Knowledge Management Process: People-Track and Knowledge Centered Perspectives

In the real world of knowledge management our attempts are to make practical use of knowledge, to accomplish some organizational objectives through the structuring of people, technology, and knowledge content. These are all process oriented and in practice government administration at large could also be regarded as knowledge management projects.

1. Two Tracks of Knowledge Management

One of KM's leading practitioners Karl-Eric Sveiby describes the current practice of knowledge management as being divided into two tracks:

**IT-Track KM** = Management of Information. Researchers and practitioners in this field tend to have their education in computer and/or information science. They are involved in construction of information management systems, AI [artificial intelligence], reengineering, groupware etc. To them Knowledge = Objects that can be identified and handled in information systems. This track is new and is growing very fast at the moment, assisted by new developments in IT.

**People-Track KM** = Management of People. Researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or business/management. They are primarily involved in assessing, changing and improving human individual skills and/or behavior. To them Knowledge = Processes, a complex set of dynamic skills, know-how etc, that is constantly changing. They are traditionally involved in learning and in managing these competencies individually - like psychologists, or at an organizational level - like philosophers, sociologists or organizational theorists. This track is very old, and is not growing so fast.

The two tracks differ in their techniques and tools. In the IT track, the emphasis is on using software and the Internet. One goal is to capture information in databases. The other goal is to improve communication internally (to share knowledge within the organization) and externally (to determine customer preferences and to better manage the flow of goods and services to and from suppliers). In the people track, emphasis is on creating an environment that fosters innovation and the highest possible level of skill-utilization—the so-called management of human capital.

Coincides with Davenport’s categorization of four mainstream knowledge management objects we discussed before, the objects for IT-track centers around the creation of knowledge repositories and improving knowledge access through IT tools and processes, while enhancing the

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knowledge environment and managing knowledge as an asset would tend to focus on the organizational and people issues along the People-track.

Our position on this matter is that we believe both tracks are very important for designing and implementing a successful knowledge management program. However one should not simply take the ground as believing one is more important than the other, as both tracks have their respective shortcomings and merits. They both are the integral parts of an organization’s grand knowledge management strategy. Rather than competing with each other, they are in the nature of supplementing each other.

### 2. Two Key Activity Processes of Knowledge Management

Within organizations, much of the emphasis of early knowledge management programs was on finding out existing knowledge so as to avoid the phenomenon of “reinventing the wheel”. As categorized by Skyrme, who called this process as knowledge sharing—“knowing what we know”\(^3\). However, more important for the establishment of competitive edge and long-term development of an organization, the other process of knowledge management that underlies innovation is being put more emphasis among organizations. As shown in the following figure\(^4\) both cycles have their own components.

![Figure 1: Two Cycles of Knowledge Management (Skyrme, 2002)](image)

The cycle on the left – the innovation cycle – represents a progression from idea creation (unstructured knowledge) into more structured and reproducible knowledge, embedded within processes, products or services. The cycle on the right – the knowledge sharing cycle – shows the processes associated with gathering and disseminating existing knowledge, having a knowledge repository as its focal point. Although the activities in each cycle roughly follow the sequences

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\(^4\) Ibid.
shown, continual iteration through different levels of aggregation means that the actual paths between activities are rather more complex than those depicted.

In the above diagram, although most of the people would acknowledge the importance of knowledge innovation cycle, we believe, the concept of knowledge sharing is an idea that people have far taken it for granted and thus requires a bit more attention than normal perceptions.

Knowledge sharing generally involves two activities: transmission (sending or presenting knowledge to a potential recipient) and absorption by that person or group. If knowledge is not absorbed, it has not been effectively shared. Merely making knowledge available is not sharing. Access is necessary but by no means sufficient to ensure that knowledge will be used. The goal of knowledge sharing is to improve an organization's ability to do things, and therefore increase its value. Even transmission and absorption together have no useful value if the new knowledge does not lead to some change in behavior, or the development of some new idea that leads to new behavior. These points need to be kept in mind during the design and implementation of any knowledge management programs.

In practice it is fairly common that even though people do understand and absorb new knowledge, they still hesitate to put it in use for a variety of reasons. Not respecting or trusting the source of the knowledge is an important one. Pride, stubbornness, lack of time, lack of opportunity, fear of taking risks (especially in an organization that punishes mistakes) are others. Our self-esteem is based on what we know and how we've done things in the past. If someone comes in and says, "My way of doing this is better than what you've been doing for the past five years," we are likely to resist. As Kanouse and Jacoby point out, "There are good reasons to believe that behavior change is a much rarer event than acquisition of knowledge." People will resist any innovation that may require them to abandon their signature skills in favor of new ones. Resistance to change is powerful, even in the face of indisputable objective evidence that a particular change makes sense. We are hardly wholly rational creatures. Here is precisely the reason why we need to build an appropriate organizational culture so that effective sharing of knowledge can happen in the government and among its departments.

To conclude, we believe this knowledge management model, among many others, has the advantage of clearly describing the essence of many existing knowledge management programs, and also very easy to follow and implement accordingly with a "step-by-step" manner. In the following when we go deeper to concrete cycles of processes of knowledge management, we will follow this dual categorization of knowledge innovation/sharing, and will centre our subsequent discussions about knowledge processes in government around these two key concepts.

3. Skyrme's Multi-Dimensional Knowledge Management Activities at Different Levels

Knowledge management covers a broad range of activities and can be operated at different levels. Also at different levels different dimensional considerations should be carried out. Based on these Skyrme has composed a KM strategy and is summarized in the following table:

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5 Dr David J Skyrme (2002), Knowledge Management: Approaches and Policies
Table 1: Multi-dimensional KM Levels and Associated Activities (Skyrme, 2002)

<table>
<thead>
<tr>
<th></th>
<th>Policy / Strategy</th>
<th>Processes / Methods</th>
<th>People / Skills</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governments (inc. EU)</td>
<td>Stimulation</td>
<td>Guidance</td>
<td>Qualification and Skills</td>
<td>Interoperability standards</td>
</tr>
<tr>
<td></td>
<td>Good practice</td>
<td>Standards</td>
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<tr>
<td></td>
<td>Regulation</td>
<td></td>
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<tr>
<td>Intra-organization</td>
<td>Collaborative associations</td>
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<tr>
<td></td>
<td>Collaboration methods and standards</td>
<td>Skills development</td>
<td>E-business networks</td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Knowledge-based business</td>
<td>Best practice</td>
<td>Personal development programmes, e-learning</td>
<td>Corporate portals</td>
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<td></td>
<td>KM processes</td>
<td></td>
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</tr>
<tr>
<td>Teams</td>
<td>Tasks and outcomes</td>
<td>Virtual working</td>
<td>Team roles</td>
<td>Collaborative workspace</td>
</tr>
<tr>
<td>Individuals</td>
<td>Career / life planning</td>
<td>KM specialties</td>
<td>Professional development</td>
<td>ICT / Internet proficiency</td>
</tr>
</tbody>
</table>

As Skyrme puts it, what is becoming apparent is the value of synergy and alignment across these cells. We believe the specific corresponding activities may not necessarily be as rigid as he has suggested, however this model is of guiding importance, especially from the government organizations' standpoint, for the mentality of linking all different levels of players and/or stakeholders together in the pursuit of establishing the "knowledge society".

4. Other Important Theoretical Models of Knowledge Creation/Innovation Processes

4.1 Nonaka and Takeuchi’s Model of Organizational Knowledge Creation/Innovation Spiral

Nonaka and Takeuchi⁶ argue that, in reality, organizations continuously create new knowledge by reconstructing existing behavior, perspectives, culture and beliefs.

For the knowledge-creating organization, knowledge is believed to be created in a cyclical trajectory simultaneously between ontological and epistemological planes, with spiral progression defining the conversion and mobilization of tacit knowledge (see Figure 2). In broad terms,

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ontology is taken to address the nature of being and reality, while epistemology explores the theory of knowledge with respect to validating what may be accepted as expressions of being and reality. Ontology is adopted to denote the dimension that represents the dissemination of knowledge throughout the diversity of strata describing an organization. This is a quite profound denotation as it draws attention to the fact that ontology may change with the transition between strata.

The orthogonal dimension of epistemology as proposed by Nonaka and Takeuchi represents the dynamic relationship between tacit and explicit knowledge, in particular, the mutuality of tacit and explicit knowledge creation.

![Figure 2: Nonaka and Takeuchi’s Spiral of Organizational Knowledge Creation](image)

4.2 Boisot’s 3-dimensional Model of Knowledge Codification, Abstraction and Dissemination

Nonaka and Takeuchi succeed in providing an elegant expression of the dynamics of organizational knowledge creation in a 2-dimensional space. Boisot, however, transforms the epistemological dimension into a 2-dimensional space by applying the proposition that cognitive activity employs the two economizing techniques to extract information from data: codifying and abstraction for assimilation (diffusion or sharing). Therefore, following Boisot’s approach, the dynamics of organizational knowledge creation must be expressed in a 3-dimensional space (see Figure 3).

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7 Ibid.
Codification within the I-space

Boisot\(^8\) holds that codification creates perceptual and conceptual categories facilitating the classification of phenomena. Effective codification is taken to be ‘partly a matter of intellectual and observational skill – an ability to discern contour and form in the data of experience’. Critically, the greater the number of distinctive attributes describing a phenomenon, the more complex the act of codification.

Codification seeks to select between competing perceptual and conceptual phenomena, with this act of selection associating complexity with codification. The level of data processing required to complete a task increases with complexity and with the absence of codification conventions.

Un-codified knowledge requires a prohibitive amount of data to describe a phenomenon and is resistant to rational analysis and communication. By contrast, codified knowledge requires only minimal data to describe a phenomenon. Thus development of codification conventions entails moving away from the un-codified end and towards the codified end of the spectrum, ‘from the inarticulate to the articulate, from the complex towards the simple’. Boisot makes the intriguing observation that while the pursuit of efficiency leads to higher levels of codification, the pursuit of effectiveness (or flexibility) exerts pressure in the opposite direction towards un-codified data.

Abstraction within the I-space

Codification is the result of perceptual and conceptual activity. However, perceptual activity is predicated on some conceptual framework and interpretation of what is perceived. Boisot argues that conceptual data is derived from organizing perceptual data into abstract categories.

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Abstraction provides the second dimension to epistemological endeavor and is linked inextricably to codification. Abstraction and codification provides complementary perspectives to phenomena: codification provides form while abstraction offers structure.

Boisot describes abstraction as a form of reductionism where the few represent the many to shape the categories employed to interpret phenomena. Abstract and concrete knowledge define the polarities of the abstraction spectrum. Concrete knowledge is ‘predominantly perceptual and local’, yet rich in causal structures and meaning that may be impenetrable. In contrast, abstract knowledge supports conceptual and remote speculation, but at the cost of shedding richness and meaning.

a) Abstraction and codification within the I-space

- Abstraction and codification provide complementary strategies for managing complexity:
  - Codification facilitates abstraction by enhancing the facility to provide categorical definitions for behavior, structure and connectivity.
  - Abstraction enhances codification by reducing and organizing the number of categories under consideration.

The application of abstraction and codification transforms knowledge into an asset that is at once both expressible and shareable. Boisot draws from Popper (1972) to introduce the qualification that abstraction and codification introduce a ‘hypothetical flavor’ and ‘provisional quality’ to articulated knowledge and is thus always subject to revision.

b) Dissemination within the I-space

Diffusion is the term adopted by Boisot to express the dissemination of knowledge throughout an organization and corresponds to Nonaka and Takeuchi’s ontological dimension. Boisot makes the distinction that diffusion addresses simply the availability of knowledge and not its adoption.

Boisot recognizes that dissemination of knowledge is exposed to the problems identified by Shannon and Weaver (1949) that impact any communication process:

- Technical - is the message received the same as the message sent?
- Semantic - is the message received understood?
- Pragmatic - is the message received acted upon as understood?

Technical issues are involved with transmitting and receiving a message. The second problem is one of semantics: do the sender and receiver share the same abstraction and codification conventions, and are they interpreted and exploited in the same way? The pragmatic concern is whether the sender and receiver share not only the same abstraction and codification conventions, but also common values, attitudes and motivations.

10 Popper, Karl: 1972, Objective Knowledge, Oxford University Press, Oxford
Returning to Nonaka and Takeuchi’s definition of the ontological dimension, it is clear that Boisot’s diffusion spectrum shares the same characteristics; i.e. diffusion of knowledge commences with an individual to transcend progressively through the strata of an organization and beyond to the external environment. The issue therefore is that each stratum provides a new ontology to engage the knowledge asset. Engagement may result in one of the following outcomes, the knowledge asset may be: absorbed, revised or rejected by the new ontology. Diffusion is thus dependent on the availability of knowledge to a given population, and the ontological absorption and exploitation of knowledge within that population.

**Synergizing the Dynamics of Knowledge Processes**

Transferring the concept of chaotic, ordered and complex organizational behavior to the I-space, it is possible to translate the definition of knowledge creation within this framework. The chaotic zone (with maximum entropy where the value of knowledge is at a minimum) is where knowledge is un-codified, concrete and fully diffused. In contrast, the ordered zone (with minimum entropy where the value of knowledge is at a maximum) is where knowledge is codified, abstract and undiffused. The zone of complexity occupies the space between the chaotic and ordered zones.

![Figure 4: Zones of Order, Complexity and Chaos in Boisot’s I-space (1998)](image)

Knowledge asset value is created in the complex zone during the cognitive ascent from chaos to order, and exploited in the descent from order to chaos. A fully realized cyclical knowledge creation trajectory within the I-space is described as follows:

- The trajectory commences within the concrete and un-codified (i.e. chaotic) region of some remote ontology.
- The trajectory descends through the ontological strata to that of an individual and invokes tacit cognitive activity.

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• The tacit cognitive activity yields a knowledge asset which moves through the zone of complexity (the value creation phase) towards the ordered region of abstract and codified enunciation, i.e. some representation of the knowledge asset becomes explicit.

• The knowledge asset now ascends through the ontological strata, with each transition offering the opportunity to exploit the potential value of the knowledge asset and progress to more remote ontological regions.

• At some point, a knowledge asset will encounter its ultimate ontology (beyond which it has no meaning) and descend to the region of chaos where its value is vulnerable to decay.

• A knowledge asset can, of course, continue to endure in interim ontologies and yield value before entropy beckons.

• Eventually, entropy ensures that the value of a knowledge asset will decay in all ontologies.

Figure 5: The knowledge creation cycle in Boisot’s I-Space (1995)13

Entropic influence is far more profound, however, than portrayed in this description. A knowledge creation cycle may be aborted, deflected, reformulated or even accelerated by environmental and ontological influences. Much depends on the commitment required to sustain the cognitive investment fully to create and exploit a knowledge asset. In turn, cognitive commitment is sensitive to conventions adopted to represent knowledge.

5. Dynamic Interactions between Explicit and Tacit Knowledge - Four Types of Knowledge Creation Process

Based on the above models and obtaining insights from the above discussions, we come to the conclusion that: the core processes of knowledge management in government rest on the dynamic interaction between explicit and tacit knowledge. Fortunately, Nonaka and Takeuchi have provided us some basic guidance, with which we proceed to concrete management processes.

According to Nonaka and Takeuchi, much of the value of knowledge is created as it is transformed between one type and other, from tacit to explicit and vice versa, back and forth, in what they describe as an ever evolving knowledge spiral that goes from individual tacit knowledge to organizational-wide knowledge. The two of them have identified four different modes of interaction between tacit and explicit knowledge:

(1) **Socialization.** This is the exchange of experiences whereby personal knowledge is being created in the form of mental models, which involves conversion from tacit knowledge to tacit knowledge. Examples of situations where this happens are master-fellow-relationships, on-the-job-training, trial-and-error-policy, imitating others, constructive brainstorm sessions, practicing and training, the exchanging of ideas and a lot of talking.

(2) **Externalization.** This involves the conversion from tacit knowledge to explicit knowledge where personal or tacit knowledge is made explicit in the form of metaphors, analogies, hypotheses and models, for example in language. One usually finds externalization in the design process when conversations and collective consideration are used to boost this design process. Nonaka and Takeuchi also find externalization is the key process in knowledge conversion because it is here that from tacit knowledge new and explicit designs are born.

(3) **Combination.** This involves conversion from explicit knowledge to explicit knowledge. During this process notions are synthesized into a knowledge system. People exchange knowledge, and this knowledge is combined through documents, meetings, telephone conversations and the exchange of information via media like computer networks. New knowledge can also be created through the restructuring of existing information by sorting, adding, combining and categorizing explicit knowledge. Combination is the kind of knowledge creation which we usually encounter in education and training. Examples of combination are knowledge and information systems.

(4) **Internalization.** This involves the conversion from explicit knowledge to tacit knowledge. This can happen through "learning-by-doing", and documented knowledge can play a helpful role in this process. Internalization can be seen as the scenario of having new (knowledge-) workers to "relive" a project by studying the archives of the project. Internalization can also be seen when experienced managers or technicians give lectures.

These four types of process are also widely known as the SECI Model and can be summarized in the following diagram:
6. Major Thematic Activities of Knowledge Management in Government

Basically derived from the above four processes we identify several major thematic activities of knowledge management in government, which have already been amply testified by practical evidences. They include the following.

6.1 Knowledge Codification

The aim of codification is to put knowledge into a form that makes it accessible to those who need it. It converts knowledge into accessible and applicable formats and literally turns knowledge into a code (though not necessarily a computer code) to make it as organized, explicit, portable, and easy to understand as possible. The common practice of knowledge codification in organizations include the processes to categorize knowledge, describe it, map and model it, simulate it, and embed it in rules and recipes. Each of these approaches has its own specific set of values and limitations, and they can be applied singly or in combination.

Codifying knowledge is an essential step in leveraging its value in the organization. Codification gives "permanence" to knowledge that may otherwise exist only inside an individual's mind. It represents or embeds knowledge in forms that can be shared, stored, combined, and manipulated in a variety of ways. The challenge is to codify knowledge and still leave its distinctive attributes intact, putting in place codification structures that can change as rapidly and flexibly as the knowledge itself.
According to Davenport and Prusak organizations that want to codify knowledge successfully should therefore keep in mind the following four principles:

1. Decide what goals the codified knowledge will serve (for example, governments whose strategic intent involves getting better understanding of the healthcare needs of the citizen may choose to codify medical-related knowledge).

2. Be able to identify knowledge existing in various forms appropriate to reaching those goals.

3. Evaluate knowledge for usefulness and appropriateness for codification.

4. Identify an appropriate medium for codification and distribution.

The first principle deals with the relevance of knowledge to be codified. Since the purpose of codification is to put knowledge in usable form, the government needs some idea of what uses it has in mind. Therefore, relevance is far more important than completeness and codifying all organizational knowledge would be an immense and futile undertaking. (The definition of usefulness should not be too narrow; however.) To be worthwhile, however, a knowledge codification project needs more specific aims than just making knowledge generally available.

The second principle concerns the identification of sources of relevant knowledge. Finding the sources of the knowledge you want to codify is obviously essential. If you don't know where it is, you can't do anything with it and are unlikely to know what it is. Therefore, mapping knowledge sources, will be discussed in detail below, is an important part of the codification process.

Once found, someone must evaluate the knowledge to assess its usefulness and importance to the organization, and to determine what kind of knowledge it is. Structured, explicit knowledge does not become usable simply by being codified. It needs to be evaluated and made accessible to the people who can do something with it in order to benefit the organization. The first thing to do is to evaluate them in order to determine which could be used and which should be abandoned. After that it should be determined is it the rich, tacit, intuitive knowledge of a seasoned expert, or is it rules-based, schematic, explicit knowledge (or something in between). Whether you should do anything with the knowledge depends on its importance; what you should do to it depends on its type. Evaluating codified knowledge and then making it available is an integral part of the entire codification process. This is what to be achieved by the third principle.

The fourth and final principle of identifying the appropriate format of codification is of course also very important and actually a very practical concern due to the fast advancement of ICTs. Obviously the choice of medium as well as the format of knowledge codification will determine the compatibility and cost issue, and thus makes great differences for its usefulness and effectiveness over time.

It should be noted that although new technologies play an important role in knowledge codification and make the prospects for these activities increasingly promising. Developing

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technologies will extend the range of possible applications, but for the foreseeable future codification will continue to be more art than science, the domain of minds rather than machines. As Lofti Zadeh, an early AI pioneer and developer of fuzzy-logic concepts, stated, "No computer can summarize what you tell it." That task, vital to knowledge codification, is still a human one.15

6.2 Transfer of Tacit to Explicit Knowledge: Mapping Knowledge Sources

Obviously the transfer of tacit to explicit knowledge, by its own nature could also be categorized under the knowledge codification process. However, it is not always an easy task to accomplish this kind of transfer. So we are here having this process singled out as one specific knowledge management project for the illustration of its difficulty and importance.

Knowledge in organizations ranges from complex, accumulated expertise that resides in individuals and is partly or largely inexpressible knowledge to much more structured and explicit content-related knowledge. Tacit, complex knowledge, developed and internalized by the knower over a long period of time, is almost impossible to reproduce in a document or database. Such knowledge incorporates so much accrued and embedded learning that it may be impossible to separate from how an individual acts. The knowledge a creative in-house research scientist uses to decide which line of inquiry to follow likewise cannot be turned into a step-by-step list or a report. This means that we simply can't represent some knowledge effectively outside the human mind. In other words, they cannot be effectively codified, at least not through a printed document for the capture of its essence; even if this kind of knowledge could be somehow successfully codified, the process of getting it on paper would be prohibitively laborious. Trying to get down everything a skilled knowledge worker knows would be similarly arduous and futile. But in the meantime organizations cannot just simply give up on mining and utilizing tacit knowledge, because it is just this kind of knowledge that is of great strategic values to organizations. Maybe it is very difficult, if not impossible, to directly transfer tacit knowledge into explicit forms, at least organizations should actively do something to move it along to the more explicit side of the spectrum.

One practical solution to this codification process for the richest tacit knowledge in organizations is generally limited to locating someone with the knowledge, pointing the seeker to it, and encouraging them to interact. The essence of this approach is to connect people who have problems with those who have the solutions. This is based on the understanding that providing access to people with tacit knowledge is more efficient than trying to capture and codify that knowledge electronically or on paper. This is what usually called mapping knowledge sources, which constitutes the major knowledge management activities in government under the umbrella of Knowledge Codification.

A knowledge map is points to knowledge but doesn't contain it. Different from repository it is simply a guide. Developing a knowledge map involves locating important knowledge in the organization and then publishing some sort of list or picture that shows where to find it. Knowledge maps typically point to people but at the same time could also be documents and databases. The principal purpose and clearest benefit of a knowledge map is to show people in the organization where to go when they need expertise rather than spending time tracking down imperfect answers. Members of the organization with a good knowledge map have access to sources with specific

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knowledge to solve the problems which would otherwise be difficult or impossible to find by themselves.

In practice, the information needed to create a knowledge map often already exists in organization, but it's usually in a fragmented and undocumented form. Every member of the organization has a little piece of the map in his/her head, knowing about his/her own expertise and where he/she goes to get certain questions answered. Creating an organizational map is a matter of combining these individual "mini-maps." Organizations that develop knowledge maps often assemble a public map out of many private ones. (There is specific software available for mapping knowledge routes and flows. IBM's network analyzer, Aegis, and Blue Marble are examples.)

It should be noted that the process of assembling knowledge map as to determine who has the most useful knowledge are open to interpretation and is highly subjective. Also if not administrated wisely and strategically, the process of mapping knowledge might result in unintended side effects that will have the consequence of ruining the culture and environment of the whole knowledge management program within organization. Because when knowledge is genuinely important to an organization and those who have it are recognized and rewarded, then the knowledge map, besides being a knowledge locator, might eventually become a picture of status and success. Under certain conditions giving away one's proprietary sources of knowledge in that particular setting might be viewed as giving away power and influence, and thus ultimately hinders the environment that cultivates knowledge sharing. It is important for the management of the organization to assemble the map that is supposed to reflect knowledge, not power.

6.3 Knowledge Repositories

The typical goal of this phase of KM is to take knowledge embodied in documents---memos, reports, presentations, articles, and so forth---and put it into a repository where it can be easily stored and retrieved. A somewhat less structured form of accumulated knowledge is the discussion database, in which participants record their own experiences on an issue and react to others' comments. As one of the "first-step-projects" of KM, the establishment of knowledge repositories can also help reinforce an organization's cultural rituals and routines. Three basic types of knowledge repositories are:

1. External knowledge (example: competitive intelligence)
2. Structured internal knowledge (example: research reports, product-oriented marketing materials and methods)
3. Informal internal knowledge (example: discussion databases full of know-how; sometimes referred to as "lessons learned")

The nature of knowledge repository project is actually very much similar to knowledge codification project. Depends on the size of the organization, or the scale and scope of knowledge to be managed, some organizations might combine the two processes into one while some might still regard them as two different steps. One instance of Knowledge Repositories is "Best Practices". However it should be noted that, as we have mentioned before, the "best practice" approach has its limitations in today's world. Even though the "Best Practice" approach is an essential component of KM as it provides an opportunity to retain and use knowledge even when
the expert leaves the organization. However within a changing business environment, such an approach might lead organizations to the stage where the cycle of doing ‘more of the same’ tends to result in with diminishing marginal returns and be locked-in behavior patterns resulting in an organizational “death spiral”. In effect, what is ‘best’ today may be ‘worst’ tomorrow depending upon the shift in the references that determined its “best-ness”\textsuperscript{16}. The underlying argument is that yesterday’s core capabilities embedded in today’s best practices could become tomorrow’s core rigidities. Therefore, organizations’ “best practices” are required for ongoing reassessment and organizations should constantly scan the environment for emerging patterns that suggest the emergence of something new before the implementation of “Best Practices”.

6.4 Knowledge Access and Transfer

Where knowledge repositories aim at capturing knowledge itself, knowledge access phase focus on the possessors and prospective users of knowledge to provide access to knowledge (tacit and explicit) as well as to facilitate linkages and socialization among members. These types of projects acknowledge that finding the person with the knowledge one needs, and then successfully transferring it from one person to another, can be a daunting process. If the metaphor of a library is useful for conceptualizing knowledge repository projects, then that of a “knowledge Yellow Pages” might best symbolize the purpose of knowledge access projects. Managers involved in knowledge access projects commonly used phrases like, “getting at the knowledge we know we have”, “sharing our knowledge” and so forth, phrases that connote a need for connectivity, access, and transfer. An instance here is “Communities of Practice” (CoP).

6.5 Communities of Practice (CoP) for Knowledge Transfer in Government

Two broad views of the meaning of CoP are found in the literature. The first view sees CoPs as channels in which knowledge sharing takes place through the process of learning: “A group of people who transfer an interest in a domain of human endeavor and engage in a process of collective learning that creates bond between them: a tribe, garage band, a group of engineers working on similar projects.”\textsuperscript{17}

The second view considers CoPs as channels in which knowledge sharing can take place on demand: “Groups of virtual or local members with similar specialization, as opposed to hard networks (network computing) which connects computers through a variety of information technology techniques to ensure distribution of data and information, form soft networks – community of practice – the establishment of a community of practice and collating a number of people who can be called upon when such expertise is required.”\textsuperscript{18}

We find that the two views are complementary. A CoP operating with the underlying principles of the above two views will not only serves its members, but will also serve external members on demand, i.e. on a-need-as basis.


\textsuperscript{17} Wenger, E. (1999), \textit{Communities of Practice: Learning, Meaning, and Identity}. Cambridge.

Three distinguishing characteristics of CoP make them excellent knowledge sharing mechanisms. A CoP operates in a specific domain, it has specific communities to serve and there is adherence to practices. Interest in CoPs lies in the fact that they can organize a society based around issues and functions, foster short and long term value creation, facilitate tacit to explicit knowledge creation, overcome cultural barriers in knowledge sharing and ensure collaboration, as well as handle deficiencies associated with downsizing and limited budgets. Effective practice of Cop often leads to an increased ability to manage organizational knowledge. As a result anyone seeking to increase the level of social capital via CoP must provide related tools that enable the community to identify and maintain contacts with new and existing members, and as well as opportunities to meet.

Perhaps another compelling reason for using CoPs is that tacit knowledge is just what it is, and one simply cannot capture in written form the answers to questions that have not yet been asked. A CoP acts like a kind of gene pool within which lies the ability to evolve future solutions. Through such communities one can also address the issues of trust and motivation essential to ensuring knowledge sharing and continuity of KM.

In implementing knowledge management programs, the U.S. Federal Government gives full play to CoPs. The Social Security Administration (SSA) is perhaps one of the first US non-military federal agencies to have been engaged in CoP. Its CoP – PolicyNet, a groupware pilot project was established in 1995. The objective of PolicyNet was to speed up the agency’s response to changes in legislative laws, so that requests from the public are correctly handled immediately after the laws have been enacted. The complexity of the tasks at SSA are attributed to the fact that policies to implement new laws go into effect immediately after the law is passed, and SSA employees must consult all the material related to the new policies so as to be able to explain them to citizens. PolicyNet serving as a CoP renders the task easy and faster as SSA employees can easily exchange and consult material with each other on a given issue. According to KMAG, PolicyNet now serves 80,000 users at more than 1,000 offices throughout the US, includes more than 130 distinct areas of collaboration and receives thousands of daily visits on its intranet.19

The CIO Council, established in 1996, is another successful CoP for CIOs of the U.S. federal IT community. It has been operating to help deliver standard IT strategies and solutions across all federal agencies. Success in handling the Y2K problem is one of the visible results of this CoP. While the CIO Council CoP is designed for federal top management, federal technologists have an opportunity to collaborate through the KM Learning-Consulting Network.

The U.S. Federal Highway Administration (FHWA) has created a CoP called the FHWA Resource Center Expertise Locator. According to one study20 this CoP has helped several specialists to transfer expertise, thereby saving time and money for the agency, and Battey notes that the FHWA CoP now serves as a prototype for other online knowledge centers21.

The FHWA has also created another CoP, called Re:NEPA after the National Environmental Policy Act (NEPA). This CoP is a virtual network of people who transfer an interest and responsibility in highway-related environmental issues. This CoP attempts to establish an open,

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collaborative environment for developing NEPA guidance, ongoing dialogue and discussion on timely issues supplemented with follow-up to live meetings. A major anticipated benefit is a greater understanding inside and outside FHWA about key NEPA issues.

The most recent community of practice at the U.S. federal level is a set of Special Interest Groups (SIG), formally working on KM for the US government. Each SIG is actually a community of practice. At the moment there are nine such SIGs: CKO Competencies, Communities of Practice, Legislation and Intellectual Property, KM Training, KM.Gov Content and KM Technology, KM Strategies and Best Known Practices, Public Policy, Ethnography, Anthropology and Program Planning and Strategic Support. It is important to note that in the above list, there is a CoP specifically designated to develop methods of building and maintaining CoPs. Given this commitment and thrust of the US government to KM, there is the distinct possibility that the U.S is likely going to become the first government to include knowledge assets in its annual reports in the nearest future.

Based on the 2nd definition of CoPs above, one notes that these CoPs can be very useful for customer support services. In the private sector, these are the usual support groups we know of, but which are often known under various names such as Global Support Groups (GSG), Customer Support Centers (CSC), etc. Providing 24-hour, seven days a week support is mandatory for private sector companies, since they have to compete for customers. However, due to limited budgets and sometimes even the lack of staff with required skills, private sector companies have embarked on knowledge management projects for their support groups in order to meet the expectation of their customers. Even though governments do not in most cases have what we traditionally think of when we think of competitors, citizens are increasingly demanding more and more services from their governments, as the result government organizations should also be prepared for establishing such practices, not only for its own sake but also for the ever increasing demands from the citizens.

6.6 Multiple Channels for Knowledge Transfer

At this point we think it is necessary to point out that multiple channels are utilized in practical situations for knowledge transfer. Successful knowledge managers realize that knowledge is transferred through multiple channels that reinforce each other. Face-to-face setting on a regular basis is equally important and if not more effective for knowledge sharing and creation compared with “Hi-tech” forms. Especially with face-to-face interactions it is easier to establish interpersonal trust; easier to develop structures for knowledge; and with more potential to solve difficult issues. MIT researcher Tom Allen has found in many studies that scientists and engineers exchange knowledge in direct proportion to their level of personal contact. In this day of the Web, Lotus Notes, and systems that cover the world, it is easy to forget the need for a common location. There is still a strong need for what the U.S. Army calls “face time.” Also active collaboration and coordination among different levels of governments and learn from each other’s KM initiatives is critical for the KM practice within government organizations.
6.7 Intellectual Property Issue

As the whole society is gradually realizing and acknowledging the importance and value of knowledge during this new era, the relationship between knowledge sharing and the existing intellectual property protection system is on hot debate these days. On one side, obstacles need to be got rid of for the establishment of a true nation-wide knowledge sharing system that promotes easy access to various knowledge so that the “great good” could be achieved. On the other side, mechanisms and systems also need to be in place to protect individual and private interests according to the values of market economy and capitalism, because corporations that spend large sums on R&D that yield successful knowledge are understandably unlikely to make it freely available to possible users because by holding patents they can charge high prices for the knowledge not only to subsidize the related cost but also to make profits. This creates an economic dilemma: once the knowledge exists, it is costless for the owner to share it and according to the principles of knowledge management, doing this is good for the whole society. But at the same time this definitely will erode a monopoly position that may have been the incentive to create the knowledge in the first place. If the knower are forced to share their knowledge then no more incentives will exist for future knowledge creation, and as the result, this ideal knowledge creation-sharing loop will cease to exist. Although someone may argue even with the existence of patents and intellectual property rights, still it is very hard if not entirely impossible to actually block third parties to get access to this kind of “protected” knowledge. At least one thing is clear, some of the used-to-be-fitted “pre-knowledge-era” mechanisms and systems were designed solely according to the profit-seeking spirits and have actually increased costs for knowledge access, and is therefore not ideal for the guiding philosophy of this new knowledge era. Then to what extent does current regulation stifle knowledge sharing and protect vested interests? Do the intellectual rights and patent laws need harmonisation? Are they appropriate for today’s economy? All these are needed to be put into consideration by government and policy makers.

6.8 Knowledge-Sharing in Government

Knowledge abounds in government, but its existence does not guarantee its use. Therefore, we need to come down to finding effective ways to let people talk and listen to each other, hence to realize knowledge-sharing in governments.

Like knowledge repository (codification), knowledge-sharing processes vary in their technological orientation. For example, some organizations build and manage expert networks (or, to use maps of knowledge sources). Others may provide technical expert referral service by maintaining a comprehensive database of external technical experts, or other types of communities of practice. Generally speaking, knowledge-sharing in government settings can be of two types: the formal or quasi-formal, structured channels, and the more informal channels of face-to-face communication.

Formal and structured mechanisms of knowledge-sharing in government can take multiple formats. Knowledge map, which we discussed in the above, can be one of the channels. However, the more commonly used formal and structured mechanism of knowledge-sharing in government is through communities of practice (CoP), which we elaborated under the title of knowledge access.
and transfer. In this section we concentrate on spontaneous, unstructured knowledge-sharing for tacit knowledge.

Tacit and ambiguous knowledge is especially hard to share from the resource that creates it to other parts of the organization. For this reason, we strongly advocate tacit knowledge-sharing through face-to-face meetings and through narratives in addition to more structured forms. In his article "What's So New About the New Economy?" Alan Webber says, "In the new economy, conversations are the most important form of work. Conversations are the way knowledge workers discover what they know, share it with their colleagues, and in the process create new knowledge for the organization."22

This specifies that tacit knowledge-sharing generally requires extensive personal contact. The "share relationship" may be a partnership, mentoring, or an apprenticeship, with the more experienced senior person passing along his/her knowledge of the job to the next generation, but some kind of working relationship is usually essential. Such relationships are likely to involve sharing various kinds of knowledge, from explicit to tacit. Not all of the learning communicated will be complex and intuitive, but it is the tacit knowledge that we cannot readily share in any other way. For this reason, organizations committed to sharing tacit knowledge often set up formal mentoring programs and make passing on knowledge to young employees an explicit part of the job descriptions of skilled senior staff.

One of the formats of mentoring program is brainstorming meetings or workshops, which is most effective for solving knowledge problems of cross-functional teams. A special challenge that the cross-functional team is confronted with is the fact that most of the knowledge the team members have to use to find a solution to the problem is tacit knowledge. As we have pointed out again and again, tacit knowledge is knowledge embedded in a person's experience and is therefore difficult to articulate. The mental models the team members use to gain an understanding of a problem are an example of this tacit knowledge. According to Johnson-Laird23, mental models are cognitive working models of the world that people use to perceive the world around them and make inferences about the future. It is one of the prerequisites for finding a common solution to explicating these mental models and share them with the other team members.

In an attempt to explicate tacit knowledge in a brainstorming session, team members at first usually come up with "information fragments" (e.g. Cox and Greenberg 2000). These fragments are single ideas about the solution to the problem, mostly unstructured and on different levels of abstraction. Team members might use different implicit ways to group the fragments because they use different mental models. Also the fragments themselves might convey only little meaning to the other team members as they might miss nuances and meanings implied by them.

The information fragments generated by the team, especially in the first of the brainstorming sessions, might be items that people would want to include in the questionnaire ("How much does your company spend on corporate training in total?") or research questions or hypotheses they want to

test with the survey (“For which kind of training do people see the largest benefit of eLearning?”). The team starts collecting large amounts of these kinds of fragments without putting them into a coherent structure.

On the basis of the above sharing process, the team may reach the point of integrating already existing information into a new process, which could be mind maps brought into the meeting by participants, other already existing questionnaires or theoretical process models of how to approach a problem. These can give team members a first understanding of the possible overall structure of the solution they are trying to achieve (integrating other sources). Of course, such structured information usually provides only a partial model of the current problem that needs to be adjusted partially or even altered completely to be of use (adjusting models). In this way, organizational knowledge is shared and intellectual assets is exploited, which is of course the major objective of knowledge management in government.

7. Inter-Link between Front- and Back-Office and How Government Agencies Can Improve their e-Services (Front Office) by Improving their e/m-Knowledge System (Back Office)

It has long been criticized that there is a huge gap between the front- and back- offices within government operations, that is, government services were deemed as unsatisfactory because complains and suggestions made by the public through front-office channels were not necessarily reflected in the policies formulated by the back-office. Sometimes even government employees from the front-office would feel confused about the rules made through the back-office, which inevitably led them to make mistakes during normal government businesses when they were dealing with customers. Generally speaking, front-office functions are directly customer-facing and therefore require an understanding of customers and their needs, and be familiar with all related rules and regulations. Back-office functions are focused on the management and tracking of data collected from the front-office and are typically policy- and rules-oriented. The limits of traditional bureaucracy of government organizations and the lacking of formal and systematic mechanisms facilitating active interactions between these two “parts” of government organizations used to be the main factors that led to this kind of gap. However, we believe, with the implementation of knowledge management this gap will gradually diminish as the inter-link between front- and back-office will be greatly improved; also the quality of government services (front-office) will be improved by the integration of knowledge management systems as the result of the initiation of KM projects (back-office).

As we have mentioned before the current proliferation of e-government projects and applications among all different levels of governments have laid a very solid foundation for the implementation of knowledge management, and can actually be seen as one of the “first steps” of KM in government. As e-government has become the standard for government operations, also with the help of state-of-art ICTs, front-office in government are able to collect and store much more detailed and specifically customer-related information. Apparently this kind of information is very important to government organizations, and as the matter of fact, for all KM projects within government organizations it will become a large part of its KM initiatives for the analysis and attempt of transformation into knowledge for the purpose of better decision-making and policy formulation. However in order to realize this purpose, the back-office would have to rely on close
collaboration of the front-office and seek their “first-line” experiences. Also for all successful KM programs it will eventually establish formal and systematic mechanisms such as Community of Practice (CoP) to encourage interpersonal connection and knowledge sharing. All these will increase the inter-link between front- and back-offices within government organizations and consequently establish a better knowledge system. At the same time, the establishment of a better knowledge system would in turn naturally improve the quality of government services. We believe, the gap between the front- and back-office will eventually diminish with the progress of fully implementation of KM in government organizations although the main functions of these two parts would still remain different and their distinctions are becoming blurred.

7.1 Use of Technology for Knowledge Share in Government

The infrastructure of tacit knowledge-sharing can also include (but should not be limited to) electronic technology. For instance, the setting up of an Internal Information Interview Network, a database that lists employees who are willing to meet with colleagues and share information, is just one way in point. This network can be regarded as a specialized kind of knowledge map. Knowledge maps are clearly part of the knowledge-sharing infrastructure, a mechanism for linking the people with knowledge to the people who need it.

Another use of technology to share tacit knowledge can be seen in the efforts of several organizations to record the stories and experience of its senior practitioners on video or CD-ROM before they leave the company. As a general rule, though, the richer the tacit knowledge is, the more technology should be used to enable people to share that knowledge directly. It's not a good idea to try to contain or represent the knowledge itself using technology: (Explicit knowledge can be more successfully stored in some sort of technological repository; such as Lotus Notes or some more highly structured database.) Extensive knowledge-sharing could not happen without the tools provided by information and communication technology, but the values, norms, and behaviors that make up an organization’s culture are the principal determinants of how successfully important knowledge is shared.

The lesson here is that knowledge-sharing methods should suit the organizational (and national) culture. We should recognize the value of both face-to-face and electronic contacts and provide opportunities for both. Above all, we need to broaden our definition of “productivity” to include what may be very productive casual conversations, periods of reflection, and learning.