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## Real Time Knowledge Management: Providing the Knowledge Just-In-Time

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### 1. Introduction

*Defining the target of the research and describing the structure of the paper*

Knowledge workers are one of the most important assets to be managed. More employees in all organizations are becoming knowledge workers; workers that their knowledge is meaningful to their success. Productivity of these people is likely to be the center of managing people (Drucker, 1999).

Knowledge Management deals with the productivity of the knowledge worker. Real-Time Knowledge Management is a subset of Knowledge Management focusing on knowledge that has to serve the knowledge worker in real time. The aim of this research is to investigate Knowledge Management in conditions of real time needs. The research assumption is that, non standard KM Solutions will be adapted for real time needs.

The research took place between the years 2010-2011. As Knowledge Management is a developing discipline, it is believed that the timing of the research has affected its results. Some Knowledge Management Solutions demonstrated were rather new (especially in the Healthcare Services Sector) and did not exist three years before-hand. In five years, namely 2015 and further, the results may differ again.

**The article is built in the following structure:**

Firstly, Real-Time Knowledge Management is defined and described. It is assumed that real time requires suited solutions, but these situations cannot be researched as one group, but rather divided into subsets, derived by the expertise level of the knowledge workers. As it is assumed that the expertise level of the role of the knowledge worker should affect the usage of Knowledge Management Systems, the expertise level of the knowledge workers should be taken into consideration. The next paragraph enlarges the discussion regarding the expertise dimension, and how different levels of expertise roles may use specific Knowledge Management Solutions. Based on these two factors, regular versus Real-Time Knowledge Management, and various KM expertise levels, the scope of the research is defined and the research methodology is explained.

For each role, defined as a Real-Time Knowledge worker role, and representing a different level of expertise, the reviewed Knowledge Management Solutions are reviewed, as learned both from literature, and from the field research conducted. This is repeated for each role in the scope of the research: Service Centers, Banks and Medical Physicians. Next, typical

standards KM Solutions are reviewed, enabling the comparison between the different KM Real-Time roles and Non-Real time roles.

The research method chosen was ground theory. Based on the findings, a theory and triggered architecture are suggested. The research is concluded specifying theoretical and business implications, and pointing out directions for further research.

## 2. Real time knowledge management

*Defining what Real Time knowledge Management Is. Synonyms clarifying the need for unique solutions in real time environments*

Knowledge workers, as any other type of workers, operate in an environment where spare time is always scarce. However, there is a difference between an Engineer sitting behind his or her desk, and trying to decide how to design a new electric circle, and a Doctor, who is speaking with a patient, as well as deciding as to what check-ups to send that particular patient.

Gartner defines the real time enterprise as "getting the right information to the right people, at the right time" (Gartner, Inc. 2002). This definition is exactly the definition suggested by Kerschberg and Jeong (2005) for Just-In-Time Knowledge Management: "the concept of Just-In-Time Knowledge Management is appealing in that, the goal is to provide the right information, to the right people, at the right time- just in time- so they can take action based on that information".

Malhorta (2005), based on Lindorff, Lindquist, Margulius, Meyer, Siegele and Stewart, add to this definition: "without latency or delay".

Reviewing various sources, the two terms, "Real-Time Knowledge Management" and "Just-In-Time Knowledge Management" are used by researchers alternately. Davenport and Glaser (2002) prefer the term "just-in-time", while Slawy and Majchrzak (2004) and Mellor Gilhardi (1997) choose to use the term "real- time", etc. Some researchers focus on delivering the knowledge in real- time/ just- in- time (i.e. Davenport and Glaser), without examining how critical is it to the specific user, while others (i.e. Kerschberg and Jeong) focus on the specific role where the just-in- time / real- time, is required do to the type of interface between the employee and the customer.

In this research, the term "real- time" was arbitrary chosen, and the focus resides on those employees, who have to decide and give answers here and now. These situations of Real-Time Knowledge Management differ from other job situations, as the employee has to respond to a person sitting in front of him, or speaking with him on the phone, waiting for a professional answer on the spot. Under these circumstances, the research aims to examine what types of Knowledge Management solutions will suit, enabling the employee to best perform at his/her job.

## 3. The expertise dimension

*Explaining how different KM roles vary in the level of expertise. And how the roles in research reflect different the different levels*

Examining the real time factor by itself is not sufficient. The usage of Knowledge Management Systems differ not only by the time one may have before making a decision, rather it may depend on the need for the system assistance. This factor representing the need of level was examined by comparing different groups of employees: on one side of the

scale stand the Call Center Representatives, who are knowledge intermediates; they are hired with no specific knowledge, trained for several weeks, and their turnover is about a year. On the other side, are the Physicians- Doctors, who studied for at least seven years, and in most cases they stay in their profession for a lifetime. In between are front line Bankers and Nurses. All the above, operate in conditions where the information based on a decision, has to be provided in real time. The research's assumption is that, this different level of self knowledge, and therefore the different level of need for the knowledge, will affect the Knowledge Management Solutions provided for the different roles.

4. Research scope

*Describing the different KM roles examined and what types of knowledge workers theses people represent*

The research examines the Knowledge Management Solution for real time needs by examining the following knowledge worker groups. The expertise level is based on average years of learning and job typical turnover:

Knowledge Workers' Group	Real Time Type Of Work	Expertise Level
Physicians (Doctors)	Real Time	Very High
Nurses	Real Time	Medium-High
Front Bankers (Investment Consultants, Tellers)	Real Time	Medium-High
Call center representatives	Real Time	Low
Back Office Employees (Engineers, etc.)	Non Real Time	Varying

Table 1. Researched roles

Note: All Real-Time Knowledge workers are in charge also for Non-Real-Time processes. For example, a Physician is in charge of checking results of patients' check-ups, in order to decide whether to pro-actively recommend a meeting with a patient. The research focuses only on the real time processes of theses knowledge workers. In addition, the research focuses only on the usage of knowledge in real time situations, and not on the creation of new knowledge in these situations.

5. Research methodology

*Describing the research methodology chosen for this research and why the specific methodology was chosen*

The research described in this paper, is based on the ground theory methodology. The research questions the way Knowledge Management is implemented, for roles that are heavily based on real-time situations. In order to fully understand the issue and suggest an effective architecture for future businesses dealing with real time roles, a ground theory (Glaser & Strauss) qualitative research was conducted. Two methods were used for collecting the data: surveying organizations that include heavily based Real-Time Knowledge Management roles; and, reviewing the literature regarding published articles, describing Real-Time or Just- In- Time Knowledge Management researches.

The data was coded, sorted and categorized. The categorization into groups was the key, for explaining why different types of Knowledge Management Solutions were demonstrated for real time situations. Categorizing real time roles by level of expertise of the people filling in these roles, gave the base for the ground theory, enabling the suggestion of a theory and hence, an architecture for real time business roles.

Hereby, are the details of the data sources described with its categorization.

a. Survey Data Sources: A survey conducted in Israel that questioned Knowledge Managers in charge of providing KM Solutions for Real-Time oriented roles. 14 cases were examined, representing the largest organizations of each type in the country:

Organization Type	Business Role	# Organizations Surveyed
Government	Call Center Representatives	1
Car Industry Services	Call Center Representatives	1
Telecommunications	Call Center Representatives	3
Banks	Account Bankers (Tellers)	2
Banks	Investment Consultants	2
Healthcare Services	Physicians (Doctors)	2
Healthcare Services	Nurses Contact Center Representatives	2
Healthcare Services	Administrative Contact Center Representatives	1
Total		14 cases

Table 2. Surveyed organizations

b. Literature Data Sources: A literature review, learning what KM Real-Time (and KM Just-In-Time) articles exist, and what solutions do these describe. The literature examined, represents worldwide knowledge reported cases. The following articles were analyzed:

Article	Organizations Type Described	Business Roles Described
Knowledge Management For Call Centers	(General)	Call Center Representatives
Contact Center knowledge Management	(General)	Call Center Representatives
The Application Of knowledge Management At Call Centers	(General)	Call Center Representatives
A Simulation Approach To Restructuring Call Centers	Utilities	Call Center Representatives (Tech Support For A Wide Range Of Products And Services)
Knowledge Management At Call Centers	Car Industry Services	Call Center Representatives
Critical Issues In Research On Real Time knowledge Management At Enterprises	(General) Hardware	(General) Call Center Representatives- Customer Support

Eyes Wide Shut? Querying The Depth Of Call Center Learning	(General) Insurance	Call Center Representatives
Getting to "Real-Time" knowledge Management: From knowledge Management To knowledge Generation	Utilities	Consultants
Knowledge Management At Malaysian Banks: A New Paradigm	Banks	(General)
Accelerating Customer-Oriented Banking With knowledge Management	Banks	Front Line (Branches And Sale Offices)
Knowledge Management In Banking Industries: Uses And Opportunities	Banks	(General)
Evaluating The Efficacy Of knowledge Management Towards- Healthcare Enterprise Modeling	Healthcare Services	(General)
Knowledge Management In Evidence-Based Medical Practice: Does The Patient Matter?	Healthcare Services	Physicians (Doctors)
Look Before You Leap: Learning From The Experience Of A Flagging KM Initiative At A Healthcare Organization In Asia	Healthcare Services	Physicians (Doctors) Nurses
Just-In-Time Delivery Comes To knowledge Management	Healthcare Services	Physicians (Doctors)
Total		15 articles

Table 3. Reviewed articles

The following paragraphs describe the Knowledge Management Solutions, demonstrated for the three main real time business roles: Call Center Representatives at Service Centers, Front-Line Bankers; and Physicians. These three roles are heavily based on real-time situations. In order to understand the uniqueness of their solutions, where exist; a preceding paragraph describes typical Knowledge Management Solutions for other business roles, where the work is not real- time oriented.

6. KM solutions for non-real time KM roles

*Describing typical KM solutions for other KM roles. Describing access to knowledge*  
Knowledge Management Solutions existed from 1995, serving various types of knowledge workers. As knowledge workers differ, one from another, there is no one system that fits all (Davenport, 2005). Among the different KM Solutions known and described, there are Portals, Communities of Practice, Expert Locators, Social Networks, Blogs, Document Systems, Web Content Management Systems, Wiki's etc. Yet, with regards to 2011, it has been learned from articles as well as interviews of organizations in Israel, that there are two common used Knowledge Management Systems, more popularly used than others. These consist of Portals (Intranets) and Document Repositories (whether as a Network Drive, a Website including Documents, or a Formal ECM System). All other types of Knowledge Management Systems do exist, yet, in most cases, do not serve as the main solution. The Document Repositories, most naturally, handle Documents. The Portals, mainly handle documents, as well, added with



some lists (Bulletin Boards, Contacts, Discussions Groups, etc.). Most knowledge workers, when accessing some Knowledge Management System, retrieve a document.

## 7. KM for call center representatives at service centers

*Describing KM solutions for Call Center Representatives at Service Centers based both on the literature and on the analyzed cases. Describing access to knowledge in real-time scenarios*

"Call Centers are high-pressure work environments characterized by constant routine, scripting, computer-based monitoring, and intensive performance targets." (Houlihan, 2000). This is true, both for Call Centers, as well as for other types of Service Centers. The representatives at these organizations work mainly in real-time situations, where they are required to pass information to a customer as fast and yet professionally as possible. At these Service Centers, and specifically in the Cellular Sector, one of the first and largest sectors that has built Service Centers, employees pass organizational information to customers, through representatives that did not create the knowledge themselves. This type of knowledge workers can be referred to as knowledge intermediates; they do not possess the knowledge, rather, they transfer it from the organization to the customers.

It should also be noted, that expertise level of these knowledge workers is not too high: They do not need specific pre academic education in order to qualify for the job. The training is provided on site, and usually its duration is two to three weeks.

Davenport, in his book "Thinking for a living" (2005) refers to Call Center Representatives and the applications that they use, as knowledge workers. "The applications for Call Centers include Customer Relationship Management tools, tools for scripting conversations with customers, knowledge tools for solving customer problems, and tools for capturing customer feedback" (Davenport, 2005, p. 106).

Knowledge retrieval is performed either by a scripting system, or some other type of tool "knowledge tool for solving customer problems" which is not described in detail, and therefore may be understood in several ways.

The findings from the data sources, articles, as well as interviews, conclude the same results: Medium and Large Service Centers are automated. The representatives use unique application systems: The information and knowledge are structured, and displayed as knowledge items. The knowledge items are structured, and each group of items share the same structure. This, as opposed to documents, which are described as the main knowledge item for non-real time workers, and where the majority of the documents are designed in free format. The research also investigated the nature of these knowledge items. In the interviews, the knowledge solutions were questioned as to knowledge items nature: Where are they stored, how are they designed and how are they accessed? The findings teach that the knowledge items are stored in unique knowledge bases, named "Contact Center Applications" or "Knowledge Management Applications". The systems resemble Web Content Management Systems as they are organized for handling structured knowledge items, and are suited for the vertical Service Center's specific needs. There are two typical ways to display the knowledge: One is by using scenarios, also named scripts, guiding the representative what to ask, say, or in some cases, how to act. This type of knowledge item is mentioned by Davenport (2005) where he describes the British Telecom Call Center case study. The second way is by knowledge items structured in sets of fields, while each representative decides what subset of fields, and hence, what information to use in each case. The issue how to organize the knowledge items is important, as it affects the response time of the Call Center Representative.

In most interviewed organizations, a mixture of the two methods was found, rather the balance (how many scripts, how many structured fields) varied from organization to organization as follows (data displayed in percentages):

Organization	A	B	C	D	E
Structured Fields	70	90	60	70	80
Scripts	30	10	40	30	20

Table 4. Structuring methods usage

Speaking with the knowledge Managers in charge, no one answer was agreed upon whether scripts are preferred or structured fields. In one organization (90:10 in favor of fields) it was stated that scripts are better, and they are changing now in order to add more scripts. In some other organization it was stated that the representatives prefer information displayed as fields, leaving them the independence to decide in what order to access the information. Another organization stated it holds both, scripts for new representatives, and structure fields for the others.

As to the large quantities of representatives at Call Centers, and as to the high effect, as stated, of the knowledge organization on the ability to respond efficiently, most interviewed organizations, and surely all in the Cellular Sector, continually work on improving the Knowledge Trees (Menus) and refining functionality of the search engine adding facilities to effectively find the requested knowledge as simple and fast as possible. These organizations hold unique teams, in charge of writing, preparing and structuring the knowledge properly.

All interviewed organizations were satisfied with having a unique KM System.

It can be concluded, that for this role, the Knowledge Management System, is unique and planned, focused on its real- time business role orientation.

8. KM for front line bankers

*Describing KM Solutions for banking investment consultants based both on the literature and on the analyzed cases. Describing access to knowledge in real-time scenarios*

Front Line Bankers may be defined as employees, working in the Banking Sector, who serve the customers of the bank. Thus, as opposed to Back Line Bankers who provide services within the bank to other employees, but not mainly directly to the end customer holding an account at the bank.

Analyzing the data sources for this sector was not trivial. Not all articles distinguished what type of knowledge worker at the bank the described Knowledge Management systems are serving. Part of the articles were therefore not taken into consideration, and the only researchers analyzed, were those who explicitly explained whom the target users were, mentioning Front Line Bankers or Real Time/ Just-In- Time needs.

Knowledge Management Solutions described in researches, included mainly Document Systems (Libraries, Maps Pointing to Documents, etc.) and Intranets (some being part of communities of practice).

The interviews held, distinguished among the Front Line Bankers, two types of knowledge workers: Investment Consultants and Account Managers (Tellers). These two types are front line knowledge workers, who both need pre-academic education, in order to qualify for the job. Yet, the Investment Consultant has more years of experience, and the job requires higher levels of training.

The largest two banks in Israel were interviewed, resulting in the following results:



Both banks have built highly invested Knowledge Management Solutions for Investment Consultants. Yet, these all fall into the category of Portals/Intranets.

For Account Managers, the two banks offered different solutions: One bank offered an Intranet. Yet, the second has realized that in order to make these front line knowledge workers more effective, a well structured knowledge base is required. They have launched, six months before the interview took place, Knowledge Management System, based on structured knowledge items, mainly structured as scenarios, accompanied by documents and structured fields. Their users were very satisfied with the change that eased knowledge usage. Special care was put into improving accessibility and easing the account find the relevant knowledge item, both through routine work on the menus (knowledge Trees) as well as on investing in purchasing an advanced search engine. This KM Solution, resembling Knowledge Management Solutions demonstrated at Call Centers, is unique and was not experienced in other medium to large banks in Israel. It should be noted that the need is emerging. Also, a third medium to large sized bank interviewed on this specific issue only, did state that the Front Line Bankers do have direct lines to the Call Center Representatives that use such a system, and they use them to answer customer query and quicken response.

Additionally, the bank that offered the structured Knowledge Management System, was in its last stages of implementing another system for all bankers, where when right clicking a term, in all systems, a window would pop-up with initial most relevant knowledge for that term. The knowledge presented was structured.

The conclusion is that in most cases, these Real-Time Knowledge workers work with the same Knowledge Management systems, as the typical Non-Real-Time Knowledge worker. There are some cases, in which unique systems that resemble the structured knowledge bases were built to ease and quicken response, yet it is not clear if these are and will be an exception, or do they forecast a new trend to be common in the future.

## 9. KM for medical physicians

*Describing KM solutions for medical physicians based both on the literature and on the analyzed cases. Describing access to knowledge in real-time scenarios*

Davenport and Glaser describe the context in which Medical Physicians work: "Dr...has a big problem, one common to all Physicians. There is so much knowledge available about the work, that he cannot possibly absorb it all. He needs to know something about almost 10,000 different diseases and syndromes, 3,000 medications, 1,100 laboratory tests, and many of the 400,000 articles..." (Davenport & Glaser, 2002). Medical Physicians may be viewed as extreme knowledge workers in terms of education, experience, information and knowledge relevant to the job, and importance of the decisions taken: Initial learning includes at least seven years of education and additional years of expertise; the relevant knowledge bases that can help them perform in their job, are huge and grow every year; and, the importance of making the right decisions is critical. Furthermore, as Medical Physicians are Real-Time Knowledge workers, they have to make many of their decisions fast, while they are in interaction with a patient.

Several articles were reviewed in order to learn what Knowledge Management Solutions are offered to the Medical Physicians: Cheah and Abidi describe a Healthcare Enterprise organizational memory knowledge base, which is divided into sub-knowledge bases. These, enable access to protocols (Policies and Procedures) separately for every unit. Types of units may include, for example, Outpatient Department, Emergency Unit, Dental Clinic, etc. Additionally, a general knowledgebase includes Medical Procedures/Treatments and Best

Practices (Cheah & Abidi, 1999). This type of KM Solution is based on documents, and represented via Intranets, Helpdesks, Workflow, Groupware, Document Management, etc. Interrelations exist between the sub-knowledgebase, in means of updating one, as triggered for others being updated.

A similar KM Solution, yet less described into details is presented by Chua and Goh, regarding a case study of a Healthcare Organization. The solution was designed, as in our interest, for Real-Time Knowledge workers (Doctors and qualified Healthcare Professionals) based as a Web System (Intranet).

Another example of KM Solution for making clinical decisions is described by Boateng and is based on evidence-based medical practice. Yet, this solution is also based, as the former described ones, on a search in the knowledgebase for relevant articles, hence, based on documents (Boateng, 2010).

Davenport and Glaser describe a different type of KM Solution for Medical Physicians. While the Medical Physicians log on into their operational systems and work within the patient's record, the KM System operates in the background. When ordering a drug for example, the system checks if there may be any allergic reactions to any other medications prescribed. Recommendations are offered also in cases of ordering tests, based on the recorded systems. This type of KM Solution is based on business rules, which are a unique type of structured knowledge items. "The power of (this type) of knowledge-based order entry, referral, computerized medical-record, and event-detection systems is that they operate in real-time." (Davenport & Glaser, 2002).

In Israel, interviews were conducted at the two largest Healthcare Service providers in the country. In both cases, the knowledge was embedded into the operational systems: In one organization, a business rule system was implemented, as described in Davenport and Glaser. It should be noted that this system was implemented already for two years, replacing a former KM Solution based only on an Intranet; at the other organization, the knowledge embedding solution enabled quick access to drugs and tests knowledge bases directly from the user's record, directing the doctor directly to the drug or test in context, when right clicking the term. The solution was new and yet tested as a pilot (implemented for a few months). Initial responses were positive.

It should be noted that these two solutions are similar, yet different; they both embed the knowledge into the operational system, yet while the first solution presented works in "push" mode, the second is "pull" oriented.

For Non-Real-Time Knowledge Management roles, the usage of business rule systems, as well as other embedded Knowledge Management Systems in operational systems can be found, yet is rather rare.

The conclusion withdrawn is that this sector is probably experiencing a change as toward the preferred solution for Real-Time Knowledge Management. From Intranets and Document Management Systems, which are stand alone Knowledge Management Systems based on documents, the organizations are moving towards embedded Knowledge Management Systems, offering their knowledge workers Just-In-Time recommendations, based on structured knowledge items in pull or push mode.

## 10. Summarized findings

### *Summarizing findings across sectors and business roles*

In the research, it was found that Real-Time Knowledge workers do use KM Systems. Findings suggest that only in the Call Center Sector, KM unique systems are the default; yet

all types of real-time roles have been found to experience real- time unique KM Systems, and have found it useful, wherever implemented, and there is a positive trend of enlarging these systems over time.

Even though unique KM Systems are typical for some roles more than others, based on the self knowledge of the type of the knowledge worker holding the position, all roles do benefit from the unique systems when provided, and do use it on real-time situations. Wherever previous non-unique KM Systems did exist, organizations were satisfied with the change. No organization was found to withdraw a unique KM System after built, returning back to an Intranet or Documenting System.

It should also be noted, that similar types of Real-Time unique systems were found across the different roles.

11. Suggested architecture

*Suggesting architecture for providing KM solutions for real-time oriented roles and for other real-time scenarios. Emphasizing on accessibility of the KM solution*

Based on the research, a theory is suggested: All Real-Time Knowledge workers can benefit from working with unique KM Systems, and should work with such systems.

As KM unique real time systems were found to be more costly, in terms of content processing and maintenance, and the main criterion defining where to prior investing in building these systems is cost-effectiveness; i.e. where the organization benefits more.

Typical examples of these may include: hold less knowledge workers for the job, as in the case of Call Representatives; benefit from less errors in decisions, like in the case of Physicians; benefit from more professional response to customer queries etc.

In order to suggest a suitable recommendation, the Real Time KM System has to be defined. A Real-Time KM System is a KM System that benefits from eased accessibility, both externally and internally, as described below:

External Accessibility- Easing the path of the user to the knowledge item.

Internal Accessibility- Easing the readability and hence the understanding of the knowledge, once it was reached.

(Levy, 2009)

Real- Time KM Systems differ from regular KM Systems, in the following ways:

Topic	Real-Time KM System	Non-Real-Time Typical KM System
Entity Managed	Knowledge Item	Document
Structuring Level	High	Low
Accessibility Level	High / Embedded	Varying / Mainly Stand-Alone

Table 5. Real-Time KM Systems' attributes

External Accessibility can be achieved in a few ways:

- a. "Pushing" the knowledge to the Real-Time Knowledge worker, while he/she uses an Operational IT System.
- b. Easing the "pull" of the knowledge by enabling access using right click, or any similar technique.
- c. Enabling direct access to the knowledge items through search engines and fine tuned menus (Knowledge Trees).

External Accessibility can be demonstrated in the following figure:

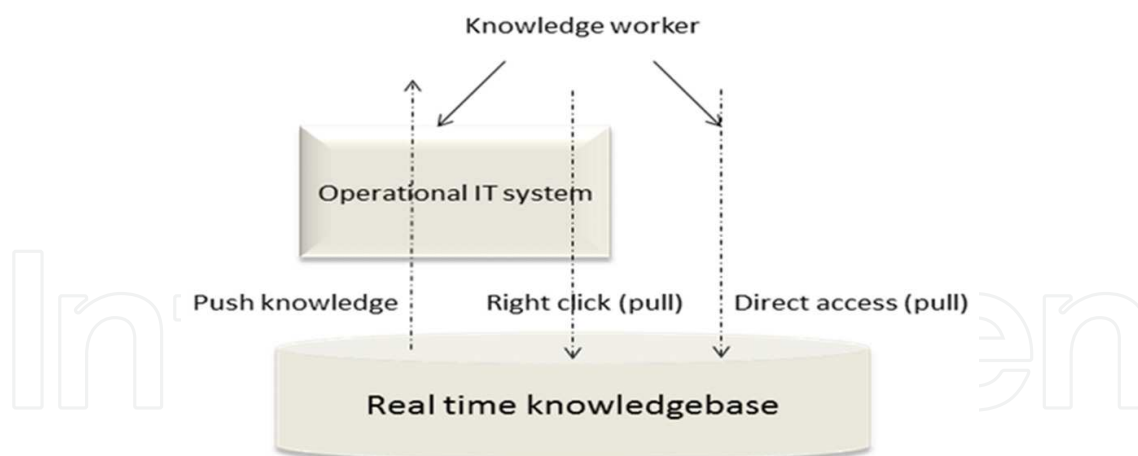


Fig. 1. External knowledge access

Note: Dealing with External Accessibility itself is not unique to the Real-Time KM Systems. However, more care and emphasis were found for real time roles, improving both the hierarchical navigation through the Knowledge Trees (mainly manually) and the search mechanism (mostly automatically- improving the software involved). In Non-Real-Time oriented roles, only few usages of business rules and other push mode mechanisms were found.

KM found Practices:

- Wherever operational IT systems exist, it is preferred to use theses to serve as the interface to the real time knowledge.
- Access, and especially pull oriented access, should be enabled through several access channels, wherever possible.

Internal Accessibility can be achieved by using structured knowledge items, rather than documents. Three types of knowledge items can be used:

- a. Business Rules: Short "bottom-lines" advising the knowledge worker what to do. Usable when relevant: knowledge is clear, short and precise.
- b. Structured Fields; may be embedded in sub-groups.  
Usable when the body of knowledge is larger, enabling the knowledge worker to decide what specific knowledge is more suitable for the specific case; usable also when there is no one unique answer, the knowledge serving decision support.

Demonstration:

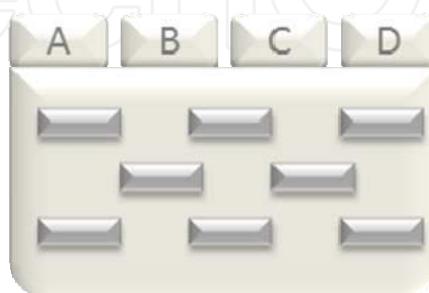


Fig. 2. Internal knowledge access- structured fields

- c. Scripts  
Usable for new users; Usable when there is a known workflow for the knowledge decision.

Demonstration:

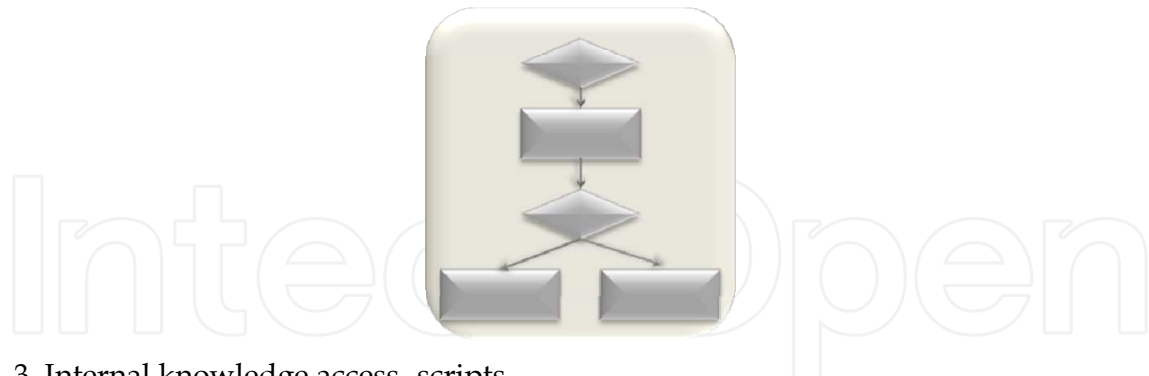


Fig. 3. Internal knowledge access- scripts

KM found practices:

- Simplicity is most important for easing understanding and usage of content. There is no clear answer to the question whether short (as in structured items) or lengthy (as in scripts) is more simple, and the decision is to be taken in each organization as to its context, striving to maximize simplicity.
- The employees in charge of writing the context may be part of each professional unit in charge of the content, or in a centralized unit. It was found that defining the internal structure and writing the knowledge items is a profession, and it is preferred to organize these technical writers as one centralized unit.

Organizations should strive to design for its Real-Time Knowledge workers KM Systems, including improved external and internal accessibility, in one or more of the defined types above. It has not been proven that Real-Time Knowledge workers will not use and benefit from other types of KM Systems, yet, it has been found that organizations that turned to using these types of unique KM Systems, were satisfied with the change and none wanted to return to classical KM Systems (as Intranets or Document Systems) even though these systems are expensive to build and expensive to maintain.

## 12. Conclusions

*Drawing possible conclusions as to the need of unique KM solutions for real-time scenarios.*

The conclusions from the research suggest:

Unique KM Systems were found in usage, serving Real-Time Oriented Knowledge workers. Different real time role types were found to use these systems in different levels, and in typical ways, yet unique KM Systems were in use of all examined role types.

It is recommended to integrate all the various solution types found in usage of the different roles and to implement unique KM Solutions, based on these, for real-time roles in the organization. These solutions will be unique in the way they ease both external access and internal access to the knowledge worker. Organizations should prioritize implementation of these solutions, as they are more expensive to implement. Thus, should be performed, prioritizing roles where knowledge is more in need (as for lower level expertise knowledge workers; scenarios in which the organization considers the decisions to be more critical; etc.).

## 13. Further research

*Clarifying limitations of the conclusions. Suggesting possible future research that may clarify the open issues*



The conclusions from the research are limited three fold:

First, the research's scope was mainly based on three sectors of Real-Time Oriented users. It is recommended to further investigate on other sectors as well, validating the findings and theory based on these findings.

Additionally, the scope was limited in the amount of organizations examined. Literature was learned where existed; deepened interviews were performed for each sector in a limited set of the leading ones in each organization. The conclusions may be validated by examining additional organizations worldwide.

And finally, while the research took place, a change was viewed. It is recommended to re-analyze the Real-Time KM topic again within several years learning, if indeed more organizations follow and design unique KM Systems as viewed during the change, and as recommended by this research.

## 14. Implications for organizations

*What can organizations learn from this research?*

Organizations have been adopting KM Systems for over a decade. These systems started from very simple ones and are developing over the years, both due to technological new opportunities, as well of fitting specific business needs.

This research enlightened Real-Time Oriented needs, and do suggests designing and building specific unique KM Systems for the Real-Time role types. Furthermore, the research points out what components such systems should include, putting the focus on improved External Accessibility (as in the push mode of business rules), and on Internal Accessibility (whether templates, scenarios or bottom lines). Organizations should not settle only for such types of solutions for Service Support Centers. The default nowadays, rather strive for supporting such solutions to all types of Real-Time Oriented roles, prioritizing where to start, as to the level of criticality of the knowledge required by the knowledge worker in order to perform best. Managers, with the assistance of KM Managers, should initiate the topic and lead these changes in the organization.

## 15. Summary

*Summarizing the research and its conclusions*

Knowledge Management is a popular researched discipline. Real-Time Knowledge Management, also termed Just-In-Time Knowledge Management, is a sub-topic less researched. This research raised the question whether Real-Time Oriented knowledge workers need a different type of KM System. The research was based both on analysis of previous researches regarding KM Systems, as well as interviews at Israeli organizations. Three types of Real-Time roles were examined representing different types of knowledge workers, each with a different level of expertise. Analyzing the current situation and the viewed changes in past few years, an integrated solution was purposed for all various real type needs, prioritizing its implementation as no organization can build all systems at once. Real-Time KM Systems have learned to be of a unique type, with improved care as to external accessibility, and with different representation of the knowledge as knowledge items, enabling the internal accessibility as well.

It is believed that these Real-Time KM Systems will be more popular over time, and will develop as to the suggested architecture. Better accessibility in this case is not about saving time. As the resource of time is scarce in real time scenarios, the KM System is, in many

cases, the differentiator between using the system or not using it at all. This fundamental point, organizations do understand.

Real-Time KM Systems serve as a business differentiator.

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Due to the development of mobile and Web 2.0 technology, knowledge transfer, storage and retrieval have become much more rapid. In recent years, there have been more and more new and interesting findings in the research field of knowledge management. This book aims to introduce readers to the recent research topics, it is titled "New Research on Knowledge Management Applications and Lesson Learned" and includes 14 chapters. This book focuses on introducing the applications of KM technologies and methods to various fields. It shares the practical experiences and limitations of those applications. It is expected that this book provides relevant information about new research trends in comprehensive and novel knowledge management studies, and that it serves as an important resource for researchers, teachers and students, and for the development of practices in the knowledge management field.

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