

# The Global Knowledge Management Framework: Towards a Theory for Knowledge Management in Globally Distributed Settings

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## Abstract

Our paper introduces the Global Knowledge Management Framework (GKMF) which describes components and influence factors of knowledge management in globally distributed settings. The framework identifies the key aspects when designing knowledge management processes and systems and can be used for two main purposes. On the one hand, it guides development processes by providing a solution space and success factors for decision makers as well as implementers. On the other hand, it is a reference for researchers to compare research in the field by providing a common set of context descriptions as well as aspects influencing the success of knowledge management solutions. We illustrate the application of our framework first within two scenarios and describe its first evaluation as a proof-of-concept in an educational setting. By that, we give insights into further research and development of the framework trying to stimulate discussion and initiating a broad initiative working towards global knowledge management.

Keywords: Global Knowledge Management, Internationalization, Global Knowledge Management Framework, Knowledge Management Processes, Culture, Knowledge Management Theory, Process Management

## 1 Introduction

In this paper, we introduce the Global Knowledge Management Framework (GKMF) which is a model to structure and compare influence factors on knowledge management (KM) in global settings. It serves as a guideline for researchers and practitioners to design, compare, and validate knowledge management systems based on a thorough analysis of current research of influence factors for successful KM around the globe. The framework describes components of global knowledge management settings and identifies the key relations and success factors. It is the first step towards a holistic theory in the domain.

Knowledge management becomes more and more important in global settings (cf. Desouza & Evaristo, 2003, Holden, 2002). The influence of aspects like geographical dispersion, communication across time zones as well as cultural influence factors has become a focus issue in research for the past decade. A variety of topics has come up in the field to understand global knowledge management, focusing on foundational issues, KM implementation and adoption processes as well as specific issues in these processes, such as supporting single tasks or using certain interventions (cf. Alavi & Leidner, 2001). However, recent studies show that still a lot of KM projects fail (cf. Coakes et al, 2010) and not all influence factors are clearly understood. This is in particular the case for global settings in which the context plays a major role such as cultural (Holden, 2001, Pauleen, 2006), political, legal, or infrastructural aspects (Richter & Pawlowski, 2007).

It is necessary to map current research to corresponding context information in order to make project and research results comparable and validate transferability across different contexts and cultures. In particular, the context of research projects as well as implementation and adoption processes should be captured in a clear way. By making KM project results comparable and mapping results and context, we will achieve a better understanding of what works in which organizational or cultural context.

Frameworks define the relevant objects and their coherences as well as providing a scaffold for aspects that have to be considered during the design and implementation process. By that, frameworks are a proper solution to map the different contextual aspects, influence factors as well as results. We understand our framework as a conceptual model on the way to a holistic theory of global knowledge management identifying influence factors and interdependencies.

In the following, we derive such a framework for global knowledge management research and practice. We start with conceptual foundations and methodological considerations. We then introduce our Global Knowledge Management Framework (GKMF) and its application within a case study serving as a proof-of-concept. We conclude with recommendations for future research in the field of global knowledge management.

## 2 Related Work

Frameworks describe concepts, aspects, such as processes or systems as well as their relations of a certain domain or problem to create a better understanding or to support specific purposes. Often, the concepts of reference models or architectures are used in a similar way. Reference models serve as conceptual models and – with a more practical orientation – blueprints for IS design (Fettke & Loos, 2003b) identifying the main components of design tasks for certain domains. As there is no clear definition of frameworks, the focus of frameworks and reference models might overlap and needs to be made explicit. In many domains such as software development, frameworks are used to understand the relation between components (such as program modules) and to structure and guide through a problem domain.

We understand the framework as a step towards building a theory for global knowledge management understanding for example cultural and contextual influence factors which has not been achieved yet. The global knowledge management framework aims at describing and relating main components influencing KM design and adoption.

### **Frameworks and Models for Knowledge Management**

In the domain of knowledge management, frameworks and corresponding approaches (architectures, models, reference models) are widely used to describe components, design aspects or technical architectures and their interdependencies (cf. Hahn & Subramani, 2000, CEN, 2004, Heisig, 2009). In many cases, KM frameworks are created to achieve a common understanding the domain (Bhagat et al, 2002, CEN, 2004, Maier, 2007), to structure approaches and practices (Grover & Davenport, 2001) and to identify research gaps (Alavi & Leidner, 2001, Grover & Davenport, 2001).

Heisig (2009) analyzed around 160 frameworks to identify the success factors and most important components. The following aspects are identified as critical success factors: 1.) human-oriented factors (culture, people, leadership), 2.) organization (processes and structures), 3.) technology (infrastructure and applications) and 4.) management (strategy, goals and measurement) (Heisig, 2009 – see below). Within this paper, we identify some of the key aspects for KM research and development. From a globalization perspective, our analysis shows the importance of aspects which are affected when working in globally distributed settings such as cultural influences.

Surprisingly, most of those frameworks do not cover global aspects – typical aspects which need to be taken into account on top of intra-organizational domestic KM projects are for example: inter-organizational processes and collaboration, communication processes, work in distributed teams, as well as additional barriers, new type of tools or instruments, or which knowledge to share in different organizational models (cf. Holden, 2002, Desouza & Evaristo, 2003, Prikładnicki, Audy, Evaristo, 2003). Thus as a first step, it is necessary to analyze which current models can be used as a basis building a framework for global purposes. Within this paper, we analyze two frameworks as an example to illustrate the structure and usage of frameworks.

One of the main frameworks currently used in practice is the framework by CEN (2004) created in the European standardization community. It provides a common terminology and frame of reference for organizations involved in knowledge management (Figure 1).

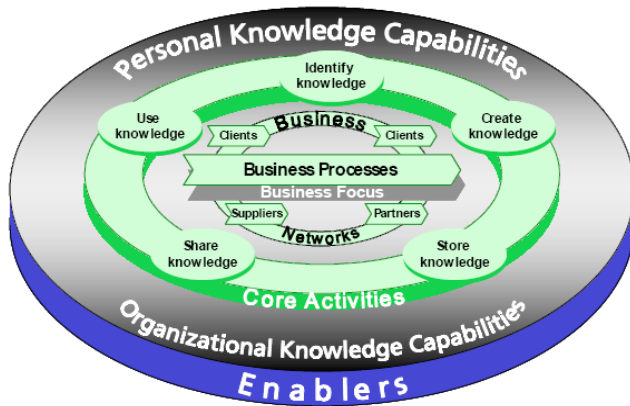


Figure 1: Knowledge Management Framework (CEN, 2004)

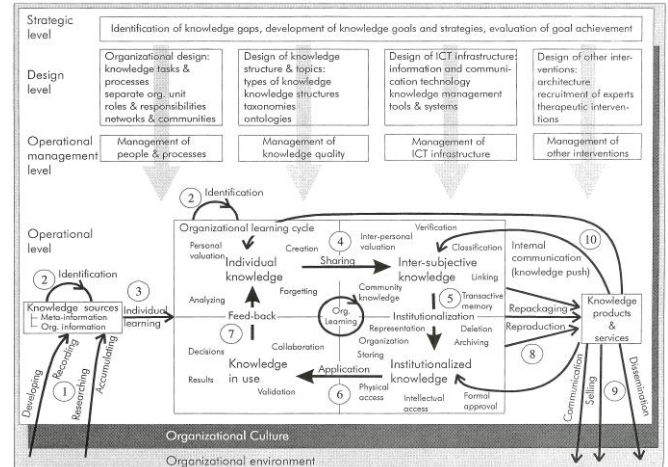


Figure 2: Knowledge Management Architecture (Maier, 2007)

The CEN framework shows a clear process orientation, aiming at describing core business processes as well as knowledge-related processes. It extends those processes by enablers: knowledge capabilities on an organizational (e.g., vision, strategy) and individual level (such as skills, competences, methods, tools). This framework has created a common terminology and structure as well as guidelines around those. However, it does not cover the main aspects of globally distributed KM but provides extension options, such as extending processes or adding enablers and additional components. It also does not incorporate the research perspectives (e.g., aspects studied or models validated). However, due to its relevance to practice, it is a good candidate to be used as a basis for a global framework.

As second framework, we consider the KM architecture by Maier (2007). This framework is organized on different levels (strategic, design, organizational) and by knowledge types which are connected by generic knowledge activities. The architecture identifies key aspects of knowledge management as well as potential tools and methods around those (e.g., ontologies, technical architectures, or roles). It is based on clear, research-based classifications and categorizations and identifies influence factors and solutions for different purposes. Thus, it is applicable for structuring both research and practice approaches. However, the framework also needs to be extended regarding the specifics of globally distributed KM activities.

The illustrated frameworks as well as most of the current frameworks (Heisig, 2009) do not – and do not intend to – cover global aspects. Thus, it is necessary to identify how global knowledge management is different from domestic, intra-organizational knowledge management. Our brief analysis has shown that suitable, extensible frameworks exist but they need to be extended regarding global processes.

### Global Knowledge Management

As global knowledge management we understand KM activities performed in globally distributed intra- or inter-organizational settings. In such settings, KM design, acceptance and deployment are influenced by a variety of additional aspects, in particular cultural aspects (both organizational and ethnic regional / national culture) (DeLong & Fahey, 2000, Holden, 2002, Alavi & Leidner, 2001). We have analyzed culture models and practices regarding KM-related aspects and specific characteristics.

Knowledge management in a broad sense is a critical aspect of globally distributed work processes (cf. Holden, 2001, Holden, 2002). However, there are certain specific questions which extend domestic intra-organizational processes. These need to cover processes as well as strategies between distributed organizations. They need to take global knowledge exchange and distribution into account. This leads to a variety of additional influence factors, barriers and challenges in global settings (cf. Holden, 2002, Desouza & Evaristo, 2003, Prikladnicki, Audy, Evaristo, 2003, Sangwan et al., 2003) – examples for this are culture-specific factors, communication factors, additional individual and organizational competences as well as further requirements towards (internationally usable) tools.

Following Heisig's (2009) analysis structure regarding KM success, it is clear that a global environment brings up new challenges:

- Human-oriented factors (culture, people, and leadership): Human work as well as collaboration and communication behavior is based on culture (both organizational and ethnic such as regional / national culture). Thus, typical KM activities like knowledge sharing are strongly influenced.
- Organization (processes and structures): Organizational processes also differ depending on organizational and geographic culture. Obviously, it is necessary to coordinate KM processes in distributed organizations and between organizations with different organizational and ethnic culture.
- Technology (infrastructure and applications): Technology infrastructures also differ in different countries. The acceptance of applications is also dependent on preferences (e.g., how technologies are accepted, which social networks are preferred in a country)
- Management (strategy, goals and measurement): Management practices differ also depending on ethnic and organizational culture. Thus, it is necessary to align KM strategies as well as corresponding management processes.

Our brief introduction of global challenges shows that cultural influences change the requirements and practices of KM in globally distributed settings. Hence, it is the challenge of a new (globally oriented) framework to capture these key influence factors and relate them to the main components of KM projects.

### 3 Global Knowledge Management Framework

In the following, we describe the Global Knowledge Management Framework (GKMF) providing a reference for structuring research and practice projects as well as guiding adopters through implementation and deployment process. The main objective of the framework is to identify global aspects of KM projects and interdependencies between the components. As a conceptual model, it is a first step towards a theory of global knowledge management.

#### Methodology

KM is highly dependent on the context and cannot be validated separated from practical implementations. It is one of the main objectives of KM research to construct solutions which achieve practical impact and benefits as the main goal. Therefore, our framework is built as a design science research approach (Hevner et al., 2004) – based on a thorough literature analysis of frameworks and global influence factors, we have identified gaps and extension needs to create this new artifact. The framework is initially validated in a first case study (Yin, 2003) in an educational setting as proof-of-concept. By this, we aim at progressing from a conceptual framework towards theory building for knowledge management settings.

#### Framework Construction

The main goal of our GKMF is to identify and relate global influence factors for distributed knowledge management projects in global settings. It aims at providing a base for research (as an analysis tool) and practice (as a guideline for development).

We base our development on a combination of frameworks (Bhagat et al., 2000, CEN, 2004, Maier, 2007, Heisig, 2009) and an analysis of influence factors, barriers and challenges in global settings (cf. Holden, 2002, Desouza & Evaristo, 2003, Prikladnicki, Audy, Evaristo, 2003, Sangwan et al., 2003).

In a first step, we have identified commonalities of the diverse frameworks (strategies, processes, knowledge resources, tools) and harmonized the different terminologies. As a second step, extensions were derived and mapped to the initial components of the framework. The components were continuously revised during the literature analysis.

Another issue is the representation of the framework. Many models remain conceptual and do not provide a detailed description of the components. Thus, we have developed a description format which contains descriptive attributes (e.g., to describe cultural aspects). This information model can be used to specify instantiations of the components. As an example, we represent assessment aspects for KM – the attributes in our model can thus be used to create concrete assessments to validate KM projects.

A particular focus is the identification of relations and inter-dependencies between the components – this is in particular important for understanding the mechanisms and impact (e.g., which intervention has positive impact on which metrics for which process?). This distinguishes our framework clearly from other frameworks which just specify components.

The complete framework consists of the following components (Figure 3):

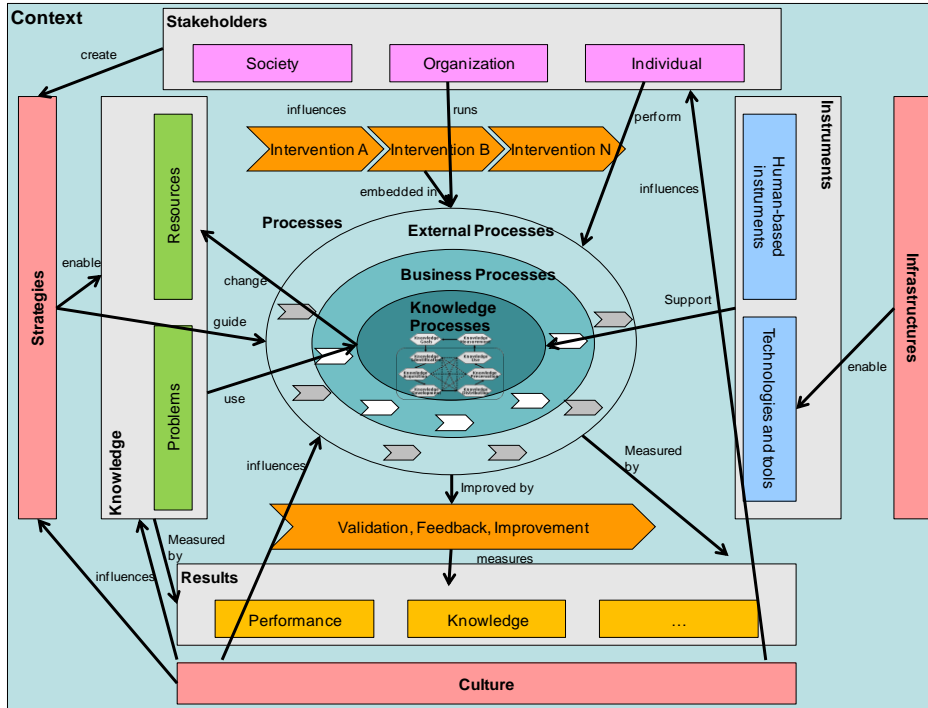


Figure 3: Global Knowledge Management Framework

In the following, we describe the components in detail – we focus not solely on identifying those components but provide potential instantiations as well as main relations. As an example, potential instruments are listed as design alternatives. By this, the framework also creates a solution space for global knowledge management design.

It should be noted that the following description of the components is linear due to readability – the framework itself is a networked model (Figure 3) with many interconnections and relationships between the components. These are described in the textual illustration.

### Processes

The core of the framework is described by **processes** on three levels. *Business processes* denote the core processes of an organization such as teaching for educational organizations or software development and deployment for software businesses. It is not possible to provide a generic process scheme for all domain – thus, we propose an abstract generic scheme such as ebXML (UN/CEFACT & OASIS, 2001) and extend this by domain specific processes (cf. Fettke & Loos, 2003b). The core business processes are supported by embedded *knowledge processes* which enable knowledge management within and outside the organization, e.g., knowledge identification, knowledge sharing or knowledge distribution (Probst, Raub, Romhardt, 1999). In the global context, those processes (e.g., negotiations, cooperation agreement, or coordination of distributed development) are highly related to external processes with stakeholders who are distributed across the globe. These processes are accompanied by interventions and supporting processes (e.g., awareness building or change processes) which are accompanying processes to improve knowledge management as well as validation processes measuring the success of the interventions (cf. Maier and Remus, 2003). The following table summarizes the main aspects of the process component: For each process class, we have also identified possible solutions (e.g., business processes can be specified using ebXML as a template).

Table 1: Process categories

Process	Description	Sample Values / Attributes	Source / References
Business Process	Core business processes of an organization	<ul style="list-style-type: none"> <li>• Procurement</li> <li>• Human resources</li> <li>• Transportation</li> <li>• Manufacturing</li> <li>• Marketing &amp; sales</li> <li>• Customer service</li> <li>• Domain specific process,</li> </ul>	UN / CEFACT & OASIS (2001), Fettke & Loos (2003b), ISO/IEC (2005)

		e.g., healthcare, education	
Knowledge Processes	Knowledge related activities of the organization	<ul style="list-style-type: none"> <li>• Knowledge identification</li> <li>• Knowledge acquisition</li> <li>• Knowledge development</li> <li>• Knowledge distribution/sharing</li> <li>• Knowledge preservation</li> <li>• Knowledge use</li> </ul>	Probst, Raub, Romhardt (1999) CEN (2004) Maier (2007) Heisig (2009)
External Processes	Processes with external stakeholders (cooperation partners, strategic alliances, customers, offshore partners)	<ul style="list-style-type: none"> <li>• Cooperation establishment</li> <li>• Awareness building</li> <li>• Negotiation</li> <li>• Cooperation agreement</li> <li>• Culture exchange</li> </ul>	Pirkkalainen et al., 2010

The above process specifications show sample processes which can be addressed and which might be modeled – based on those process specifications, it is necessary to identify which processes are required in a specific setting and how those processes are embedded (Remus & Schub, 2003). The embedding is one of the critical success factors: it is highly necessary to have knowledge processes as an integral part of core business as well as external processes. Furthermore, new interventions need to be embedded seamlessly as well. The process design has a main impact on acceptance, performance as well as speed and quality of knowledge creation.

### Stakeholders and context

The categories *stakeholders* and *context* are discussed in one paragraph as there are several overlaps. The organizational background is – in some research works – seen as context, in other works the organizational aspects are designed and changed (e.g., organizational culture). In particular, barriers are overlapping. In our context, some barriers are caused by the cultural background but are observed when studying individuals. Thus, it is useful to combine those categories.

The category *stakeholders* describes characteristics of participating stakeholders. This can be related to individuals (e.g., preferences, interests), organizations or societies. The stakeholder category is in most research works an important factor. In many cases it is seen as a constraint as research investigations are done for certain target groups or types of organizations. Whereas these characteristics are mostly part of the context, other aspects are subject to research analyses, in particular barriers (individual as well as organizational).

The sub-category *context* describes the context or environment in which knowledge management takes place. In most cases, it relates to organizations (organizational culture, strategies, cf. Desouza & Evaristo, 2003) or society (ethnic culture, technological infrastructures, policies, see Richter & Pawlowski, 2008). A focus in this category is the analysis of cultural aspects influencing communication, collaboration and coordination of knowledge processes (DeLong & Fahey, 2000, Pauleen, 2006).

The following table summarizes our findings regarding the categories of contents and stakeholders.

**Table 2: Stakeholder and context categories**

Category	Description	Sample Values / Attributes	Source / References
Individual: Personal Characteristics	Description of individuals' characteristics	<ul style="list-style-type: none"> <li>• Demographic data (name, age, gender, ...)</li> <li>• Qualifications</li> <li>• Competences (Skills, Knowledge, Attitudes)</li> <li>• Globalization competences</li> <li>• Educational preferences</li> <li>• Media and application preferences</li> <li>• Cultural experiences, offshore assignments</li> </ul>	Maier & Thalmann (2010), Pawlowski et al. (2010) Stewart (1998)
Individual: Barriers	Potential barriers towards knowledge management utilization	<ul style="list-style-type: none"> <li>• Lack of time</li> <li>• Fear about job security;</li> <li>• Lack of awareness for KM</li> <li>• Use of strong hierarchy, position-based status</li> <li>• Lack of time and interaction</li> <li>• Poor verbal/written communication and interpersonal skills;</li> <li>• Age, gender, cultural differences;</li> <li>• Lack of networking skills</li> <li>• Lack of trust</li> </ul>	Riege (2006), CEN (2004) Maier (2007). Argyris (1990) Bick (2004), Fahey & Prusak (1998) Lugger & Kraus (2001) Szulanski (1996), Holsapple & Joshi (2000)
Context: Organizational	Description of organization characteristics	<ul style="list-style-type: none"> <li>• Name</li> <li>• Size</li> </ul>	Desouza & Evaristo (2003), Earl (2001)

Characteristics		<ul style="list-style-type: none"> <li>Type (private, government, NGO, ...)</li> <li>Sector (healthcare, automotive, ...)</li> <li>Vision &amp; Strategy for KM</li> <li>Core organizational capabilities</li> </ul>	
Context: Organizational Barriers	Potential organizational barriers towards knowledge management utilization	<ul style="list-style-type: none"> <li>Lack of leadership and managerial direction</li> <li>Shortage of formal and informal spaces to share, reflect and generate (new) knowledge;</li> <li>Lack of a transparent rewards and recognition</li> <li>Insufficient corporate culture</li> <li>Shortage of appropriate infrastructure supporting sharing practices</li> <li>Deficiency of company resources</li> <li>Communication and knowledge flows are restricted</li> <li>Physical work environment and layout of work areas</li> <li>Internal competitiveness within business units,</li> </ul>	<p>McDermott &amp; O'Dell (2001), Riege (2006), CEN (2004) Maier (2007). Argyris (1990) Bick (2004), March &amp; Olsen (1976) Fahey &amp; Prusak (1998)</p>
Context: Cultural Characteristics	Description of cultural characteristics	<ul style="list-style-type: none"> <li>Power Distance, Uncertainty avoidance, individualism/collectivism, ...</li> <li>Value of errors and failures</li> <li>Roles of knowledge experts</li> <li>Value / direction of knowledge sharing</li> <li>Understanding of contextual knowledge</li> <li>Understanding of common knowledge</li> <li>Ways of decision making and negotiation</li> </ul>	<p>Richter &amp; Pawlowski (2008) Bick &amp; Pawlowski (2009)</p>
Context: Cultural Barriers	Potential cultural barriers towards knowledge management utilization	<ul style="list-style-type: none"> <li>Inability of communication and collaboration</li> <li>Fear / insecurity</li> <li>Lack of awareness and sensitivity</li> <li>Lack of integration skill / will</li> <li>Language issues</li> <li>Fear of imitation</li> </ul>	<p>Desouza &amp; Evaoristo (2003), Holden (2002), McDermott &amp; O'Dell (2001), Kalkan (2008), Pauleen (2006)</p>
Context: Infrastructure Characteristics	Description of infrastructure	<ul style="list-style-type: none"> <li>National ICT policies</li> <li>Strategies</li> <li>Communication networks. network availability</li> <li>Security / privacy regulations and perception</li> <li>National initiatives (libraries, services)</li> <li>Technology / media acceptance</li> </ul>	<p>Gibbs et al. (2002) Richter &amp; Pawlowski (2008) Bick &amp; Pawlowski (2009)</p>
Context: Success factors	Success factors for KM in organizations	<ul style="list-style-type: none"> <li>Integrated Technical Infrastructure</li> <li>Knowledge Strategy that identifies users, sources, processes, storage strategy, knowledge</li> <li>Clear knowledge structure</li> <li>Motivation and Commitment</li> <li>Organizational culture supporting sharing and use of knowledge</li> <li>Senior Management support including allocation of resources, leadership, and providing training</li> <li>Measures are established to assess the impacts</li> <li>Clear goal and purpose for the KMS</li> <li>Search, retrieval, and visualization functions</li> <li>Work processes incorporate knowledge capture and use</li> <li>Learning Organization</li> <li>Security/protection of knowledge</li> </ul>	<p>Maier (2007), Bick (2004), Fahey &amp; Prusak (1998) Davenport &amp; Prusak (1998) Lehner &amp; Haas (2010)</p>

The table above shows samples for the context and stakeholder view. In contrast to domestic intra-organizational knowledge management frameworks, these categories contain the main extensions and particularities for global settings: cultural aspects, contextual influence factors and corresponding barriers.

The components have a strong impact on further framework components – as an example, it is clearly necessary to include dedicated awareness building and training processes into the knowledge processes to facilitate cultural understanding. Cultural factors also influence how and which knowledge is shared. This can be expressed by metrics such as the amount of knowledge elements shared or the communication intensity between stakeholders.

## Knowledge

This component describes and characterizes knowledge aspects and elements which are shared or required in the organization. This category contains for example problems to which knowledge is applied as well as resources representing codification of knowledge.

**Table 3: Knowledge categories**

Category	Description	Sample Values / Attributes	Source / References
Knowledge element	Description of knowledge areas of an organization	<ul style="list-style-type: none"> <li>• Subject area</li> <li>• Type</li> <li>• Representation / codification</li> <li>• Culture specifics (common, contextualized, ...)</li> </ul>	Thalmann (2011), Pirkkalainen et al. (2010)
Knowledge type	What kind of knowledge	<ul style="list-style-type: none"> <li>• Knowing that / knowing how</li> <li>• Tacit / implicit / explicit</li> <li>• Knowledge as object / knowledge as process</li> <li>• Importance (routine, important, critical)</li> <li>• Complexity (simple, expert, specialized)</li> <li>• Group (team, organization, strategic partners, ...)</li> </ul>	Ryle (1949), Polanyi (1966) Nonaka & Takeuchi (1995) Hansen et al (1999)
Problem	Problems to which knowledge is applied	<ul style="list-style-type: none"> <li>• Problem description</li> <li>• Context</li> <li>• Related knowledge, competences, actors</li> </ul>	Kalz et al. (2010)

This category describes the core of knowledge management systems – it shows only one perspective on knowledge with the assumption that knowledge is intended for problem solutions. However, it needs to cover both, human- as well as technology-oriented knowledge aspects (i.e. attached to actors or represented in a codified form). One main influence is the question which and how knowledge is made explicit: In highly contextualized cultures, less knowledge is made explicit. Also common knowledge is perceived differently. Thus, a strong relation to cultural aspects exists. Furthermore, interventions need to be tailored to the types of knowledge shared and problems addressed. As an example, highly complex knowledge innovations can only be achieved using certain interventions such as focused think-tanks, open spaces or using creativity tools.

## Instruments and interventions

Instruments describe methods and activities to realize the knowledge processes. The main categories (Maier, 2007) are human-oriented instruments (e.g., job rotation or knowledge fairs) and technological instrument (e.g. knowledge bases or communication tools). These interventions need to be embedded in the above described process areas (Maier and Remus, 2003). The following table shows a (small) subset of potential interventions and instruments.

**Table 4: Instrument categories**

Category	Description	Sample Values / Attributes	Source / References
Human-based instruments	Description of the instrument	<ul style="list-style-type: none"> <li>• Mentoring</li> <li>• Open Space</li> <li>• Job Rotation, Job Enlargement</li> <li>• Career Planning</li> <li>• Team Development</li> <li>• Simulation Games</li> <li>• Future Search Conference</li> </ul>	Maier (2007), CEN (2004), Bick (2004)
Technology-based instruments	Problems to which knowledge is applied	<ul style="list-style-type: none"> <li>• Document / Content Management</li> <li>• Micro-Blogging</li> <li>• Search, Browse, White Pages</li> <li>• Data Mining</li> <li>• Videoconference, Messaging</li> <li>• Mash Ups</li> <li>• News-Channel / News-Feed</li> <li>• Application Sharing</li> <li>• Social Networks</li> </ul>	Maier (2007), CEN (2004), Bick (2004), Mentzas et al. (2002)

The list of instruments is of course a small set of options as this is a main research field of constructive research in information systems, human resource management (HRM) and related areas. However, a focus is the usage and validation of instruments to address certain barriers.



## Results

Results describe the key outcomes of the knowledge processes using some form of assessment and metrics (Bose, 2004). Obviously, there are many approaches to assessing and validating the success of KM activities (cf. Grossmann, 2005). The assessment can incorporate a variety of aspects: from a project management perspective, the project success needs to be validated. From a knowledge perspective, it is important to assess newly generated or utilized knowledge as well as measurements of the knowledge and its impact (Shin, 2004). Measuring knowledge management success can be in principal done on a general level (e.g. using the Information System Success Model, Kulkarni et al, 2006, Jennex and Olfman, 2005, 2006, Lindsey, 2002) or for specific components such as organizational capabilities (Gold et al., 2006), performance (Massey, 2002, Lee et al, 2005) or knowledge / competence development. A starting point for comprehensive metrics are the reviews by Bose (2004) and Kankanhalli & Tan (2005) which identify comprehensive categories and aspects of metrics on an organizational level.

However, the measurement of global aspects is in many cases only addressed indirectly. We have thus derived initial assessment factors through barriers and success factors (e.g., measuring communication intensity as a metric for addressing the potential loss of communication richness or needed interventions / escalations to avoid project failure).

**Table 5: Result categories**

Category	Description	Sample Values / Attributes	Source / References
Knowledge	Measurement of knowledge and core processes	<ul style="list-style-type: none"> <li>• Acceptance of knowledge management systems (KMS)</li> <li>• Usability / usefulness of KMS</li> <li>• Knowledge assets (number, usefulness, complexity, ...)</li> <li>• Knowledge sharing (number of knowledge elements, motivation, know)</li> <li>• Knowledge utilization (usage of knowledge elements, number of users per element, perceived usefulness, ...)</li> </ul>	Kankanhalli (2005), Lee (2005) Maier (2007)
KM Project success	Success of specific KM projects	<ul style="list-style-type: none"> <li>• Project awareness and commitment</li> <li>• Project usefulness</li> <li>• KM effectiveness</li> <li>• KM process capabilities</li> <li>• KM infrastructure capabilities</li> <li>• Job performance</li> </ul>	Jennex & Olfmann (2004)
Intellectual capital	General knowledge-related metrics of an organization	<ul style="list-style-type: none"> <li>• Human capital / knowledge development (no. of employees, employee turnover, profits / employee, motivation, satisfaction, ...)</li> <li>• Customer benefits (rating, sales / customer, satisfaction, length of customer relationship, response time, ...)</li> <li>• Structural capital (expense / revenues, errors / order, quality performance, ...)</li> <li>• Financial focus (assets / employee, revenues per new business operation, value added / employee, return on education, ...)</li> <li>• Process improvement (process timing, knowledge process time / total process time, ...)</li> <li>• Innovation (number of patents, improvement of product renewal, ...)</li> </ul>	Bose (2004), Maier (2007) Stewart (1998)
Global aspects	Measuring international aspects	<ul style="list-style-type: none"> <li>• Strategic partnerships / collaborations</li> <li>• Communication intensity</li> <li>• Coordination activities, coordination breakdowns</li> <li>• Escalation procedures</li> <li>• Management meetings</li> <li>• Improvement of global competences</li> <li>• Cultural awareness and sensitivity</li> <li>• Team understanding, team awareness</li> <li>• Imitations</li> </ul>	DeLong & Fahey (2000), Desouza & Evaoristo (2003), Holden (2002), Kalkan (2008)

This category is related to other components in all types of research works. In case that success models are used, this is modeled in structural equations, in other cases the relations are implicitly described in publications.

For global settings, these metrics are applied in a similar way as traditional KM assessment (cf. Cummings, 2004) in which mainly the influence factors are analyzed. However, there are very few dedicated publications on measuring the specific global effects of knowledge management – most publications address specific aspects such as the communication and team work in global settings. Finding appropriate, explanatory, comprehensive metrics for knowledge management in global settings beyond performance and effectiveness is still a challenge.

### **Main relations of the components**

One of the key tasks for researchers and practitioners using the GKMF is to identify the relations between its components. Due to space limitations we cannot mention every single relation but the main relations. From a research perspective, it can be stated that the success of knowledge management projects is not generalizable and not necessarily predictable as it depends strongly on the context (Jennex, 2008). Thus, it is necessary to map and understand more and more relations for different contexts. However, the main relations can be identified from existing qualitative (Heisig, 2009) and quantitative (Jennex & Smolnik, 2008) research. We distinguish between general relations (for all KM projects) and specific globally oriented relations (mainly applicable in global settings). The first relations are applicable for most KM projects:

- *Context – Processes / Interventions*: The success of KM projects depends highly on the organizations' context as the organizational context influences strongly initial barriers. Furthermore, potential instruments depend on the context, i.e., depending on the organizations' processes and infrastructure, different technology options need to be chosen.
- *Processes – Interventions*: In global settings, processes are organized differently (different ways of working, different roles and responsibilities). To develop successful KM projects, processes of different organizations need to be understood and aligned, interventions need to be integrated in their process models.
- *Strategy and Management – Processes*: The support and importance of KM in an organization's strategy is a clear requirement for KM success. In global settings, strategies of multiple partners need to be aligned and implemented in common processes. This means that business processes are affected, e.g., by adding change and integration processes.
- *Instruments / Interventions – Processes*: Chosen interventions influence the success of a KM project. The balanced combination and related (change and awareness) activities influence how business processes incorporate KM and how knowledge is utilized.

The following relations are in particular important for globally distributed KM settings:

- *Culture – Knowledge / Processes / Interventions*: In global settings, both organizational and ethnic culture have strong influences. Culture influences how processes are managed and performed, how knowledge is shared and communicated, how technologies and interventions are perceived. When different cultures are involved, additional (and totally different) interventions need to be applied.
- *Barriers – Processes / Interventions*: A variety of barriers exist in KM projects – for global settings, these barriers need to be addressed by different interventions (and thus different processes).
- *Knowledge – Interventions*: Different types of knowledge are handled differently across cultures. Depending on the knowledge types, interventions are chosen and selected. In particular, this is relevant in global settings to make common knowledge explicit and externalize it.

In this section, we have briefly illustrated main relations for global settings. This description serves as a starting point for further research as the GKMF is intended to provide a structure for comparative research as one of its main goals.

## **4 Application Scenarios for the GKMF**

We have shown the variety of potential components, attributes and instantiations of the Global Knowledge Management Framework. It thus serves as an initial solution space for global KM. Describing the above mentioned categories, elements, and relations enables us to compare both research works as well as implementations. Thus, the framework serves also as a basis for comparing current and future research with a focus on the global context. In the following, we describe how the GKMF could be applied with two short scenarios. According to Hevner et al. (2004) scenarios could be applied as evaluation technique for innovative artifacts, in particular for new and complex artifacts which cannot be evaluated as such in one step.

### **How to describe and analyze research models based on the framework**

A first scenario is using the framework for building research models leading to a theory of global KM. For example a variety of models have been developed to analyze the success of knowledge management (Lehner & Haas, 2010,

Kulkarni et al., 2006, Jennex & Olfman, 2005, 2006), some of them addressing culture as a key aspect (Leidner et al, 2006, De Long & Fahey, 2000) or variable in a structural equation model (Lindsey, 2002, Jennex & Olfman, 2004, Urbach et al., 2009). For this research scenario, the GKMF provides a description format for:

- **Describing the context of the research setting:** The context of research can be clearly and transparently described by using the context component of the GKMF. This enables researchers to better describe their own settings and moreover creating a basis for comparative research. It also allows analyzing the transferability of research works.
- **Development of research models:** GKMF provides main influence factors on a detailed level. These can be initially used for building quantitative research models (e.g., barriers or cultural factors as exogenous variables, result attributes as endogenous variables).
- **Building domain specific frameworks:** The model can also be used as a basis for more specialized models (e.g., KM for health care in developing countries). For this, we provide a common base of existing knowledge.

Therefore, the framework can be used as a starting point or artifact for transparent research towards better understanding of global KM.

### Guiding the KM design process

The GKMF can also be used to guide international KM design and development processes. These processes need a clear planning of knowledge management activities as those are crucial for success in inter-organizational, regionally / geographically distributed processes. Thus, the following steps can be derived from the model:

1. **Identifying the context and barriers of stakeholders:** In an initial phase, stakeholders across different organizational units and partner organizations are asked about their KM context and barriers towards using and providing KM resources. The framework is then used to identify potential (cultural) barriers towards knowledge sharing. As an example, questionnaires can be directly created based on the GKMF attributes and thus provide a guideline for the requirement analysis.
2. **Designing knowledge sharing processes:** Based on the knowledge process component, a set of processes and activities for knowledge sharing as well as cultural preparations are planned and implemented, taking guidance on process embedding into account (in particular for employees, additional activities need to be embedded into their everyday routine). Thus, the GKMF knowledge processes serve as guidance to take different phases into account and to connect them to basic work processes.
3. **Providing a supporting infrastructure:** Based on the barriers, supporting interventions and tools are planned. Based on barriers and context, tools and accompanying processes are selected to 1.) overcome barriers, 2.) support the combination of business and knowledge processes, and 3.) address culture-specific issues.
4. **Assessing the success of the project:** The success of scenarios / KM projects is essential. KM projects need to show clear evidence that continuous improvements are achieved. For this, indicators can be derived from the knowledge-focused indicators of the GKMF.

As a conclusion, the model serves as a guideline which provides a solution space but not the solution itself. In particular, the provision of barriers, success factors, and inherent recommendations (e.g., process embedding or analysis references) is the main added value of the framework.

### Case Study: GKMF for KM Design Education

In the following, we briefly describe an initial case study carried out in an international educational setting as proof-of-concept of the GKMF. The framework was applied by an international group of students during their final assignment of a summer school course on Global Knowledge Management at the University of Jyväskylä (Bick, Pawlowski, Lehner 2011). Most of the students applied for this specific knowledge management course after a) taking part in an introductory KM course at their home universities or b) participating in the general KM course held during the 21<sup>st</sup> Jyväskylä summer school (n.a. 2011). Therefore, the participants can be seen as experienced in the field of KM aiming – as an international group – at additional insights into culture, context etc. After the course with lessons on cultural models or integrated (global) knowledge processes the students had to prepare a final assignment to achieve the corresponding credits. The assignment was an extension of the Securitech Ltd. case study (Eppler 2003). This case study was extended with regard to an internationalization strategy by Securitech in general and to China in particular and coping with corresponding global knowledge management issues. This scenario was chosen as the GKMF should be understandable for managers and professionals with a basic knowledge in KM who

need to address global issues and design and execute complex projects. Students on this level are thus a fitting target group using the GKMF for both, professional and educational purposes.

To prepare the assignment, the groups of international students (from Finland, Russia, Ukraine, Poland, Japan, Czech Republic, Vietnam, and China) were recommended to apply the GKMF to structure their group work as a suggestion. However, all four groups used the framework to organize their work and to structure their essay or final group presentation. Besides, they intuitively followed the above mentioned KM design process guide: Firstly, they identified the (different) contexts and potential barriers, before designing related business and knowledge processes. In a second step, they suggested a corresponding infrastructure as well as supporting interventions on different levels. Finally, the students had to develop an approach to evaluate their project based on what is already suggested during the first part of the case study.

During the assignment, the students divided their tasks to different group members. There were experts in context/culture, instruments, processes, and performance. They used the above provided tables as a certain kind of work template – explaining that these are (first) potential, not complete categories and attributes. After that – to work on the main relations between the different framework components – they were asked to discuss their answers in their group.

The four different assignments show that the GKMF was adequate to design a global KM project. The framework guided successively the work of the students dividing the big project in different work packages and milestones. However, some teams struggled with the comprehensiveness of the framework as the provided sample attributes and their corresponding references are quite demanding and could lead to a kind of information overload or disorientation. The latter is of course the contrary of what this framework was built for. For that reason, the evaluation of the framework in additional settings is of integral importance to adapt the current subset of attributes to specific contexts. Moreover, we learnt that students sometimes had quite big problems to cope with the main relations between the various dimensions of the framework. This could of course be related to the fictional environment of the case study that would need a lot more of background information or assumptions regarding Securitech Ltd. However, the complex task was quite a challenge for several students from different countries and different disciplines. Finally, it also indicates that in the near future the relation between the several parts of the framework must be elaborated in detail.

## 5 Conclusion and Future Research

In this paper, we have created a solution space for global KM by providing the Global Knowledge Management Framework identifying and harmonizing KM research efforts in the global context. Based on two scenarios and one proof-of-concept case study, we were able to observe the usefulness of this framework as an artifact and to identify further research needs.

Even though our first validations have shown that the framework is applicable to knowledge management cases and scenarios in different domains for a target group with basic KM knowledge, it still needs additional validation. The scenarios as well as the case study are limited, methodologically as well as regarding the application domain. Further studies for other domains, contexts, and stakeholders need to be performed to understand the generalizability of the GKMF framework. Validating the framework, we will take into account how its theoretical foundation as well as its practical relevance and applicability in practice is (cf. Fettke and Loos, 2003a, Frank, 2007). Applying the framework will create theoretical contributions as well as practices in different domains and finally lead to its validation with regard to:

- *Usefulness*: How does the framework support potential users?
- *Adaptability*: How can the framework be adapted for different contexts?
- *Understanding*: How is the framework understood by different stakeholders?
- *Comparative value*: How does the framework improve comparability of different contexts?
- *Contribution to theory-building*: How does the framework support theory building in the domain?

As a next step, we intend to utilize the model for identifying further research gaps and directions as well as applying and assessing the framework in different contexts. We believe that the GKMF can contribute to theory building, provide research-led guidance, create comparative research models and to serve as an evaluation opportunity for actors in the field.

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