types of impact (scientific, socio-economic, vis-à-vis the research context) in Table 3.
Table 3: Factors to be taken into account during impact assessment

<table>
<thead>
<tr>
<th>Scientific impacts</th>
<th>Socio-economic impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Scientific advances</td>
<td>• Innovative products, processes, services, or technologies that arise from knowledge transfer</td>
</tr>
<tr>
<td>• Contribution to science (publications, influence, etc.)</td>
<td>• Progress and advances (social, medical, technical, etc.) made possible by the application of the transferred knowledge</td>
</tr>
<tr>
<td></td>
<td>• Skills and individual performance increase, etc.</td>
</tr>
<tr>
<td></td>
<td>Impact on the research context</td>
</tr>
<tr>
<td></td>
<td>• Research funding policies</td>
</tr>
<tr>
<td></td>
<td>• Amount allotted for funding</td>
</tr>
<tr>
<td></td>
<td>• Facilities accorded to research structures</td>
</tr>
<tr>
<td></td>
<td>• Interactions between the context in which the research is undertaken and transfer activities carried out by researchers</td>
</tr>
</tbody>
</table>

A transfer assessment at the individual level is aimed at verifying and analyzing, among other things:

- the willingness of various users to become familiarized with the transferred knowledge
- the adoption or rejection of the transferred knowledge
- the appropriation (or lack thereof) of the transferred knowledge
- the effective application of the transferred knowledge
- the influence of the context
- other users not initially targeted

A transfer assessment at the organizational level generally tends to verify or measure:

- the conditions through which knowledge reaches an organization
- the means and factors that favour its appropriation
- its implementation and institutionalization by the organization as a whole and by its various constituents (workers, departments, etc.)
- the modifications or changes adopted as a result of the transfer
- organizational performance, etc.

Usually, institutions that undertake transfer or that foster transfer operate in a well-defined branch of industry (e.g. JSA), operate in many sectors (e.g. CSST) or operate in a specific professional branch (e.g. employer's associations, trade associations). Transfer assessment at the sectorial level consists in checking a number of elements, such as:

- the relevance, utility, and adequacy of the research relative to the current and potential concerns of actual or potential users
- transmission supports, such as the choice of communication channels or the quality of the supports
- the existence of reinforcement networks (communities of practice, exchange forums, etc.)
- the context in which these institutions operate (resources set aside to ensure the effectiveness of the transfer as well as the nature and quality of the resulting social relations).
All levels of assessment are of interest to each of the actors involved in a transfer action. This is what gives a global and comprehensive idea of what is to be assessed. However, in certain cases, actors may favour a level of analysis depending on specific concerns.

**Funding organizations**

Funding organizations are interested in the overall aspect of transfer and have a national perspective (supporting knowledge creation through training and research funding, contributing to the development of networks, assisting in the establishment of partnerships between researchers and users, etc.).

**Researchers**

Researchers are concerned with all levels of assessment, all actors, and all knowledge transfer stages.

**Intermediaries**

Intermediaries approach knowledge dissemination from both global and sectorial points of view. They are interested, among other things, in knowledge dissemination, marketing of research findings, the creation of networks, and the development of innovative technologies within a targeted group, a specific sector, or a given region or country.

**Decision-makers**

Depending on their decisional jurisdiction (governmental, sectorial, or organizational), decision-makers are generally interested in measuring the range, results, and efficiency of their decisions at the national, sectorial, or organizational level when these decisions are based on research findings, especially evidence-based data.

**Organizations**

Organizations generally carry out assessments at the organizational and individual level and verify if and how the transferred knowledge is being implemented, and with what results.

Lastly, at the national level, transfer assessment seeks to verify, among other things:

- the valorization of transferred knowledge into innovative and profitable products, processes, services, or technologies
- the progress and advances (social, medical, technical, etc.) made possible by the application of the transferred knowledge
- decisions made on the basis of the transferred knowledge
- problems entirely or partially solved by the transferred knowledge
- the contribution of the transferred knowledge to the reinforcement of human capital (increased skills, individual performance, etc.) and technical assets
- the context in which the research is carried out (research objectives, sources of funding, etc.).

**Key readings**

References

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Guide to knowledge transfer research


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Researchers have accumulated a considerable amount of experience, understanding, and “know-how,” mostly informal, regarding knowledge transfer. It is plausible to think that in the coming years, researchers will not only become increasingly interested in these issues (i.e. knowledge transfer will become the focus of their research), but that they will also attempt to formalize/model/conceptualize a corpus of knowledge that is specific to OHS.

We therefore thought it appropriate to create a document, primarily a working tool, to help researchers desirous of focusing on knowledge transfer to become familiar with its broad outlines, its limits, and its subtleties (basic concepts, vocabulary, areas of research, main questions, positions of funding organizations, key literature, etc.). This guide is not an exhaustive review of the literature related to knowledge transfer; it is meant to identify key elements as far as OHS is concerned.