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Master Program in Information Management

**A MODEL FOR ENTERPRISE KNOWLEDGE  
MANAGEMENT AFTER COVID-19 CRISIS**

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Master Thesis presented as partial requirement for obtaining  
the Master's degree in Information Management

NOVA Information Management School  
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# **A MODEL FOR ENTERPRISE KNOWLEDGE MANAGEMENT AFTER COVID-19 CRISIS**

by

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Dissertation presented as partial requirement for obtaining the Master's degree in Information Management, with a specialization in Knowledge Management and Business Intelligence

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## **ABSTRACT**

The Covid-19 crisis has provoked many abrupt changes worldwide, affecting everyday life facets from government decisions to people's social conducts. In addition, this crisis has forced many enterprises to change their normal approach to organizational workstyle. These changes have brought to the surface permanent issues different organizations must deal with. Crisis Management provides organizations with important tools and methods to deal with the different stages of crisis. However, the management of knowledge as key resource for problem mitigation is yet to be included in Crisis Management initiatives.

Consequently, the objective of this work is to provide a solution that brings the areas of Knowledge Management and Crisis Management closer together, in support of enterprise management during the aftermath of the Covid-19 crisis.

An initial literature review during this research allows to study the concepts of Crisis Management, Knowledge Management, and the context specific to the Covid-19 crisis. Furthermore, this study develops on Knowledge Management strategy solutions and existing Crisis Management frameworks. Subsequently, the Covid-19 current context and future impact on enterprise management is reviewed.

From the study of the areas of investigation, the assumptions leading to the final solution are presented. The artifact of Knowledge Management for post Covid-19 Crisis Management is introduced, in the form of a step-by-step model.

Lastly, a case scenario with the model application is presented, as well as further evaluation of the model via interviews with professional experts. Conclusions are withdrawn regarding the model's utility and applicability for enterprise management.

## **KEYWORDS**

Crisis Management; Knowledge Management; Knowledge Strategy; Knowledge Management implementation; Strategic management; Enterprises; Covid-19

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## LIST OF ABBREVIATIONS AND ACRONYMS

<b>KM</b>	Knowledge Management
<b>DSR</b>	Design Science Research
<b>WFH</b>	Work from Home
<b>IT</b>	Information Technology
<b>HR</b>	Human Resources

# 1. INTRODUCTION

## 1.1. BACKGROUND

In the wise words of the Greek philosopher Heraclitus, “The only constant in life is change.”. The global pandemic of COVID-19 the world is facing today has proven once more just how unexpectedly life can change from one day to the other. As the environment changes, so do organizations. The current pandemic has reminded the organizations that have already been through moments of crisis of how uncertainty can come knocking at the door at any time. For others, it might be the first time they are faced with the fact that what can be taken for granted one day might not be true the next. Inevitably, organizations have had to find ways to deal with how crisis impact them in all sorts of dimensions, from their organizational goals, to changing how they must operate or how resources are managed, and more. But the current situation is not the first or last time some enterprises will face crises in their lifetime. As unexpected and potentially disruptive events (Pearson & Clair, 1998), the importance of crises and how to manage them has become of great relevance.

The concept of Crisis Management has raised out of the need to comprehensively tackle crisis in a proactive way in the hopes of decreasing their negative impact in organizations. The dynamics and surprising factors of crises makes reaching a bullet proof management approach that much harder to accomplish. However, research on Crisis Management grasps the issue of crisis from a systematic and process-based viewpoint, where different steps can be taken throughout the different moments of pre-crisis, crisis, and post-crisis. This indicates organizations going through crisis are far from hopeless and can reach a successful recovery (Mitroff et al., 1987).

Given the complexity and disastrous potential of crisis, the idea of bringing approaches from other management areas to the discussion seems to be worth exploring. With this in mind, another growing area that more and more is essential for organizations is the management of a constantly relevant subject: knowledge.

In an ever-growing globalized world, a factor that characterizes today’s economy is not only the intensive use of knowledge by organizations in order to remain relevant (Nonaka, 1991) but also its vast and rapid erosion (Makó et al., 2020). The role of knowledge for organizations has increasingly been approached by researchers and organizations.

The proper management of knowledge can help organizations reach their goals and increase chances of success (Nonaka, 1991; Zack, 1999). Knowledge Management strategy brings the topic of Knowledge Management close with strategic management, involving all areas of organizations from human resources to technology and organizational processes (Bolisani & Bratianu, 2017; Von Krogh et al., 2001).

The abruptness of crisis will bring the need of organizations to react quickly, based on what they know. Pre-crisis, crisis and post-crisis stages will have different knowledge demands (Li & Wang, 2009). Collaboration and decision making will be harder to achieve and will have to be made under immense pressure. Therefore, better management of knowledge resources can provide organizations with the tools they need in order to thrive during these chaotic times (Jennex & Raman, 2011).

## 1.2. MOTIVATION

The principal motivation behind this research topic came to be as of the current COVID-19 pandemic. All around the world, we have observed how this crisis has taken its toll on organizations and the global economy. Some businesses have had to shut down, while others have strived to survive by making evident alterations. Government and public institutions have also had to make drastic changes to the normal course of their policies in order to try and make path for sustainable recovery. Even when living in a world of constant economic growth and advanced technologies, the global pandemic has still enforced drastic change in the most robust of societies.

The inevitability that crisis will strike organizations must be seen as a serious issue, as crisis can significantly reduce organizations' performance or even destroy all possibilities of them reaching their goals (Wang & Belardo, 2005; Jasko et al., 2012). Even though there are constant technological and system improvements that can help organizations deal with crisis, there are still many vulnerabilities organizations must deal with in the face of adversity (Wang & Belardo, 2005).

The complexity and emergent nature of crisis calls for different areas of management to come together. Despite how much the world has changed over decades, knowledge is a constant need. Therefore, leveraging on knowledge as a primary resource is key for survival during turbulent times (Nonaka, 1991).

Covid-19 crisis forced many enterprises to change the approach to their organizational work style, which in turn has meant organizations must change their ways more permanently in the long-term (Kniffin et al., 2021). Even though existing Crisis Management models and frameworks provide organizations with important tools and methods, they still do not include knowledge as a key resource (Wang & Belardo, 2005).

Therefore, an integrative application of Knowledge Management, considering the future of enterprise management after the Covid-19 crisis, can be most useful when creating a sustainable solution for organizational survival.

## 1.3. OBJECTIVES

The goal of this research is to build a model (organized set of recommendations) for efficient enterprise Knowledge Management after Covid-19 crisis. This model should provide guidelines for any enterprise in the new post Covid-19 context to better manage its knowledge capital in favor of its business results, as well as workers satisfaction.

Considering the methodology followed during this research (chapter 3), it was important to break our main goal into smaller objectives. As such, it was considered important to gain knowledge around the concepts of Knowledge Management, Crisis Management and what are currently the researchers' viewpoints regarding post Covid 19 enterprise management.

The following intermediate objectives were defined:

- Define Knowledge Management and clarify why it is important for enterprise management.

- Identify existing research on Knowledge Management strategies.
- Understand the concept of organizational crisis and existing Crisis Management approaches according to research.
- Investigate the Covid-19 crisis context and its impact on enterprise work style according to scholars.
- Identify Covid-19 crisis main long-term changes for enterprise management.
- Design a Knowledge Management solution, fitting to the post-crisis moment, entailing a comprised set of recommendations.

## **2. LITERATURE REVIEW**

### **2.1. KNOWLEDGE MANAGEMENT**

With the growing knowledge and innovation centered economy, Knowledge Management and its usefulness for organizations has become the subject of discussion in the past few decades (Olubunmi, 2015; Haggie & Kingston, 2003). There is a wide variety of literature around this subject, with different perspectives and all sorts of presented definitions. For this research, we will consider a high-level Knowledge Management definition that embraces the complexity and multi-dimensionality of the subject:

Knowledge Management is a multidisciplinary approach to managing an organization from the perspective of its knowledge resources. It is about managing the organization in such a way that the right knowledge gets to the right people at the right time in order to help the organization reach its objectives (Olubunmi, 2015; Haggie & Kingston, 2003; Greiner et al., 2007; Bhatt, 2001; Shannak et al., 2012).

In this chapter, we will go through the definition, organizational relevance, and classification of knowledge according to experts, understanding the multiplexity of the subject of management in question. We will also develop on the term of Knowledge Management strategy, as the direct application of Knowledge Management in organizations.

#### **2.1.1. Knowledge definition and organizational relevance**

It is essential to develop on the concept of knowledge to understand why it is relevant for organizations. Data, information, and knowledge are three different dimensions that play different parts in the organizational context. Even though literature has often highlighted other dimensions besides these three such as wisdom (Nonaka et al., 2014), for the purpose of this work, knowledge will be the last layer to be explored. Not having a clear understanding of the difference between them has often been a problem for organizations (Davenport & Prusak, 1998). As such, in this section we will define the difference between these three dimensions, with a highlight to the definition of knowledge and its relevance for organizations.

Data can be defined as a set of raw, objective facts (Davenport & Prusak, 1998; Bhatt, 2017). Retrieving and owning correct data is essential for organizations as it is the source, the input for many important results. However, on its own data has little value, as it is non-sensical (Davenport & Prusak, 1998). Data is like loose pieces of a puzzle: you cannot build the puzzle without it, but the pieces on their own cannot be considered a relevant output as one cannot yet see the full picture. Information can be defined as a second layer that encompasses data. Information is putting the pieces of raw objective facts into context and giving them meaning (Davenport & Prusak, 1998, Bhatt, 2017). It is about putting pieces of the puzzles together in a correct manner, so whomever looks at it can make sense of this full picture. As an output, information has been defined as a flow of messages (Nonaka, 1994; Davenport & Prusak, 1998). At last, knowledge, the third and most complex layer. Knowledge has its genesis in the extraordinary and complex human mind (Nonaka, 1994; Davenport & Prusak, 1998), derived from information. Knowledge is generated as people look at the picture of the puzzle and make something

meaningful out of it (Bhatt, 2001). This something, this new knowledge, will depend on people's experience, values, contextual information, and expertise (Davenport & Prusak, 1998). The importance of knowledge comes from its direct impact on actions or decisions, as better knowledge can lead to measurable better decision making or action taking (Nonaka, 1994; Davenport & Prusak, 1998).

To better understand the complexity of knowledge, Davenport & Prusak (1998) reflects on key knowledge components: experience, truth, judgment and rule of thumb. Knowledge evolves over time as one experiences through formal and informal learning. Experience makes people more or less "expert" or knowledgeable on certain subjects. Knowledge has "ground truth", meaning its more than theories or assumptions. It is based on what actually happened, on the reality of actions. Knowledge has judgment, as it judges new information based on what is already known and refines it. It grows and changes, just like people do. The rule of thumb of knowledge is related to internalized experience that allows one to arrive to a solution without having to actually think much about it. Accumulated internalized experience allows for intuition, rapid answers that come to be without one deeply reflecting how. Lastly, contemplating on another dimension that has been considered central to understand knowledge: beliefs (Nonaka, 1994). Beliefs are "deeply rooted in the value system of individuals" and play a significant role on how human beings behave and act upon what they know. Human beliefs and values characterize in large the difference between information and knowledge. (Nonaka, 1994; Davenport & Prusak, 1998). Values and beliefs shape people and will make them react to new information and experiences differently from anyone else, adding up to knowledge complexity.

In an increasingly globalized world, where technology has enabled rapid spread of information, the constant need to change and innovate is all the more so fundamental to survive the fast-paced economy (Nonaka, 1994; Makó et al., 2020). In order to stay relevant and have the ability to grow in a changing environment, an organization does not only need to process information efficiently as it must create and proliferate new knowledge (Nonaka, 1994; Rashman et al., 2009). The unique and special knowledge an enterprise holds is what allows it to sustainably hold competitive advantage. Companies might be able to replicate other's products or services in some way, given current proliferation of technology and information. However, a company with the ability to manage its knowledge efficiently is always able to move forward and keep creating new and innovative ideas (Davenport & Prusak, 1998). Public sector organizations, even with different types of objectives than private companies, are still faced with a lot of pressure that calls for the need to properly manage knowledge, such as competition from the other sectors, increasing public expectation on services and political power (Rashman et al., 2009).

### **2.1.2. Knowledge types**

#### **Nonaka and the SECI model**

One of the most widely accepted approaches in the literature to classify knowledge is the differentiation between explicit knowledge and tacit knowledge, first presented by Michael Polanyi from the philosophical viewpoint. The major difference between these two types of knowledge is their opposition in easiness of communication and transmissibility by knowledge carriers. Tacit knowledge is more difficult for one to communicate in a formal or explanatory manner. This knowledge arises from someone's personal setting and context. It is embedded in the person's own set of beliefs and unique perspective. On the other hand, explicit knowledge is simpler to communicate, being more

easily expressed in a systemic manner (Nonaka, 1994). This type of knowledge can be codified, collected, stored, and disseminated (Greiner et al., 2007).

Nonaka's SECI model presents four different ways that the two different types of knowledge (tacit and explicit) can interact, allowing a better conceptualization of the notion of knowledge:

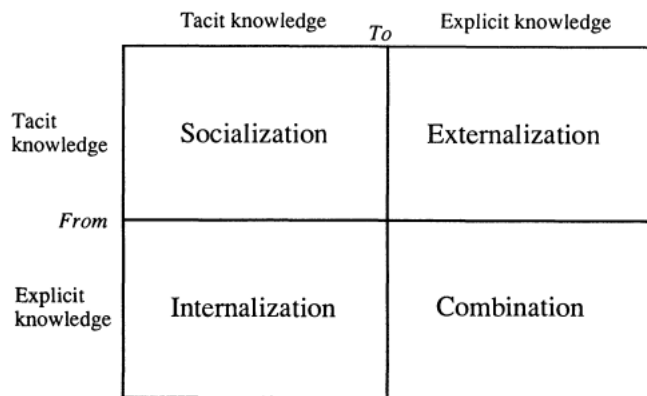


Figure 2.1 - Four modes of knowledge creation (Nonaka, 1994)

The first interaction, from tacit-to-tacit knowledge, is Socialization. In Socialization, knowledge is created through shared experiences and interactions between individuals (Von Krogh et al., 2001). Von Krogh et al. (2001) highlights here the importance of understanding these types of interaction go beyond simply communicating through language, but by actually observing or imitating someone. By sharing experiences with another individual, a person can absorb knowledge by acting and becoming perceptive of their social environment (Von Krogh et al., 2001). In this way, the thinking process and nuanced context of individual tacit knowledge does not get lost (Nonaka, 1994). Secondly, Externalization is the process of conversion from tacit to explicit knowledge. Here, tacit knowledge can be articulated through images, written documents, concepts, metaphors analogies and other forms of dialogue (Von Krogh et al., 2001). The third mode of knowledge conversion is Combination. Combination consists of making use of different explicit knowledge, process it and combine it such a way as to develop a new form of explicit knowledge. Lastly on the SECI model is Internalization, the process of conversion from explicit to tacit knowledge. Through this process, the individual can learn from external explicit knowledge by acting and reflecting on these external aspects to transform that knowledge into their own. This can be done for instance by reading documents and reflecting on what was read or trying to make use of a new product and learn by doing, gaining new knowledge from it.

It is the dynamic interaction between the four different types of knowledge conversion modes that allow for knowledge creation (Nonaka, 1994; Von Krogh et al., 2001). This interaction is the spiral of knowledge creation, where the exchange between tacit and explicit knowledge is amplified through the four modes of knowledge conversion (Nonaka, 1994; Von Krogh et al., 2001).

### Binney's Spectrum

In order to better understand the applications of knowledge, Derek Binney developed the KM Spectrum. It allows placement of tacit and explicit knowledge not as completely separate and different views of knowledge but as ends of a larger knowledge range (Haggie & Kingston, 2003). This spectrum

(Figure 2.2) complements the ideas of the SECI model and of tacit and explicit knowledge in action – as well as how it can be managed (Haggie & Kingston, 2003; Binney, 2001).

<b>Transactional</b>	<b>Analytical</b>	<b>Asset Management</b>	<b>Process</b>	<b>Developmental</b>	<b>Innovation and Creation</b>
Explicit			Tacit		

Figure 2.2 – The KM Spectrum (Binney, 2001)

**Transactional** KM derives directly from the interaction with technology. The individual can ask questions to the technological system, which will retrieve information stored from the past in order to answer the person’s question. From there, the individual will interpret the presented information. One step further, in **analytical** KM, there is interpretation of large amounts and sources of material. This data/information is used to derive trends or patterns (i.e. data mining and business intelligence). **Asset management** involves explicit management of knowledge assets, through active categorization in unstructured form for later access and usage (i.e. documentation of product development history). Codification and improvement of lessons learned and best work practices of processes are captured in **Process** KM. **Developmental** KM matches the internalization knowledge mode. Through training and other solutions for workers learning, there is an investment on increasing knowledge workers capabilities. Lastly, **Innovation and Creation** KM covers the tacit knowledge interactions of the spectrum (socialization). It is about the collaboration and teamwork of workers from various backgrounds that bring new ideas to discussions about different work projects (Binney, 2001).

### 2.1.3. Knowledge Management Strategy

The efficient management of the interaction between the different explicit and tacit knowledge types will imply on the quality of Knowledge Management. Knowledge Management strategy consists of planning the set of actions to manage knowledge resources with the objective of reaching its long-term strategic goals.

An organization’s strategy relates to the identification of long-term goals and planning a set of actions in order to reach such goals (Bolisani & Bratianu, 2017). The linkage between managing knowledge and organization’s strategy is what can be defined as a Knowledge Management Strategy (Sunassee & Sewry, 2002).

The term Knowledge Management Strategy has been defined and explored from different perspectives in literature. Two prominent concepts about Knowledge Management Strategy were identified: Knowledge Management Strategy as a Knowledge Strategy and Knowledge Management Strategy as a Knowledge Management implementation Strategy (Shannak et al., 2012; Bolisani & Bratianu, 2017; Wang & Belardo, 2005).

The first concept, Knowledge Strategy, regards to aligning Knowledge Management with strategic management (Shannak et al., 2012; Bolisani & Bratianu, 2017; Wang & Belardo, 2005). In this perspective, knowledge, as a main organizational resource, must be an integrative part of strategic management’s vision. It concerns acknowledging and identifying the unique knowledge and different knowledge domains the organization holds and knowing what to do with it so it can help the



organization achieve its mission and objectives. (Shannak et al., 2012; Bolisani & Bratianu, 2017; Wang & Belardo, 2005). The second definition is of Knowledge Management implementation Strategy. Here, Knowledge Management Strategy is recognized as a set of methods and practical tools to plan how to manage knowledge in the specific enterprise context (Shannak et al., 2012; Bolisani & Bratianu, 2017; Wang & Belardo, 2005).

Knowledge Strategies and Knowledge Management implementation Strategies are complements rather than different meanings of Knowledge Management Strategy (Shannak et al., 2012; Bolisani & Bratianu, 2017).

#### a) Knowledge Strategy

As previously mentioned, Knowledge Strategy concerns acknowledging and identifying the unique knowledge and different knowledge domains the organization holds and knowing what to do with it so it can help the organization achieve its mission and objectives (Shannak et al., 2012; Bolisani & Bratianu, 2017; Wang & Belardo, 2005).

Von Krogh et al. (2001) developed an interesting framework of four generic strategies for handling knowledge. To obtain this framework, two main aspects were taken into consideration: knowledge domains and knowledge processes. A knowledge domain, as defined by Von Krogh et al. (2001), embodies both a list of essential tacit knowledge holders as well as documents or platforms with data, information, and explicit knowledge. Different essential knowledge domains can be identified within an organization, depending on the different objectives and areas of expertise. The two fundamental knowledge processes are knowledge creation and knowledge transfer.

		Knowledge process	
		Transfer	Creation
Knowledge Domain	Existing	Leveraging strategy	Expanding strategy
	New	Appropriating strategy	Probing strategy

Figure 2.3 - Four knowledge strategies (Von Krogh et al. 2001)

As can be seen in Figure 2.3, the four strategies come as a combination of knowledge creation and transfer with existing or new knowledge domains. The Leveraging Strategy, as the name indicates, consists of leveraging on existing knowledge by transferring it within the organization. The Expansion Strategy aim is creating new knowledge based on existing knowledge domains. Von Krogh et al. (2001) argues this can be done by exploring more in depth about certain knowledge domains, acting on the previously mentioned knowledge creation modes such as Combination and Socialization – once again leveraging on existing tacit and explicit knowledge. In the Appropriation Strategy, organizations can make use of existing external knowledge. New knowledge domains, external to the organization, can be transferred internally through acquisition or partnerships with other organizations. Lastly, the Probing Strategy is most lightly the one that requires a more innovative approach. It consists of

creating a new knowledge domain within the organization, making use of a vision or idea knowledge workers may have for a new knowledge domain. This strategy is the one that takes a more proactive approach. To formulate organizations' knowledge strategies, firstly the knowledge domains are identified, and then the processes that will be applied are thought of in order to reach the knowledge strategy objectives (Von Krogh et al., 2001).

Zack (1999) has also developed on the importance of an organizations' strategy for successful Knowledge Management integration. In this presentation of a Knowledge Strategy framework, Zack (1999) develops on another dimension of knowledge classification besides identifying the organizations' unique knowledge domains. Knowledge can also be categorized in terms of ability to support organizational goals: while *core knowledge* is the basic knowledge the organization holds just to be able to hold a position in its sector, which can be shared amongst organizations, *advanced knowledge* allows the organization to differentiate itself from competition and players in the same sector; the final layer of knowledge, *innovative knowledge*, not only sets the organization apart from others as to possibly allow it to play in a league of its own, leading the market or being the sector's revolutionor (Zack, 1999).

In this framework, the notions of exploration and exploitation of knowledge are also developed. While exploration is about creating knowledge that is necessary to remain competitive and reach the organization strategic goals, exploitation is about making use of all the unique knowledge the organization might already possess to reach its objectives (Zack, 1999). These notions go hand in hand with the processes of creation and transfer of knowledge presented by Von Krogh et al. (2001). From our interpretation, exploitation is parallel to both leveraging and expansion strategies as they are about making use of existing knowledge, while exploration is parallel to probing strategy that is precisely about exploring new knowledge. The appropriating strategy, although exploring knowledge new to the organization, is exploiting existing knowledge from outside the organization. Similarly to Von Krogh et al. (2001), Zack (1999) also points out the different sources of knowledge, which can be either internal or external to the organization.

In conclusion, Zack reflects on how organizations that balance exploration and exploitation together with internal and external knowledge acquisition are considered the most aggressive players. On the other hand, organizations that limit themselves to only exploiting internal knowledge are more conservative, most likely not being able to be innovative enough to remain relevant in their sector (Zack, 1999).

Furthermore, Greiner et al. (2007) developed a "fit model" between Knowledge Management and organizational strategy, concluding that personalization as a knowledge strategy can help with innovation strategic objectives, while codification allows the the company to reach its efficiency objectives. To note here that while personalization is a strategy more focused on tacit knowledge communication and transfer (high Socialization modes), codification is about collecting and storing more explicit forms of knowledge (high Combination modes) (Greiner et al., 2007). Choi & Lee (2002) also developed a study where a similar analysis is made, related to the success of system (codification) or human (personalization) based strategy.

Both Greiner et al. (2007) and Choi & Lee (2002) conclude remarking that these strategies are not exclusive, rather complementing each other. The importance of a balance between tacit and explicit knowledge creation and transfer has also been highlighted by Nonaka in the SECI model. Greiner et al.

(2007) conclusions complement this idea, adding that each type of knowledge strategy can help the organization achieve different types of strategic goals. In addition, Choi & Lee (2002) suggests that different departments in an organization might have the need for more human or system-oriented strategies, depending on the nature of their knowledge and departmental objectives. For example, for operational, repetitive types of function, forms of system strategies allow for better explicit knowledge creation and transfer. On the other hand, R&D departments might gain from more human oriented knowledge sharing strategies, helping important tacit knowledge and innovative ideas to grow.

In research on knowledge strategies, there is a general highlight on the importance of the alignment of Knowledge Management with organizational strategy. It is important to understand what are the so called strategic and knowledge gaps (Zack, 1999; Bolisani & Bratianu, 2017; Sunassee & Sewry, 2002). The difference between what an enterprise must do and what it is already doing to reach its strategic goals is called the strategic gap (Sunassee & Sewry; 2002, Zack, 1999). On the other hand, by identifying its knowledge domains (Von Krogh et al., 2001), the organization can recognize the difference between what it knows and what it must know in order to reach its strategic goals. This is called the knowledge gap (Von Krogh et al., 2001; Sunassee & Sewry, 2002; Zack, 1999; Bolisani & Bratianu, 2017). By identifying both these gaps, the organization can aligned them, integrating knowledge needs into organizational strategy (Figure 2.4).

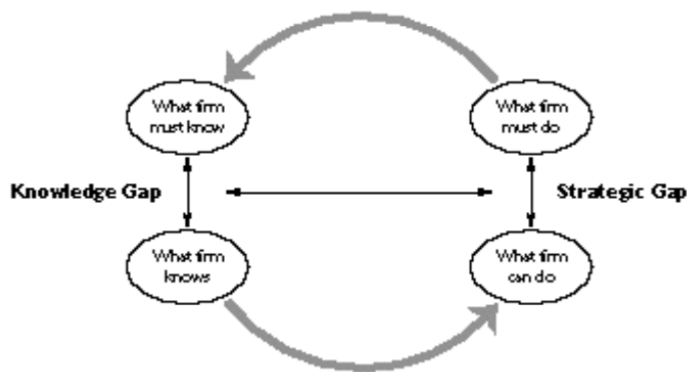


Figure 2.4 – Strategic and Knowledge Gap (Zack, 1999)

To gather what the organization knows or does not know is subject to context. The degree of awareness can only go so far, and it is possible that organizations “don’t know what they know” in totality and “don’t know what they don’t know” but must know to succeed in the future (Figure 2.5).

		Organizational Knowledge	
		Known	Unknown
Awareness	Knowing	I know what I know	I know what I don't know
	Not knowing	I don't know what I know	I don't know what I don't know

Figure 2.5 - The known-unkown matrix (Bolisani & Bratianu, 2017)

This uncertainty might rise important issues that can only be better understood with proper planning of what tools and techniques to implement to reach the optimal combination of knowledge strategies (Bolisani & Bratianu, 2017).

b) Knowledge Management Implementation

To build an actual Knowledge Management implementation plan, there are a number of steps to considered. As discussed in the previous sections, it is a balance between different types of knowledge, knowledge sources and processes which allows Knowledge Management strategies to succeed. Therefore, it is important to take on a holistic approach when developing an implementation plan (Shannak et al., 2012; Sunassee & Sewry, 2002; Rubenstein-Montano et al., 2001).

Wiig et al. (1997) developed a framework with methods and techniques for Knowledge Management Strategy implementation planning. This framework consists of the following stages: review, conceptualize, reflect, and act.

The **Review** phase consists of monitoring and evaluating organizational performance. In this phase, the organization should not only monitor the internal knowledge as well as to observe the external environment, for threats and opportunities related with knowledge. The monitored knowledge scene should be critically evaluated, understanding how current Knowledge Management is helping or not the organization to reach its objectives (Wiig et al., 1997).

The **Conceptualization** phase, in our view, incorporates Knowledge Strategy: getting a full picture of the organization’s relevant knowledge. Organizations ask themselves what business processes use the knowledge from which knowledge assets, when and where the knowledge is used, and which agents (people) provide the knowledge. This task is not necessarily easy or straightforward and might take a lot of mapping of knowledge agents and knowledge processes. Wiig (1997) also suggests that a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is implemented. The SWOT analysis is a widely used strategic management technique. In the case of Knowledge Management, it can provide a good view of organizational strategic objectives and which knowledge is needed to reach them.

For applications associated with each type of knowledge in order to identify the different concrete knowledge processes, lets revisit the KM Spectrum by Binney (2001):

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	<ul style="list-style-type: none"> <li>▪ Case Based Reasoning (CBR)</li> <li>▪ Help Desk Applications</li> <li>▪ Customer Service Applications</li> <li>▪ Order Entry Applications</li> <li>▪ Service Agent Support Applications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data Warehousing</li> <li>▪ Data Mining</li> <li>▪ Business Intelligence</li> <li>▪ Management Information Systems</li> <li>▪ Decision Support Systems</li> <li>▪ Customer Relationship Management (CRM)</li> <li>▪ Competitive Intelligence</li> </ul>	<ul style="list-style-type: none"> <li>▪ Intellectual Property</li> <li>▪ Document Management</li> <li>▪ Knowledge Valuation</li> <li>▪ Knowledge Repositories</li> <li>▪ Content Management</li> </ul>	<ul style="list-style-type: none"> <li>▪ TQM</li> <li>▪ Benchmarking</li> <li>▪ Best practices</li> <li>▪ Quality Management</li> <li>▪ Business Process (Re)Engineering</li> <li>▪ Process Improvement</li> <li>▪ Process Automation</li> <li>▪ Lessons Learned</li> <li>▪ Methodology</li> <li>▪ SEI/CMM, ISO9XXX, Six Sigma</li> </ul>	<ul style="list-style-type: none"> <li>▪ Skills Development</li> <li>▪ Staff Competencies</li> <li>▪ Learning</li> <li>▪ Teaching</li> <li>▪ Training</li> </ul>	<ul style="list-style-type: none"> <li>▪ Communities</li> <li>▪ Collaboration</li> <li>▪ Discussion Forums</li> <li>▪ Networking</li> <li>▪ Virtual Teams</li> <li>▪ Research and Development</li> <li>▪ Multi-disciplined Teams</li> </ul>

Figure 2.6 – KM applications mapped to the elements of the KM spectrum (Binney, 2001)

This broad list of applications is a useful way of identifying the organization's current use of knowledge related activities, mapped to each knowledge type (Binney, 2001).

The **Reflect** phase revolves around deciding which actual steps to take on in action. Organizations define and select improvements, considering what was identified in the conceptualization phase as important strategic knowledge. The author suggests that a good approach can be to think of these steps as programs instead of isolated actions. This is because of the complex nature of knowledge, as well as its embeddedness in day-to-day work. As such, long-term multidisciplinary programs would work best. In this phase, organizations should also define these improvement Knowledge Management programs in the terms any other program would be defined: time (start and end date), budget (money and resources allocated), objectives, deadline, and responsible staff allocation. Still in this preparation phase, a risk assessment of the program(s) should be made by identifying any possibly risk with high probability of happening, balancing the pros and cons of implementing the program. (Wiig et al., 1997)

Lastly, the **Act** phase is the actualization of the decided plans accordingly. In the view of Wiig (1997), this is no longer part of Knowledge Management, but of other organizational areas such as Human Resources or Information Technology.

After the actualization of these plans, organizations can come back to the first presented step, Review, in order to understand how successful the implementation of the programs is. Thus, the Knowledge Management implementation suggested by Wiig forms an iterative cycle, in line with the previously explored idea that knowledge, as in constant change, needs a dynamic management approach.

To better help understand the holistic approach taken in Knowledge Management implementation, three main components/areas of action in organizations where identified in research: People, Organization and Information Technology (Shannak et al., 2012; Sunassee & Sewry, 2002; Riege, 2005; Intezari et al., 2017):

### **People**

Besides being knowledge agents and carriers, people hold sets of values, emotions, skills, and expectations that need to be considered when managing knowledge (Sunassee & Sewry, 2002; Davenport & Prusak, 1998; Shannak et al., 2012). In order to engage in knowledge creation and sharing processes, people need to create commitment and feel engaged in the creation and communication of knowledge (Makó et al., 2020).

### **Organization**

For organizational knowledge processes to work, proper organizational structure and functioning that supports knowledge creation and transfer needs to be in place. From best practices to hierarchical structure and workflows, the organizational structure impacts the way individuals engage in knowledge processes (Shannak et al., 2012; Sunassee & Sewry, 2002). Organizational structure will also impact the easiness with which the right knowledge in its right form is located within the organization (Bhatt, 2001). In addition to structure, organizational culture has been highlighted as one of the most important aspects of knowledge organizations (Rubenstein-Montano et al., 2001, Intezari et al., 2017; Shannak et al., 2012, Bhatt, 2010). The correct set of organizational values and beliefs will impact how individual workers perceive learning and innovation, as well as engagement in knowledge creation and sharing (Intezari et al., 2017).

## Information Technology

Even though on its own is not sufficient, technology is definitely very relevant as a supporting tool to better manage knowledge and help people engage in knowledge sharing (Riege, 2005, Sunassee & Sewry, 2002, Shannak et al., 2012, Davenport & Prusak, 1998, Rubenstein-Montano et al., 2001, Binney, 2001). The incorporation of new IT systems accelerates access to information and data which, when interpreted by individuals, can lead to knowledge creation (Davenport & Prusak, 1998). In addition, proper technological infrastructure such as internet, intranets, emails and other communication flow systems can provide workers with faster and better ways to engage in knowledge sharing (Riege, 2005).

For a good overlook of potential technologies that enhance the knowledge flow functioning, we can get back to the KM Spectrum presented by Derek Binney (Binney, 2001; Haggie & Kingston, 2003). For each of the KM Spectrum elements, Binney has presented the appropriate enabling technologies:

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Enabling Technologies	<ul style="list-style-type: none"> <li>▪ Expert Systems</li> <li>▪ Cognitive Technologies</li> <li>▪ Semantic Networks</li> <li>▪ Rule-based Expert Systems</li> <li>▪ Probability Networks</li> <li>▪ Rule Induction, Decision Trees</li> <li>▪ <i>Geospatial Information Systems</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ Intelligent Agents</li> <li>▪ Web Crawlers</li> <li>▪ Relational and Object DBMS</li> <li>▪ Neural Computing</li> <li>▪ Push Technologies</li> <li>▪ Data Analysis and Reporting Tools</li> </ul>	<ul style="list-style-type: none"> <li>▪ Document Management Tools</li> <li>▪ Search Engines</li> <li>▪ Knowledge Maps</li> <li>▪ Library Systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ Workflow Management</li> <li>▪ Process Modeling Tools</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer-based Training</li> <li>▪ Online Training</li> </ul>	<ul style="list-style-type: none"> <li>▪ Groupware</li> <li>▪ e-Mail</li> <li>▪ Chat Rooms</li> <li>▪ Video Conferencing</li> <li>▪ Search Engines</li> <li>▪ Voice Mail</li> <li>▪ Bulletin Boards</li> <li>▪ Push Technologies</li> <li>▪ Simulation Technologies</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Portals, Internet, Intranets, Extranets</li> </ul>					

*Figure 2.7 – Enabling technologies mapped to the KM spectrum (Binney, 2001)*

Each organization is different from any other and therefore there is not one generic appropriate choice of tools to implement a Knowledge Management Strategy. As such, organizations should make a very good evaluation and consider different aspects of People, Organization and Information Technology initiatives in order to reach their goals (Riege, 2005; Bhatt, 2001).

That being said, before considering any changes in order to implement a Knowledge Management Strategy, it is important to check if there are pre-existing barriers to Knowledge Management (Riege, 2005; Singh & Kant, 2008, Ciotlos, 2020, Wiig et al., 1997). This is what Wiig has called “bottleneck analysis” (Wiig et al., 1997), which can be part of the Conceptualization phase.

Besides what can be found through a typical SWOT analysis, there are generic barriers to Knowledge Management identified in literature that can help provide a baseline for this identification (Wiig et al., 1997). We reviewed three papers that consider generic potential barriers to Knowledge Management (Riege, 2005; Singh & Kant, 2008; Ciotlos, 2020) and have summarized their most important findings in the table below:

<b>KM Components</b>	<b>Potential Barriers to Knowledge Management</b> <i>(Riege, 2005, Singh &amp; Kant, 2008; Ciotlos, 2020)</i>
<b>People</b>	<p>Lack of time to engage in knowledge sharing</p> <p>The idea that “knowledge is power” and engaging in knowledge sharing will risk job security</p> <p>Lack of motivation from not understanding the usage of knowledge as an important strategic tool</p> <p>Lack of trust in the knowledge sources or recipients</p>
<b>Organization/Structure</b>	<p>Poor organizational culture</p> <p>Strong hierarchical organizational structure that slows down knowledge sharing processes</p> <p>Sense of competition between different areas within the organization</p> <p>Lack of top management commitment/poor leadership directions towards a positive image of knowledge engagement activities</p> <p>Lack of formal and informal conditions and spaces to engage in knowledge processes (creation and transfer)</p> <p>Lack of rewarding and recognition systems to support knowledge sharing</p>
<b>Processes/IT</b>	<p>Lack of IT systems and processes integration</p> <p>Lack of technical support/maintenance when IT systems are not working, hindering normal communication and knowledge processes</p> <p>Individuals not knowing how to use the existing IT system/ lack of training</p> <p>Individuals’ reluctance towards using knowledge IT systems due to lack of understanding towards their usefulness</p>

*Table 2.1 – Potential barriers to Knowledge Management*

A final remark on managing knowledge with a holistic approach is the analysis of the environment. Organizations are always part of a specific environment that uniquely contextualizes its knowledge needs (Wiig et al., 1997; Sunassee & Sewry, 2002; Haggie & Kingston, 2003). To properly assess the knowledge potential of their environment, organizations should:

- Care for customer’s needs, as understanding stakeholders will allow to proactively meet their needs and create space for innovation (Sunassee & Sewry, 2002)
- Foster good relationships with suppliers, as they can provide external knowledge (Sunassee & Sewry, 2002)
- Consider views of shareholders (Sunassee & Sewry, 2002)
- Collect and analyse information about what the competition is doing (Sunassee & Sewry, 2002)

### c) Integrative view on Knowledge Management Strategy

The management of knowledge as a key resource in organizations asks for its close alignment with strategic goals. Knowledge Management Strategy encompasses both the necessity to include knowledge as an object for strategic planning and framing long-term plans of programs for Knowledge Management implementation (Bolisani & Bratianu, 2017).

From the two sections above we can conclude that different Knowledge Strategies help us understand the different ways knowledge can interact and be put into action. Considering Nonaka's SECI model and Binney's KM Spectrum, one can understand what the different types of knowledge are. From the following Knowledge Strategies presented, once again we can understand how different types of knowledge interact and what are the different knowledge processes. With the awareness of how knowledge dynamics work, organizations can more easily formulate what the knowledge strategy means for the overall organization as a resource to reach its strategic objectives. It provides an integrative vision of organizational knowledge (Bolisani & Bratianu, 2017). However, and in itself, mainly identifying the different types of knowledge and knowledge domains - and how knowledge can optimally interact in order to support the organization - might not be enough or sustainable in the long run. As such, the second and complementary idea of actual implementation of Knowledge Management suggests planning. It brings to the table how Knowledge Management needs formal programming and dedication just like any other organizational project.

Knowledge Strategy that provides vision leads to planning and implementation but planning and implementation can also lead to Knowledge Management (Bolisani & Bratianu, 2017). This calls for the distinction between two views on Knowledge Management Strategy approach: deliberate or emergent (Bolisani & Bratianu, 2017). We have been mostly referring to the idea of Knowledge Management Strategy from a rational viewpoint, deliberately planning ahead all Knowledge Management initiatives, from organizational structure and culture, to processes, people management and Information Technology. But there is another component which is the level of turbulence and change in the environment. Since change is certain and there is instability regarding what the future will bring, it can be better to make changes according to emerging needs over time – therefore no need for formal planning. This is called the emergent view of Knowledge Management planning, where practical implementation of Knowledge Management initiatives will take place overtime without relevant planning. (Bolisani & Bratianu, 2017). In this view, the identification of the Knowledge Strategy will come after implementation of changes and tools. In a positive note, this approach can lead to surprising learning activities, as the natural changes and turbulences in the surrounding environment can leave the organization in a chaotic situation. In the novelty of such situation, the organization will have to experiment different paths in order to respond to chaos (Wang & Belardo, 2005; Bolisani & Bratianu, 2017). This approach however is passive and can lead to underestimation of existing knowledge and its potential development (Bolisani & Bratianu, 2017).

Bolisani & Bratianu (2017) suggests that an integrated view of both rational and emergent approaches to Knowledge Management Strategy (figure 2.8):



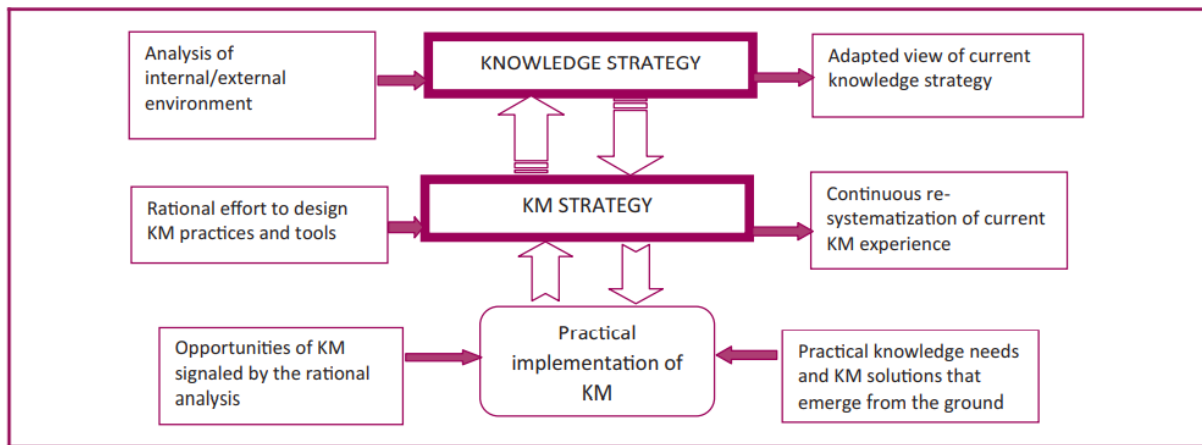


Figure 2.8 - An integrated view of rational and emerging planning dynamics (Bolisani & Bratianu, 2017)

This view allows for planning of Knowledge Management to consist of continuous efforts to learn and improve. Organizations can identify initial knowledge strategies that will result in practical implementation of Knowledge Management projects. On the other hand, the results from implementation will result in individual learning processes that can bring new ideas and solutions to unexpected problems. These ideas and solutions, if properly absorbed by Knowledge Management implementers, can contribute to further re-planning of Knowledge Management strategies (Bolisani & Bratianu, 2017).

## 2.2. CRISIS MANAGEMENT

With the growing globalized world, demands to optimize Crisis Management efforts have increased (Jasko et al., 2012; Mitroff et al., 1987). Major crises have affected all sorts of organizations in the world like the financial crash of 2008, which ended up affecting the global economy for years to come (Jasko et al., 2012). The closest example of one of these major crises is the current Covid-19 global pandemic the whole world is facing. What began as a health system crisis in China quickly generated crisis in many other sectors all over the world, such as education, tourism, culture, sports, business, or finance (Bratianu, 2020). In addition, crisis specific to organizations have also made news throughout the years – for example, when in 1997 a fire destroyed the production line for one of the important parts of Toyota’s car manufacturing (Kakihara & Sørensen, 2002), leading to operations in the production line of Toyota at high risk. Crisis Management has therefore arisen as the management area dedicated to considering the possibilities available in order prevent, respond, and react to crisis, diminishing their negative impact (Jasko et al., 2012; Wang & Belardo, 2005). Even though crisis and their potential impact can be very hard to predict, just like the current global pandemic, organizations can still develop comprehensive plans for managing them more efficiently (Mitroff et al., 1987).

### 2.2.1. Organizational Crisis

Terms such as “emergency” or “disaster” have been used to describe crisis (Wang & Belardo, 2005; Fischer et al., 2016). An integrative and agreeable classification of organizational crisis (Jasko et al., 2012; Wang & Belardo, 2005; Bratianu, 2020) is that by Pearson and Clair (1998): “An organizational

crisis is a low-probability, high-impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly.”. Even though of low probability, organizations should prepare for the inevitability of having to deal with some sort of crisis during their lifetime (Jasko et al., 2012), in particular given the concerning threats it imposes on organizations (Jennex & Raman, 2011).

Organizational crisis can have several origins and, as previously mentioned, many times external and uncontrollable by the organization, contributing to the surprise factor (Jennex & Raman, 2011; Jasko et al., 2012; Bratianu, 2020; Mitroff et al., 1987). Mitroff et al. (1987) has helped to classify the types of crises depending on their origin and root-cause. Crisis can originate either internally or externally to the organization. In addition, crisis can be caused by Technical/Economic issues and People/Social/Organizational issues:

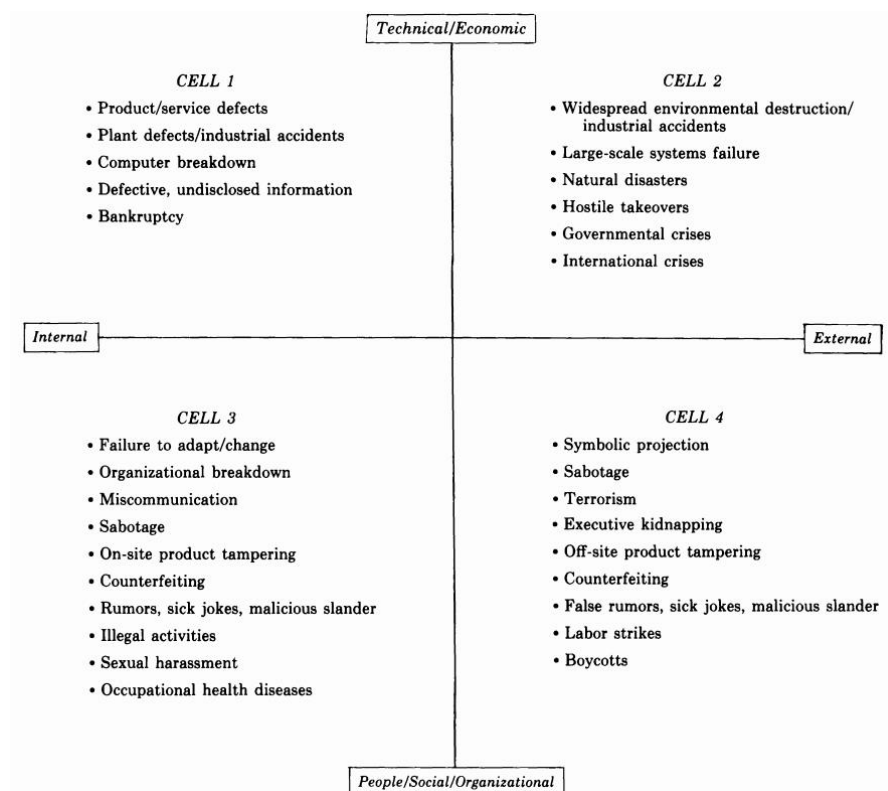


Figure 2.9 – Types of corporate crisis (Mitroff, 1987)

The differentiation between Technical/Economic and People/Social/Organization sources of crisis allows us to comprehend how one type of crisis can lead to another type of crisis. Technical/Economic causes influence People/Social/Organizational crisis, and the opposite can also happen (Mitroff et al., 1987).

Although crisis can be defined as events as previously seen, there is also a phased process that evolves around crisis (Jasko et al., 2012; Wang & Belardo, 2005), which allows one to bridge the concepts of crisis and management. This process intakes a pre-crisis and post-crisis moment, as well as the crisis itself. Mitroff’s comprehensive model intakes four main moments in crisis (figure 2.10): Detection (pre-crisis), Crisis, Repair and Assessment (post-crisis). This view of crisis throughout moments in time

suggests that there are different actions organizations will most likely intake over time. This leads us to the possibility of managing the actions throughout different stages of crisis.

## 2.2.2. Crisis Management Stages

As crisis can be viewed in a spectrum of pre-crisis, crisis, and post-crisis, Crisis Management accordingly consists of different stages. The four main phases of Crisis Management suggested by Mitroff are Detection, Crisis, Repair and Assessment (figure 2.10). In addition, there are different Crisis Management stages between the main phases – which are represented by the arrows in figure 2.10:

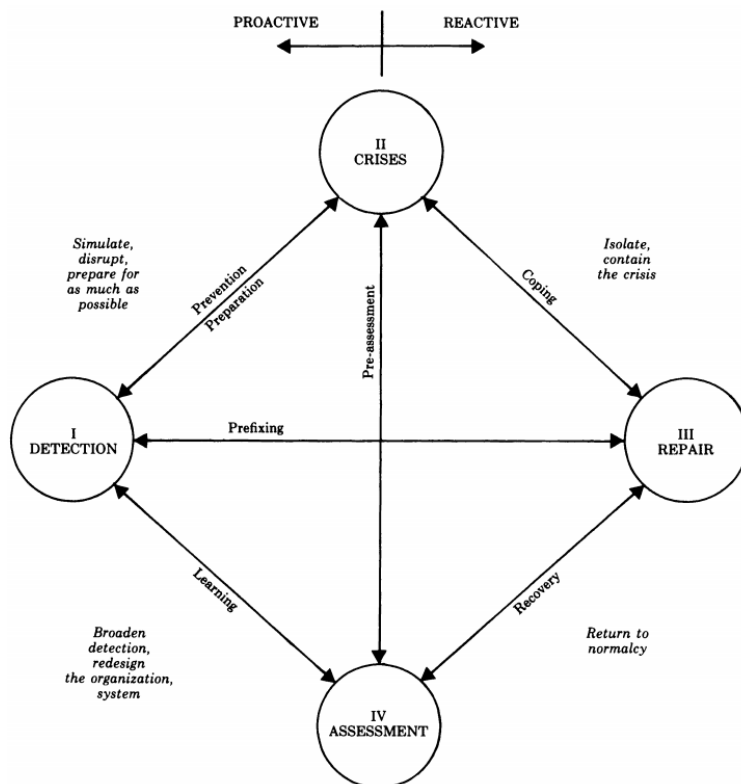


Figure 2.10 – A model for Crisis Management (Mitroff, 1987)

While Prevention/Preparation stages are of proactive nature, once the crisis hits, containment/damage limitation (Coping), and Recovery stages suggest a reactive approach (Mitroff et al., 1987). In post crisis, Learning will be more of proactive essence once again. Organizations will create a less vulnerable environment for themselves if they are more proactive. On the other hand, organizations that are simply reactive to crisis will become more vulnerable and less secure (Mitroff et al., 1987).

The model suggests that there is a first phase called **Detection**, where organizations should be attentive to any early warning signs of crisis, by scanning both the internal and external environment (Bratianu, 2020; Wang & Belardo, 2005). Preventative measures to eliminate or minimize negative effects should be entailed, if possible, after getting some idea of what the crisis might be (Mitroff et al., 1987). In addition, preparation will allow for organization resilience and better cooperation with crisis outcomes (Bundy et al., 2017). Even though implementation of prevention measures can help and diminish the negative impact, it might not be sufficient to completely prevent **Crisis** from happening, given its more often than not incontrollable by nature. As such, in the

containment/damage limitation stage (Wang & Belardo, 2005), where the organization is coping with the crisis, the objective is to control and mitigate further loss and damage (Fischer et al., 2016). Given the critical nature of the crisis phase, time is scarce, and as such having a well thought through plan - product of pre-crisis - is very important, even if not all aspects of the plan end up being relevant for that specific crisis (Jasko et al., 2012; Wang & Belardo, 2005). The **Repair** and **Assessment** phases are both post-crises. In the recovery stage, organizations focus on fixing issues that the crisis has caused, prioritizing what are both the most urgent and critical aspects for repairment. Nevertheless, a long-term recovery plan should also be envisioned to anticipate any sustainability issues – meaning quick fixes might not be enough in long run for organizational survival (Wang & Belardo, 2005). Lastly, the final Assessment phase entails a very relevant organizational aspect: **learning**. The crisis phase certainly brought a lot of novelty and changes to the organization (Bratianu, 2020), which came with new lessons and new acquired knowledge (Bratianu, 2020; Mitroff et al., 1987). As such, this stage is essential for two reasons: crisis can help organizations identify weakness points that were never identified before, enabling them to readjust the way they operate accordingly and making them more resilient (Jasko et al., 2012); and organizations can learn from everything that happened during pre-crisis and crisis and readjust their Crisis Management plans, making them better prepared for the potential next crisis (Jasko et al., 2012; Wang & Belardo, 2005; Mitroff et al., 1987).

Mitroff's Crisis Management model is to this day quoted in many research papers (Jasko et al., 2012; Wang & Belardo, 2005; Pearson & Clair, 1998; Bratianu, 2020; Li & Wang, 2009; Bundy et al., 2017). Given its popularity among reviewed literature, we agree this model provides a complete overview of Crisis Management. However, we acknowledge that crises are complex and impact a great magnitude of areas and perspectives. Pearson and Clair (1998) created a Crisis Management Model that integrates psychological, social-political, and technological-structural perspectives of crisis. This integrative approach allows for a multidimensional definition of organizational Crisis Management:

“Effective Crisis Management involves minimizing potential risk before a triggering event. In response to a triggering event, effective Crisis Management involves improvising and interacting by key stakeholders so that individual and collective sense making, shared meaning, and roles are reconstructed. Following a triggering event, effective Crisis Management entails individual and organizational readjustment of basic assumptions, as well as behavioural and emotional responses aimed at recovery and readjustment.” (Pearson & Clair, 1998)

This definition adds to Mitroff's model by acknowledging the importance of these three different perspectives:

- 1) From the psychological viewpoint, individuals that are part of the organization will impact all the phases of crisis. Individual's behaviours can be the root cause of organizational crisis (pre-crisis). Individuals can also suffer from the negative impact of crisis, which can make them act differently than they normally would in crisis/post-crisis situations. Adapting their behaviour and recovering emotionally will come more easily to some individuals than others, which will impact the organization as a whole throughout crisis stages (Pearson & Clair, 1998).
- 2) The social-political perspective highlights the possible breakdown of normal social order and common set of beliefs due to crisis. Individualism and violence might increase as a consequence of the abnormal situations crisis creates (Pearson & Clair, 1998).

- 3) Lastly, crisis will also impact the technological structures in place. Reliability on technology for managerial or structural processes might be put into question when faced with crisis. The normal usage of technology might not be possible, meaning organizations should not rely too highly on risky technologies, and have backup plans in case there is technological malfunctioning (Pearson & Clair, 1998).

### **2.2.3. Knowledge Management for Crisis Management**

Research particularly highlights the importance of Knowledge Management as regards to post-crisis, especially for supporting recovery and learning measures – measures to be taken on between the Repair and Assessment phases and between Assessment and Detection phases (Bratianu, 2020; Jennex & Raman, 2011; Wang & Belardo, 2005). In particular, new crisis are a good opportunity to gather new knowledge on lessons learned as preparation for future crisis. Knowledge Management can assist the organization in closing their knowledge gap on Crisis Management, as it creates valuable knowledge structures, competencies and capabilities (Bratianu, 2020; Wang & Belardo, 2005). Knowledge Management compilation as preparation for future crisis can include: knowledge on how to design communication and information protocols in order to more quickly respond to crisis; incorporate lessons learned to team training and decision making guidelines; and create knowledge bases that enterprises can use in case of emergency (Jennex & Raman, 2011).

An important aspect of Knowledge Management for Crisis Management is preparedness when dealing with change. The adaptation of knowledge workers will influence Knowledge Management success towards crisis mitigation. The four building blocks for successful change implementation are fostering understanding and conviction, reinforcing with formal mechanisms, developing talent and skills, and role modelling (Schaninger & Basford, 2016). To foster understanding and conviction, creating a good common vision that creates a clear story of where an organization is headed is key. Reinforcement can be made via not only monetary incentives, but also by sharing a sense of purpose and collaboration between co-workers, in order to align their progresses with organizational goals. Supporting worker's constant learning and development will also create a sense of competence in people, allowing them to be more open to change. Lastly, providing worker's with good and convincing role-models of change will increase willingness to "imitate" – therefore becoming allies of change (Schaninger & Basford, 2016).

## **2.3. THE COVID-19 CRISIS**

### **2.3.1. Pandemic context**

The origin of the Covid-19 pandemic took place in December of 2019, when there was a first outbreak of this disease in the City of Wuhan, China. This new disease has since then been associated with a virus similar to avian influenza, SARS and Ebola, responsible for a range of flu symptoms such as dry cough, fatigue and high fevers. However, this virus showed to have a high contagion rate, provoking many more deaths than the other similar viruses. It rapidly spread to many countries until it become a worldwide issue. On 11 March 2020, the World Health Organization made an official announcement where it classified this crisis as a global pandemic (Bratianu, 2020). The pandemic lead over time to a slowdown of the Chinese economy, which implied a slowdown of the world economy - given the current globalization, where many markets are dependent on intercountry relationships. Financial

markets worldwide also reacted, with a general slowdown and drawback on normal activities (Akbulaev et al., 2020).

The rapid spread and growth of the pandemic, leading to many deaths and healthcare systems' exhaustion, called for government action and drastic policy implementation worldwide. These policies have mostly involved social distancing measures and massive lockdowns in order to prevent further spread of the virus (Bratianu, 2020). As such, and even though this crisis is biological and sociological, it also imposed numerous obstacles for businesses (Kansal, 2021). The lockdown measures impacted business sectors to different degrees, but some way or another all organizations were forced to make changes. In the case of some industries such as airlines, hospitality, and manufacturing the lockdown led to complete or almost complete temporary shutdown of the businesses. For others, it meant changes to their normal work style (Kniffin et al., 2021), explored in the next sections of this chapter.

### **2.3.2. Impact on the work style and enterprises**

What has been more than a year now into the COVID-19 global pandemic has meant months of adaptation by enterprises to on and off relaxation or imposition of lockdown measures varying on the different waves of this crisis. Considering Mitroff's Crisis Management model, the COVID-19 pandemic has led to several coping stages between crisis peaks and repair moments, depending on the different cycles of the crisis each country has faced.

Current research suggests most enterprises suffered challenges related with all organizational aspects: people (workers) management, organizational culture and supporting technologies. The main highlighted change to work style by scholars is moving from working in the office to working from home – WFH – caused by the social distancing policies implemented by most governments. There was already a trend for the migration of work to virtual environments, usually depending on worker's area of expertise and personal preference. However, the crisis made WFH become mandatory in most cases, exponentially accelerating the existing trend (Kniffin et al., 2021).

#### WFH – Technologies and infrastructure

Given this mandatory and rapid change, enterprises had to first and foremost quickly adapt technologies to support workers in the change of their working environment. Moreover, these technologies had to allow not only worker's to use tools daily that support their regular tasks and activities, as to help them communicate with their teammates and clients if needs be. Without a proper IT support team to help workers adapt their work laptops, phones and other hardware to their home environment, smaller companies and SME's might have struggled particularly to make this change (Kansal, 2021). In addition, workers had to adapt to this situation by creating a work environment at home that would allow them to have their usual IT setup as they would in the office. It became therefore necessary for workers to find space in their homes with desks and often proper ergonomic chairs, extra screens and/or keyboards – anything found necessary to meet normal work-health conditions with proper setups. For workers that did not have this set up already, it meant creating it for themselves. This led some companies to provide workers with an allowance for home office investments (Kaushik, 2020).

As regards to virtual teamwork and support to communication, companies have made extensive use of tools such as Zoom, WebEx, Zoho, Google Hangouts, Microsoft Teams and others. These tools have

replaced meeting rooms, allowing for meetings that would normally take place in the office to still occur. Through these platforms, workers can also text each other and make one-on-one face-to-face calls. In addition, cloud-based process management tools such as Jira have also helped workers to manage their work with their teams (Kansal, 2021).

### WFH and People

The COVID-19 crisis has led to cultural and social challenges, imposing unnatural behaviours on people (Chang et al., 2021; Kansal, 2021). On top of the abnormal conditions that led to lack of healthy social interaction and feelings of fear towards the impact of the virus, workers had to deal with the abrupt change to their normal way of work.

Mandatory WFH raised mental health and life balance issues. Although for some workers WFH has been a work modality that works for them and where they feel most productive, informal conversations that take place in the office between co-workers have shown to be important for mental health, as well as normal physical interactions such as handshakes (Mogilner et al., 2018). WFH amplified isolation caused by government lockdown measures, leading to feelings of loneliness and lack of work engagement amongst some workers (Kniffin et al., 2021; Ojo et al., 2021). WFH also led to blurry work-life balance boundaries, given the lack of physical space separation. This can lead to unbalanced habits which in turn can cause overworking, high levels of stress or even burnout (Kansal, 2021).

WFH has also affected helping and pro-social behaviours amongst workers, as it does not foster open and easy communication as working in the same office does. Virtual team meetings are also harder to coordinate and can lack the richness of face-to-face team work (Kniffin et al., 2021).

On a different note, however, flexibility regarding self-management of working hours and time saved commuting to the office have shown to be a plus, helping workers to save time for their personal benefit (Kaushik, 2020).

### WFH and the organization – organizational culture and norms

Experiencing WFH impacted organizational culture and norms. Organizational culture can be defined as the set of common values, beliefs, and behavioral patterns unique to each organization that will impact the norms that guide work practices, as well as how workers interact with each other. With the emergent digital workplace, companies have tried to develop initiatives to keep employees engaged and with a positive mindset (Chang et al., 2021; Kansal, 2021).

Cultural tightening, characterized by order, efficiency, and directive leadership, become more adaptive during crisis but do not foster however creativity. It is therefore important that an equilibrium between rules that encourage collectivism and prevent loneliness and flexibility that empowers workers to feel autonomous is reached – a state of flexible tightness (Kniffin et al., 2021).

Organizations have made use of available communication tools to conduct teambuilding activities (virtual cooking classes, musical evenings), contests and challenges to keep workers engaged and motivated. Wellness programs such as home gym exercises to foster a healthy lifestyle have also been circulated within companies (Kansal, 2021).

Virtual management and leadership also face some challenges, as it is also harder for managers and team-leads to be aware of workers day to day developments and struggles. There is therefore a need to once again make use of technology to communicate the important changes in organizational vision and processes to their teams.

### Cyber security

The new digital workplace has also raised awareness to the issues of cyber security. With the COVID-19 pandemic, cyber-attacks have increased. Furthermore, working from home made companies more sensitive to possible data privacy disruptions, as it is harder to protect company information that resides in workers' hardware that is now spread out. It became therefore important for information structures to adapt to remain resilient, such as scaling VPN (Virtual Private Network) portals as well as gateways to help all workers working remotely safeguard business information (Dwivedi et al., 2020; Kaushik, 2020).

Remote working tools like videoconferencing systems are also sensitive to hackers. As such, trainings on cyber-security and data protection have become even more relevant. The implementation of cloud based security and platform services, data leakage prevention and threat-protection controls can also help safeguard enterprises' important information (Dwivedi et al., 2020).

### **2.3.3. Future impact**

The new era of the digital workplace is here to stay. Even though there were initial struggles, mostly related with technology and worker's wellbeing, over time there has been an adaption to the so called "new normal". A study by McKinsey predicts that 20 to 25% of advanced economies' workforce could work remotely without losing efficiency, which is four to five times more workers WFH than before the pandemic. This will change the geography of workplace, as companies are devising hybrid remote work plans to reduce office space. That in turn may change the geography of work and urban centers. There will also be less business trips as physical meetings are being replaced with virtual meetings (Lund et al., 2021).

Given the emergence of the digital workplace, new forms of training and development of workers will have to take place. Live-sessions, Webinars and Online counselling are becoming popular means of learning for companies to manage worker talent, investing in their skill development (Kansal, 2021).

With the acceleration of the digital, companies have also invested in automation, AI and other technologies (Lund et al., 2021).

The implementation of new technologies will help companies to provide employees with proper channels to engage in information and knowledge sharing. However, workers will make use of new knowledge and information repositories if they are easy to use and access. In order to generate trust in their knowledge systems, the wider spread of a culture of knowledge sharing is needed. A survey conducted by Deloitte shows that workers that find it easier to use the knowledge sharing systems are the ones that already prioritize knowledge transfer as an important work activity. As such, knowledge sharing as a priority should become part of organizational values, fostering a more transparent culture (Behem & Becker, 2021). To tackle the future of Knowledge Management and better embrace knowledge sharing platforms, Behem & Becker (2021) suggests raising employee trust in new tools by properly "defining expectations, purpose, knowledge roles and rewards".



### 3. METHODOLOGY

#### 3.1. DESIGN SCIENCE RESEARCH

Design Science Research is an approach to research which main objective is to create an innovative solution for an existing, identified research problem. This solution comes in the form of a new artifact that can be represented by models, methods, frameworks or constructs (Peffer et al., 2008; vom Brocke et al., 2020). Although DSR (Design Science Research) application has its premises in the Information Systems discipline (Peffer et al., 2008), it has become a central research paradigm in many other areas such as engineering, business and economics, as well as other IS related disciplines for the creation of novel solutions (vom Brocke et al., 2020). This research methodology aims to generate knowledge of how resolutions can be design, based on existing knowledge.

For the purpose of this research we will be following the DSR model presented by Peffer et al. (2008), given it is the most widely referenced model to date (vom Brocke et al., 2020). In order to build such artifact and present a solution, this DSR methodology consists of six steps, from problem identification to the communication the proposed artifact (Figure 3.1):

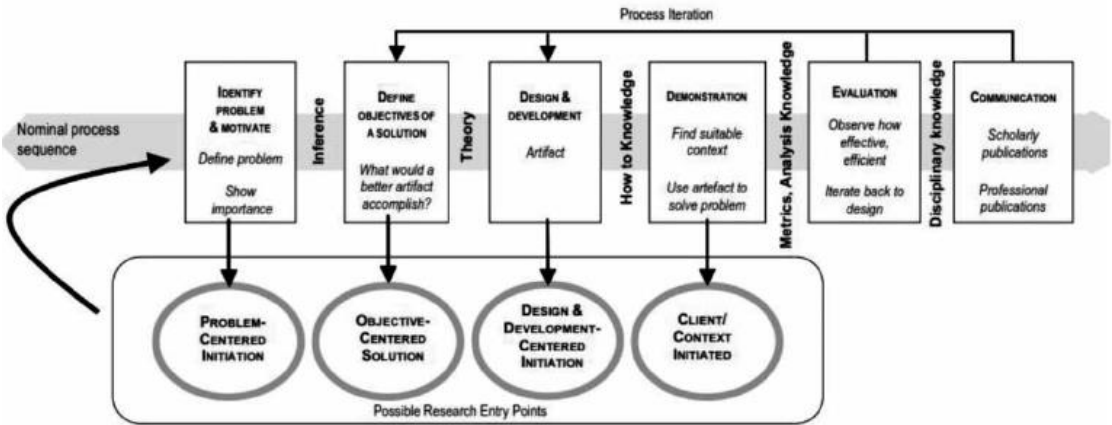


Figure 3.1 – Design Science Research methodology process model (Peffer et al., 2008)

1 – Problem Identification and motivation: In this first step, it is important to properly substantiate the value of the solution, as this will help both the researcher and its audience to better understand the reasoning behind the problem and justify the importance of its choice. Here it is important to have knowledge of the state of the problem.

2 – Define the objectives for a solution: Since the design of a solution is incremental by nature (made of partial solutions), it is important to identify objectives for the solution, inferred from the identified problem. The objectives can either be quantitative or qualitative, either stating how the optimal solution would be better than existing ones or how the new artifact can support already existing solutions to better address the problem identified.

3 – Design and development: making use of knowledge of theory that can support the solution, this core step consists of the creation of the artifact itself. As previously mentioned, the artifact can come in the form of constructs, models, methods and frameworks or new resources of technical, social, or informational nature. In theory, the result can be any artifact that entrenches the research

contribution in its design. In this step, the researcher(s) define the artifact's purpose and construction, then building the actual artifact.

4 – Demonstration: Validate the artifact solution for the defined problem. This step can involve experimentation, simulation, a case study, or other activities considered appropriate for proper demonstration of use case of the designed and developed solution.

5 – Evaluation: Evaluate how well the artifact supports the solution for the firstly identified problem. The techniques used during this process can depend on the nature of the problem and the form of the artifact. The purpose is to compare the objectives of the solution to actual measured results from use of the artifact during step 4, demonstration. It can include quantitative performance measures (budgets, results from satisfaction surveys or client feedback and simulations). In principle, the evaluation could include any empirical evidence or logical proof considered appropriate. Lastly on this step it is important to note the iterative process of the DSR methodology. As can be observed in figure 3.1, depending on the conclusions withdraw from this step, researchers can either go back to step 3 and redesign or redevelop the artifact by implementing improvements. Researchers can also conclude after the evaluation that it is worth to redefine the objectives, going one step further back to step 2. The nature of the research will dictate the feasibility of this iteration process.

6 – Communication: This step consists of the effective communication of the artifact to the respective audience. This should include the communication of previous steps (problem identification, objectives, artifact designed utility, novelty and structure). Researchers can publish this communication in form of a scholar article in the common structure of empirical research papers.

Lastly, Peffers et al. (2007) clarifies that the above order is the nominally sequential order approach to DSR. However, researchers can always choose which step makes the most sense to start from depending on the root causes that lead to the research.

## 3.2. RESEARCH STRATEGY

For this work, research was developed following a problem-based approach, meaning the idea for this research derived from an observed problem – the Covid-19 crisis and how it was impacting organizations' work style. As such, we follow the nominally sequential order presented in the section above, starting in step 1.

**Problem identification and motivation:** Working in an organization when the Covid-19 pandemic started raised awareness for how this crisis was forcing enterprises to change and how abruptly workers had to adapt. Literature reviewed complemented this awareness when the concepts of Knowledge and Crisis Management where reviewed, and most importantly current research on Covid-19 impact and thoughts for the future of enterprises.

**Define the objectives for a solution:** Literature reviewed allowed to compile knowledge on the topics of knowledge and Crisis Management, as well as the specific Covid-19 current context of enterprises. Getting this understanding allows one to form specific knowledge in support of the final model development.

**Design and development:** The model intakes formalizing previous gathered knowledge into a set of organized recommendations that can be easily understood by enterprises. For the creation of this model, we considered what researchers highlight as main observed changes/struggles for the future enterprises, as well as correct Knowledge Management planning and Crisis Management approach. We then develop comprised guidelines to approach these changes, organized in a structured manner.

**Demonstration:** The validation process in this research consists of a simulation - business case scenario. The objective was to corroborate the model's functioning in a practical organizational setting.

**Evaluation:** In this step we draw conclusions regarding the model through interviews to professional specialists that work in the areas of applicability in organizations. This stage allows to evaluate the model's utility, as well as possible improvement aspects.

**Communication:** Lastly, this dissertation will serve as means to communicate our artifact to the public.

## 4. RESULTS AND DISCUSSION

### 4.1. ASSUMPTIONS

Considering the Literature Review made regarding the concepts of Knowledge Management, Crisis Management, and the context of the Covid-19 crisis, it is possible to gather key assumptions the final artifact will be based on. The assumptions are in order of relevance for each stage of the model:

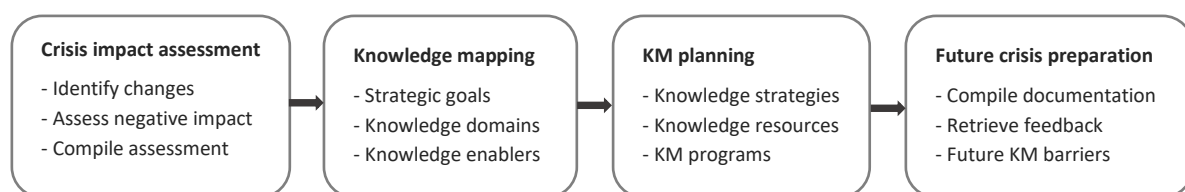
- Knowledge Management is a useful way of dealing with crisis, as threats can be prevented, or impact lessen if knowledge of influencing factors is better managed. In addition, Knowledge Management provides right knowledge resources allocation to when and where is most needed (Jennex & Raman, 2011; Wang & Belardo, 2005).
- The post-Covid 19 crisis moment englobes the Repair and Assessment phases of Crisis Management. Post-crisis entails the recovery stage, where focus should go not only to quick fixes but also to the definition of a long-term recovery plan. In addition, the learning stage can help enterprises identify weakness points and readjust Crisis Management plans accordingly for a more resilient organization (Mitroff et al., 1987).
- The model is to provide guidelines to follow in the aftermath of the pandemic – with special focus on the Assessment stage, defined by recovery (return to normalcy) and learning (redesign the organization). Enterprises should be able to implement the model in a period of time where most changes caused by Covid-19 have already happened.
- Most of the changes on enterprise normal workstyle identified in literature are related with mandatory Work from Home (chapter 2.3 of the dissertation). As such, there is a particular focus on WFH throughout the model. However, these are examples to explain the applicability of the model, and any other changes an enterprise has suffered should be considered.
- The main components of Knowledge Management in enterprises are People, Organization and Information Technology (Sunassee & Sewry, 2002; Riege, 2005; Singh & Kant, 2008; Shannal et al., 2012; Intezary et al., 2017; Ciotlos, 2020). In addition, the external environment that also holds relevant knowledge to the enterprise (Wiig et al., 1997; Sunassee & Sewry, 2002; Haggie & Kingston, 2003).
- Aligning Knowledge Management strategy with the organization's strategic goals is an important step in Knowledge Management, as knowledge should be managed in a way it helps the organization reach its final objectives (Bolisani & Bratianu, 2017; Wang & Belardo, 2005; Wiig et al., 1997).
- The Knowledge gap identification allows the enterprise to integrate knowledge needs into organizational strategy (Bolisani & Bratianu, 2017; Zack, 1999; Von Krogh et al., 2001; Sunassee & Sewry, 2002).
- Defining what knowledge is in the enterprise context has been identified as a first common issue in Knowledge Management. As such, identifying different knowledge resources within the organization lays as an essential step in Knowledge Management (Davenport & Prusak, 1998).

- There are several possible knowledge strategies, arising from the combination of different knowledge domains, knowledge creation and transfer (Von Krogh et al., 2001; Zack, 1999).
- Because of the complex nature of knowledge, as well as its embeddedness in day-to-day work, Knowledge Management should be implemented through long-term multidisciplinary programs. These programs should be defined in the terms any other project is defined (time frame, budget, objectives, responsible staff and deadline) (Wiig et al., 1997).
- Learning, prevention and preparedness are all pre-crisis phases, that take a proactive approach, of proper Crisis Management before crisis hits (Mitroff, 1987; Wang & Belardo, 2005).
- New crisis are a good opportunity to gather new knowledge on lessons learned as preparation for future crisis (Bratianu, 2020; Wang & Belardo, 2005).
- An integrated view of both rational and emergent approaches to Knowledge Management strategy allow for continuous efforts for the enterprise to learn and improve (Bolisani & Bratianu, 2017). As crisis are emergent in nature (Wang & Belardo, 2005; Fisher et al., 2016), the model will allow for organizations to rationally take on emergent changes that imply further re-planning of Knowledge Management strategies.

## 4.2. MODEL

Based on the assumptions summarized in the previous chapter, it was possible to develop the proposed model. The model's objective is to provide support for efficient enterprise Knowledge Management after the Covid-19 crisis. It is composed of an organized set of guidelines and recommendations to evaluate the organization's state post-crisis, further Knowledge Management planning for recuperation, and future preparedness.

Figure 4.1 below represents the main components reflected in the final artifact:



*Figure 4.1 – Model for enterprise Knowledge Management post Covid-19 crisis*

Each stage of the model consists of specific steps. These steps are to be implemented by a Team selected based on expertise and availability. Since Knowledge Management initiatives will impact workers day to day lifestyle, as well as normal knowledge processes and technology, the ensembled Team that will implement the model should consists of people management experts (i.e. Human Resources), information management and/or information technology experts.

### 4.2.1. Crisis impact assessment

In this stage, three steps can be taken to properly assess the crisis impact and compile the assessment results:

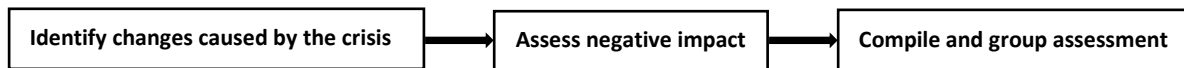


Figure 4.2 – Crisis impact assessment

**Identifying the changes caused by the crisis** should be made via an internal assessment. Resorting to an internal survey to all workers and/ or individual interviews with different Team Leads, targeted questions on the effects of the crisis on the different knowledge components can be made. In addition, it is important to evaluate the impact on the environment external to the enterprise (Wiig et al., 1995; Sunassee & Sewry, 2002). To assist in the selection of questions, Table 4.1. below comprises a list of common changes caused by the Covid-19 crisis on enterprises, identified on chapter 2.3 of this dissertation (Kniffin et al.; 2021, Kansal, 2021; Kaushik, 2020; Chang et al., 2021; Ojo et al., 2021; Dwivedi et al., 2020). This table comprises however generic issues only. Each enterprise is unique and has its own set of changes that should be identified. In case of doubt, the team in charge should leave open questions for workers to express other issues they have identified. The assessment should result in information on what changes workers and team leads identify as having happened to them and to the organization, the root-cause of these changes and their impact.

<p><b>People</b></p> <p>Change of attitude – more fearful towards unknown conditions.            Changes to overall levels of mental and physical health.            Feelings of loneliness as compared to before.            Lack of work engagement as compared to before.            Change in work life balance – overworking/underworking            In the case of change to working from home, being more or less productive.</p>
<p><b>Organization</b></p> <p>Changes in leadership style – more effective and directive orders, less flexibility and space for creativity.            Changes in organizational culture - core common values and beliefs.            Change in physical and virtual working space.            Changes to workers training programs.</p>
<p><b>Information Technology</b></p> <p>Change of communication tools used between workers - channels being used more or less than before.            Changes to hardware used by workers.            Changes in the process management tools.            Changes in information repositories.            Changes in information structures.</p>
<p><b>External environment</b></p> <p>Changes in partnerships, stakeholders and/or shareholders.</p>

Table 4.1 – Crisis impact on knowledge components

The results of the questionnaire/interviews are then evaluated according to the degree to which it impacted the organization’s normal workstyle. As such, we propose the following assessment table (4.2), to compile the results. This way, the Team responsible for this process will be able to identify not only the **negative impact** caused by the crisis but also the root causes of this impact:

Components	Why	Change	Impact
People	Mandatory WFH	Workers are lacking healthy work life balance	Takes more time to reach same objectives/ loss of productivity
Organization	Business objectives shift	More effective orders	Less space for flexibility and creativity
Information Technology	Mandatory WFH	Change in communication tools used by workers	Slower/ loss of easiness of communication between co-workers
External Environment	Partner had to close business due to the crisis	Loss of a partnership	Loss of specific relevant knowledge

Table 4.2 – Example of crisis impact assessment results

To prepare for the following steps, the **results should be grouped** according to their root cause (Why). For example, based on Figure 4.1, a grouping could be issues related with mandatory WFH, affecting both People and Information Technology.

#### 4.2.2. Knowledge mapping

It is important to get a good understanding of the organizations’ knowledge before deciding on which specific measures to implement. Even if a similar exercise has been made before the crisis, with the changes brought by the crisis and analyzed in step 1) also came new acquired knowledge to be taken into consideration (Bratianu, 2020). This step can also be useful towards identifying the Knowledge Gap - the difference between what the enterprise knows and what it must know to reach its objectives. The figure bellow presents a macro view of the strategic-knowledge gap:



Figure 4.3. – Macro view of enterprise knowledge

The knowledge goals will be the difference between where the organization wants to go, meaning its business objectives, and what the organization knows – the identified knowledge. By acknowledging both existing knowledge and strategic goals, the organization can better grasp what it doesn’t know yet but must know to reach its objectives. This in turn will mean identifying the knowledge gap.

Since knowledge identification is a complex step (Wiig et al., 1997), for this model’s final objective, knowledge mapping will be based only on relevant knowledge and strategic goals that are related with the issues identified and grouped in the first stage of the model.

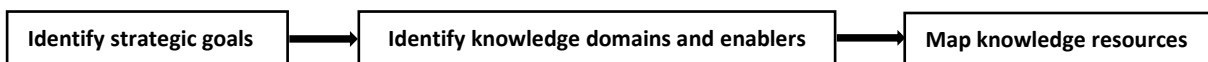


Figure 4.4. – Knowledge mapping

The first step of knowledge mapping is **identifying the relevant business strategic goals**, understanding the bigger picture of how issues caused by the crisis can be stopping the enterprise from reaching its objectives. This is an important step, as all future decisions on which Knowledge Management initiatives will be implemented are defined by whether they are aligned with the business objectives. These objectives have usually already been decided prior to the crisis and have to do with the business/area of expertise per say of the organization, as well as the environment where

it operates. These objectives also might have changed from pre to post crisis, depending on how the organization was affected.

Subsequent and most importantly on this stage comes **knowledge identification**. Knowledge identification will imply identifying all knowledge domains and enablers, which will entail the knowledge resources. Knowledge domains are key knowledge holders (people), documents or platforms with important data, and explicit knowledge (Von Krogh et al., 2001). Knowledge enablers are the resources that allow for the creation and transfer of knowledge – the interaction between knowledge domains.

The table below presents examples of different knowledge applications for each type of knowledge as well as their enabling technologies. The table can serve as support for knowledge enablers identification:

Knowledge Type	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and creation
<b>Knowledge Application</b>	Case Based Reasoning Help Desk Applications Customer Service Applications Service Agent Support Applications	Data Warehousing Data Mining Business Intelligence Management Information Systems Decision Support Systems CRM Competitive Intelligence	Intellectual Property Document Management Knowledge Valuation Knowledge Repositories Content Management	TQM Benchmarking Best Practices Quality Management Business Process Engineering Process Improvement Process Automation Lessons Learned Methodology	Skills Development Staff Competencies Learning Teaching Training	Communities Collaboration Discussion Forums Networking Virtual Teams R&D Multi-disciplined Teams
<b>Enabling Technologies</b>	Expert Systems Cognitive Technologies Semantic Networks Rule-based Expert Systems Probability Networks Rule Induction, Decision Trees Geospatial Information Systems	Intelligent Agents Web Crawlers Relational and Object DBMS Neural Computing Push Technologies Data Analysis and Reporting Tools	Document Management Tools Search Engines Knowledge Maps Library Systems	Workflow Management Process Modelling Tools	Computer-based Training Online Training	Groupware e-Mail Chat Rooms Video Conferencing Search Engines Voice Mail Bulletin Boards Push Technologies

*Table 4.3 – Examples of knowledge applications and enabling technologies (from Binney, 2001)*

Recapturing what was developed regarding the knowledge classification in chapter 2 of this dissertation, the knowledge types in the table move from most explicit to most tacit types of knowledge (left to right). As such, knowledge applications and technologies on the left-hand side of the table will allow for knowledge processes of explicit nature to occur, while knowledge applications and technologies on the right-hand side will allow for more tacit knowledge related processes to occur.



The key knowledge resources will be the sum of relevant knowledge domains, applications and/or technologies that allow for knowledge processes to take place. **Key resources are mapped to the different groups of issues from step 1) of the knowledge mapping flow.**

Let us take on the example of issues gathered in the previous step, related with mandatory WFH. The issues imply both people and tools. As such, knowledge domains will be key people – workers with issues and workers with expertise on such issues, as well as any documentation on topics related with these issues. Looking at table 4.3, knowledge enablers will allow any combination of knowledge creation and transfer of more explicit nature, for instance the tools that bring up the issues themselves, as well as processes of tacit nature such as communities and collaboration between co-workers. Thus, the final knowledge mapping resources could be:

Change	Impact	Knowledge resources
Workers are lacking healthy work life balance	Takes more time to reach same objectives/ loss of productivity	- Workers that acknowledged to be less productive - Human Resources expertise - People engagement initiatives
Change in communication tools used by workers	Slower/ loss of easiness of communication between co-workers	- Communities and collaboration - Virtual communication tools (i.e. Microsoft Teams) - IT expertise on virtual communication tools

Table 4.4 – Example of knowledge resources map

### 4.2.3. KM planning

From the results of the crisis impact assessment and the knowledge mapping process, it is possible to create a Knowledge Management plan. The objective is to plan the Knowledge Management actions to take on in order to combat the negative impact of the crisis and optimize knowledge resources usage.

Since Knowledge Management affects different areas of expertise, this plan consists of different programs, sets of short to long term multidisciplinary projects (Wiig et al., 1997).

The figure bellow presents the steps to be taken in order to plan the programs:

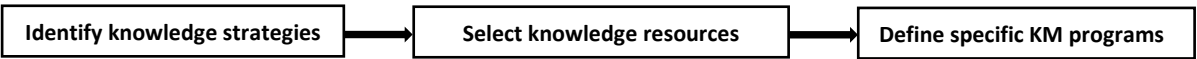


Figure 4.5 – KM planning

From the different grouping of issues, the Team should be able to **gather what potential knowledge strategies making use of the knowledge resources the organization can apply** in order to combat the negative impact caused by such issues. In this step, it is important to reflect weather the previously identified resources are enough, or if further outsourcing of knowledge resources is necessary. When creating these knowledge strategies, the Team should also bear in mind the organization’s final strategic goals, as the knowledge strategies should support business progresses towards those goals. Our model suggests the creation of the table below, writing down issues, potential knowledge strategies and knowledge resources for each issue:

Issue	Potential knowledge strategy	Knowledge resources (internal/external)
<b>WFH – workers struggling with work life balance and making use of virtual communication tools</b>	<p>Leverage on Human Resources knowledge/ external sources to give counselling to struggling workers</p> <p>Create initiatives to connect workers that easily adapted to workers that are struggling with WFH (leverage on other workers knowledge)</p> <p>Leverage on IT expert’s knowledge about virtual communication tools to provide training to users</p>	<p>HR expertise on people management</p> <p>Virtual communication tools (i.e. Microsoft Teams)</p> <p>Communities and collaboration</p> <p>IT expertise on virtual communication tools</p>

Table 4.5 – Example of knowledge strategy

As can be seen in the example, knowledge strategies consist of the combination of exploration and exploitation strategies from internal and external knowledge resources. The knowledge strategies are ways of optimizing knowledge usage to mitigate the issues caused by the crisis. These knowledge strategies are ideas of ways to use not only existing knowledge resources but also potential external resources that could be useful to solve the issues. The knowledge resources compiled during knowledge mapping will serve as a baseline for creating the knowledge strategies.

The final step of this stage consists of **setting-up necessary investment in specialized, feasible programs** to solve crisis negative results. The programs are created based on the ideas for knowledge strategies. By defining specific programs to implement the strategies, the Team can verify how manageable and realistic the knowledge strategies are. Taking for instance the examples in Table 4.5, strategy number two might not be realistic considering time constraints of workers. As such, the organization might decide to move forward only with specific programs to implement knowledge strategy one and three.

Specific parameters should be defined as in any other enterprise project – including a small description, priority status, time frame, budget and allocated resources, objectives and responsible staff (Wiig et al., 1997):

Project	Description	Priority	Time frame	Budget/resources	Objectives	Responsible staff
<b>IT training on virtual communication tools</b>	Provide training session to all workers on better ways to communicate making use of tools	High	2 months, bi-weekly sessions for each team	IT team time allocation	Create more agile communication between co-workers	Project Manager & IT
<b>Counselling on WFH healthy habits</b>	Counsel workers on healthy work life balance habits	Medium	No finish date/ minimum 6 months, weekly personal sessions	HR time allocation OR price of external psychologist sessions	Help workers to adapt to WFH so they can return to normal productivity levels	Project Manager & HR

Table 4.6 – Example KM programs set-up

**4.2.4. Future crisis preparation**

As new crisis can strike at any minute, the final stage of this model is preparedness for future crisis. The COVID-19 crisis certainly brought a lot of learning experiences. Comprising such lessons learned can be a good way to prepare for future crisis.

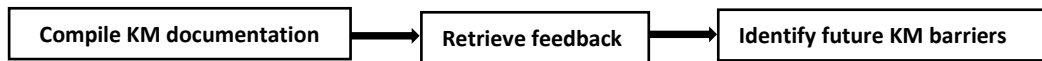


Figure 4.6 – Future crisis preparation

The first step in this stage should be to **compile all KM documentation** from the previous stages – from issues identified, to knowledge resources, knowledge strategies and final KM Programs. This documentation will be useful to have for future crisis, as a baseline for faster KM mitigation of crisis consequences.

Secondly, it is of high relevance to **obtain feedback from workers on the progress of the KM projects**, evaluating if the final objectives are being reached. This should be done by presenting the KM Programs to workers and providing a questionnaire to obtain such feedback.

Since Knowledge Management success relies on the engagement of all workers, asking for more feedback can add to the contribution of everyone towards KM initiatives, as well as further prevention towards future crisis. In hopes of **identifying further Knowledge Management barriers** that go beyond the Covid-19 crisis, the Team can in addition retrieve worker’s take on other issues they have been facing, based on generic KM barriers.

The table below comprises common challenges faced by enterprises by KM component, gathered in chapter 2.1.3 b) of this dissertation, providing support to this further identification of issues:

<p><b>People</b></p> <ul style="list-style-type: none"> <li>Lack of time to engage in knowledge sharing</li> <li>The idea that “knowledge is power” and engaging in knowledge sharing will risk job security</li> <li>Lack of motivation from not understanding the usage of knowledge as an important strategic tool</li> <li>Lack of trust in the knowledge sources or recipients</li> </ul>
<p><b>Organization</b></p> <ul style="list-style-type: none"> <li>Poor organizational culture</li> <li>Strong hierarchical organizational structure that slows down knowledge sharing processes</li> <li>Sense of competition between different areas within the organization</li> <li>Lack of top management commitment/poor leadership directions towards a positive image of knowledge engagement activities</li> <li>Lack of formal and informal conditions and spaces to engage in knowledge processes (creation and transfer)</li> <li>Lack of rewarding and recognition systems to support knowledge sharing</li> </ul>
<p><b>Information Technology</b></p> <ul style="list-style-type: none"> <li>Lack of IT systems and processes integration</li> <li>Lack of technical support/maintenance when IT systems are not working, hindering normal communication and knowledge processes</li> <li>Individuals not knowing how to use the existing IT system/ lack of training</li> <li>Individuals’ reluctance towards using knowledge IT systems due to lack of understanding towards their usefulness</li> </ul>
<p><b>External environment</b></p> <ul style="list-style-type: none"> <li>Relationships with partners, stakeholders and/or shareholders.</li> </ul>

Table 4.7 – Potential barriers to Knowledge Management (adapted from chapter 2)

### 4.3. CASE SCENARIO

In order to complete the demonstration step of this research, the simulation bellow presents a business case scenario with the model application. The scenario presents pre and post crisis conditions of a fictitious company called XYZ.

Company XYZ is a B2C Portuguese business that sells both man and women's cosmetics from several brands. Company XYZ sells through two channels: physical stores all over several Portuguese mainland regions; and online, with home delivery to consumers, via a partnership with the national postal service. The company, although still growing and dedicated to the Portuguese market only, already has a stable organizational structure. Besides the core area, Commercial, dedicated to the relationships with the cosmetics' producers, it is composed of other relevant areas such as Marketing, Online - dedicated to the company's website and home delivery service, Human Resources, Information Technology – in charge of the company's technological infrastructure, Legal, and Store Management.

With the Covid crisis, some main changes suffered by the company led to periods of time where stores had to close, increasing online home delivery demand of products. Large differences in the demand of different products as compared to before the crisis also changed due to consumers sudden change of habits. This in turn led to some rethinking of the business strategy, as well as reallocation of resources to increasing assistance to critical areas such as Online.

In a more stable post-Covid 19 moment, Company XYZ finds itself in the need of instruments to deal with the drastic and rapid changes the crisis enacted. As such, bellow is presented the application of the Model for enterprise Knowledge Management post Covid-19 crisis as an instrumental solution for this company.

Company XYZ starts by defining who is going to be on the team responsible for implementing the model – Team ABC. The company decides that Team ABC is going to be composed of one HR specialist and one IT expert. A person with experience in project management from the Commercial team was also selected to support Team ABC with the model implementation. Next, the Team goes through each stage of the model:

#### **1) Crisis impact assessment:**

Team ABC started by selecting specific questions based on all the team leads to identify more prominent highlighted issues of each team. After compiling information on such issues and based on the crisis impact on knowledge components (Table 4.1), the team of Company XYZ build a questionnaire with targeted questions regarding possible changes on the different knowledge components from worker's viewpoint. The results of both the interviews and questionnaire were collected. The results showed some prominent issues that the crisis brought to what used to be the normal functioning of the enterprise. Making use of table 4.2, the following assessment was compiled, gathering information on the changes, root-cause of changes and what was their impact from workers view-point:

Components	Change	Why	Impact
<b>People</b>	<ul style="list-style-type: none"> <li>- 75% of workers feel they are less productive working from home on most days.</li> <li>- 80% of workers from Online team find it challenging to share information with their colleagues and are often working overtime more.</li> </ul>	<ul style="list-style-type: none"> <li>- Workers are more distracted and find it harder to manage their time WFH</li> <li>- Information used to be passed on more informally within the team, via casual conversations in the office – which has not been possible WFH.</li> </ul>	<ul style="list-style-type: none"> <li>- A large portion of workers are more tired and more prominent to make mistakes in their tasks.</li> <li>- With the increase in demand of work for this team, it has been very complicated to respond, and workers are feeling frustrated. Online services haven't been working as well as before.</li> </ul>
<b>Organization</b>	<ul style="list-style-type: none"> <li>- 2 workers were contracted to the Online team and were onboarded virtually.</li> <li>- Online team lead has had less space for flexible orders, having changed to a more rigid and directive leadership style.</li> </ul>	<ul style="list-style-type: none"> <li>- In order to help with the extra work demand.</li> <li>- Due to extra work demand.</li> </ul>	<ul style="list-style-type: none"> <li>- Onboarding has been challenging due to lack of good flow systems to support virtual training.</li> <li>- Less space for creative approaches.</li> </ul>
<b>Information Technology</b>	<ul style="list-style-type: none"> <li>- Higher demand on virtual communication channels and internal knowledge repositories.</li> </ul>	<ul style="list-style-type: none"> <li>- Due to mandatory WFH.</li> </ul>	<ul style="list-style-type: none"> <li>- 15% of workers were not used to using these tools as often and are finding them challenging.</li> </ul>
<b>External Environment</b>	<ul style="list-style-type: none"> <li>- Additional partner to help with home delivery service of products</li> </ul>	<ul style="list-style-type: none"> <li>- Due to the high demand of online sales.</li> </ul>	<ul style="list-style-type: none"> <li>- Challenging extra work for Online team.</li> </ul>

Table 4.8 – Case scenario example 1

Lastly on this stage of the model, the team identified two groups of prominent issues:

*Result group 1 – Increasing demand of Online work:*

- *Burnout of Online team workers;*
- *Less space for flexible and creative leadership;*
- *Challenging onboarding of Online team newcomers;*
- *Challenges dealing with managing extra work with the new partner.*

*Result group 2 – general issues related with WFH:*

- *75% of all workers are facing mental and physical health issues related with WFH, making them more prominent to make mistakes;*
- *A small proportion of workers (15%) are finding it hard to use virtual communication tools, also related to WFH.*

## 2) Knowledge mapping

Following the model, Team ABC was now responsible for creating a knowledge map. Team ABC acknowledged one of the Company's XYZ business strategic goals, related with Result group 1:

Strategic goal - *Providing customers with the best online service experience when buying cosmetics.*

Next, Team ABC identified knowledge resources by choosing key tacit and explicit knowledge holders - knowledge domains. In addition, it made use of the knowledge applications and technologies examples (Table 4.3) to identify key knowledge enablers. Lastly, knowledge resources were mapped to the results, with the following outcome:

Change	Impact	Resources
Increasing demand of Online work	<ul style="list-style-type: none"> <li>- Burnout of Online team workers</li> <li>- Less space for flexible and creative leadership</li> <li>- Challenging onboarding of Online team newcomers</li> <li>- Challenges dealing with managing extra work with the new partner</li> </ul>	<ul style="list-style-type: none"> <li>- Online team workers and team lead</li> <li>- Internal knowledge sharing platform</li> <li>- Virtual communication channels</li> <li>- Experts on virtual communication channels</li> <li>- Virtual training for Online newcomers</li> <li>- Partners who perform home delivery services</li> <li>- People management experts</li> </ul>
General issues related with WFH	<ul style="list-style-type: none"> <li>- 75% of all workers are facing mental and physical health issues related with WFH making them more prominent to make mistakes</li> <li>- A small proportion of workers (15%) are finding it hard to use virtual communication tools, also related to WFH.</li> </ul>	<ul style="list-style-type: none"> <li>- Workers</li> <li>- People management experts</li> <li>- Virtual communication tools</li> <li>- Training on virtual communication tools</li> </ul>

Table 4.9 – Case scenario example 2

**3) KM planning**

Looking at the knowledge map for the specific issues identified during the crisis impact assessment, company XYZ was able to identify relevant possible knowledge strategies - making use of Table 4.5:

Issue	Potential knowledge strategy	Knowledge Resources (internal/external)
<b>General productivity issues of WFH</b>	Leverage on Human Resources knowledge and/or external sources to provide WFH counselling to workers.	<ul style="list-style-type: none"> <li>- HR expertise on people management</li> <li>- External psychologists or life coaches</li> </ul>
<b>Virtual teamwork and knowledge sharing in the Online team</b>	<ul style="list-style-type: none"> <li>- Create a proper knowledge repository space in the internal intranet for the Online team.</li> <li>- Give training to workers on virtual communication tools and knowledge repositories functioning.</li> </ul>	<ul style="list-style-type: none"> <li>- IT expertise on knowledge repositories and virtual communication tools</li> <li>- Existing guides/documentation on knowledge sharing repositories and virtual tools</li> </ul>
<b>Virtual onboarding in the Online team</b>	- Create a welcoming package and virtual onboarding program specific to the Online Team.	<ul style="list-style-type: none"> <li>- HR expertise on people management</li> <li>- IT expertise on virtual tools</li> <li>- Online Team Lead expertise on Online Team</li> <li>- Partnership knowhow on home delivery services</li> </ul>

Table 4.10 – Case scenario example 3

Lastly, based on the potential knowledge strategies identified, Team ABC decided on the actual KM projects that were feasible considering knowledge resources and most prominent issues. Team ABC settled on 4 KM projects and defined priority, time frame, budget/resources, objectives and responsible staff for each (Table 4.6):

Project	Description	Priority	Time frame	Budget/resources	Objectives	Responsible staff
<b>Counselling on WFH healthy habits</b>	Providing team sessions during working hours. Make personal sessions available for workers.	High	2 months (Sep.- Oct.)	External psychologist price of counselling sessions	Help workers to adapt to WFH so they can return to normal productivity levels.	HR specialist
<b>Online Knowledge repository</b>	Create a proper and useful knowledge sharing repository for the online team in the existing intranet.	High	1 month (Oct.)	IT intranet expertise and online team	Help Online workers to work better from home.	IT Specialist; Online Team
<b>Online team training</b>	Provide training sessions on internal knowledge sharing repositories and virtual communication tools	Medium	2 months (Oct.- Nov.)	IT expertise on virtual communication tools and intranet.		IT Specialist
<b>Package for virtual onboarding</b>	Creating a welcoming package with compiled documentation and training sessions for Online team newcomers.	Medium	3 months (Oct.- Dec.)	HR, IT, Online and partner's home delivery service expertise.	Leverage on internal and external knowledge in order to prepare Online newcomers for success.	Online Team Lead; HR specialist; IT specialist

Table 4.11 – Case scenario example 4

#### 4) Future crisis preparation

After setting out the projects, company XYZ was in conditions to start the process of preparation for future crisis. Team ABC gathered all the documentation compiled in 1), 2) and 3) and prepared a presentation for all the workers on the Knowledge Management projects progresses. In the end of the session, they open the floor for workers feedback, as well as other ideas they might have – contributing to the engagement of everyone towards Knowledge Management initiatives.

Lastly, team ABC verified Table 4.7 to gather more potential barriers to Knowledge Management. They realised that in order to be better prepared for future crisis, considering the issues found after the Covid-19 crisis and highlighted by workers, company XYZ should focus at least on these two KM barriers:

- Lack of formal and informal conditions and spaces to engage in knowledge processes (creation and transfer).
- Individuals not knowing how to use the existing IT system/ lack of training.

Investing on the enhancement of these two important barriers that hinder Knowledge Management should prevent the same issues resulting from the previous crisis to happen once more. The success of the KM Projects from step 4) will also influence these investments, depending on their results.

## 4.4. EVALUATION

Proper evaluation of the model was made recurring to individual interviews to different professional experts. As the model was built based of Literature Review and is meant to support enterprises in a professional context, this method of evaluation allowed to corroborate its utility, as well as obtain further feedback on potential improvements.

To do so, the model was presented to three professionals making use of the presentation in Appendix 1 - where the background behind the research was presented, as well as the different model stages and steps. Afterword's, questions were made in view of retrieving the desired feedback. As the purpose was to understand the utility of the model and obtain further advice on improvements, the questions made were:

- 1) Do you consider the proposed model is useful?
- 2) Do you agree with the presented model? If so, why/why not?
- 3) In view of your work experience, would you have any recommendation or suggestions for further improvements of the proposed model?

The experts were selected based on their professional background. All three interviewees were and are working as experts in positions where they had to or are still dealing with the changes to the normal workstyle of their respective workplaces caused by the Covid-19 crisis. As such, these experts could be part of the Team responsible for implementing the model. Each expert works in a different high knowledge demand area within their organizations – Internal Communications, Information Management/Governance, and Human Resources. The different backgrounds allowed to retrieve feedback on the model from different perspectives for a more complete evaluation.

The summary of each interviewee' background together with their answers to the interview questions can be found bellow:

### **First interviewee: Internal Communications Specialist**

This specialist works in the internal communications team of a large organization. This person lived through pre crisis and crisis moments in their current position, in a team responsible for understanding the quick crisis responses in place and internal communication of such responses to workers.

#### Question 1 - Do you consider the proposed model is useful?

Yes, especially as a tool to substantiate middle management advises on crisis reactions for top management approval, providing support to the decision making process behind such advises.

#### Question 2 - Do you agree with the presented model? If so, why/why not?

I do agree with the presented model. However, the last stage most likely does not help with completely new/unpredictable crisis, if we follow an iterative process. That being said, it can provide support for future similar crisis, or at least similar consequences different crisis might entail.

#### Question 3 - In view of your work experience, would you have any recommendation or suggestions for further improvements of the proposed model?



I was trying to think of a particular example of an issue to go through the process of this model. It does work for some issues, but not for all as knowledge resources are not necessarily all that relates to a problem – for instance communications, legal or security actions are very much necessary for some crisis issues. This can be something to take into consideration. However, even if it does not solve all issues, it does at least help to mitigate them.

### **Second interviewee: Information Management Specialist**

This specialist has worked in the information management/governance team of a large organization. They lived through pre crisis and crisis moments in their information management position. They worked towards finding information and Knowledge Management solutions during the crisis times, leveraging on the organization's information management tools.

#### Question 1 - Do you consider the proposed model is useful?

I think it is useful. It is clear and follows an intuitive structure.

#### Question 2 - Do you agree with the presented model? If so, why/why not?

I agree, it is quite complete and self-explanatory.

#### Question 3 - In view of your work experience, would you have any recommendation or suggestions for further improvements of the proposed model?

I think it would be interesting to give more specific examples on working from home for the sake of better understanding how Knowledge Management would apply in such more specific cases. That being said, from a more macro perspective the model seems to work quite well.

I would like to add that it is part of everyone's (every worker's) job to keep an eye out/ keep updated on new tools. If this could somehow be expressed in the model, I think it could be useful.

### **Third interviewee: Human Resources Specialist**

This Human Resources Specialist has vast experience with people engagement initiatives, employee training and onboarding. This specialist has faced/ has been facing the natural issues the Covid-19 situation has brought to their company workstyle, finding solutions for these enforced changes.

#### Question 1 - Do you consider the proposed model is useful?

I do, I think this is a very nice model. I can see your model work in our company.

#### Question 2 - Do you agree with the presented model? If so, why/why not?

I do agree with this model as from what you have described this is very much the process we tried to follow in our company. For instance, when the crisis hit a major issue was onboarding virtually, as we were not used to this at all. As such, it was very important for us to assess workers take on this and make use of all our resources in order to come up with a solution that would provide our newcomers with the best virtual welcoming as possible. I would also add that we can see how some things have changed for the better for the future – for instance, some workers do feel they are more productive

working from home. Obviously, there are no right solutions for the future, but having these inputs and getting workers on board with different initiatives allows us to adapt and keep a flexible attitude.

Question 3 - In view of your work experience, would you have any recommendation or suggestions for further improvements of the proposed model?

Right now I cannot say I would have any specific recommendations, as from what I gathered the model is quite complete. I would perhaps suggest exploring different examples to see if the model still applies. I would also find it interesting to check what other practical situations the model could apply to – but for the specific investigation you have made regarding Covid-19 I think it is a good, flexible model.

## 4.5. DISCUSSION

After the completion of the interviews, it was possible to retrieve important thoughts and different views respecting the model.

Overall, interviewees found the model useful and complete. The first interviewee mentioned how it could be specially interesting when attesting for decision making. For instance, it can provide proof to substantiate decisions based on intuition, which can happen particularly in early stages of Crisis Management when quick decisions must be made. The third interviewee added how they could imagine very well the model being applied in their company, as it formally provides guidelines to what they have informally been trying to do.

Besides the answers given to each questions, interviews provided space for more discussions, allowing to arrive to further conclusions about this research.

To start with, after the presentation of the model to the first interviewee (Internal Communications Specialist), there were a couple of important questions raised.

The first one was regarding which stage exactly of crisis or post-crisis is pretended for model applicability. The question was raised as this interviewee believes their organization is still going through some changes and quick repairments cycles, making them question the applicability of the model in such scenario. We explained exactly which stages of Crisis Management exist, and which stages the model fits into. This really helped the interviewee understand its utility for some changes their organization had already gone through, and how latter on it could help with most changes.

The second question was on what exactly the different types of knowledge in Table 4.3 (examples of knowledge applications and enabling technologies) were, so they could better understand the knowledge enablers. Once we explained how the table displays knowledge from most explicit to most tacit types, the interviewee doubt was made clear.

These questions allowed us to conclude that, to have the model ready for implementation, it is very important to include the relevant assumptions. In addition, we added a brief explanation about the types of knowledge on Table 4.3 for clearance. We took into consideration both these aspects during the following two interviews and these questions did not arise, which allowed to conclude these

additions were useful. Ultimately, if the model is to be utilized by different types of workers, it is important that very specific aspects are well made clear.

Another important point of discussion raised in all interviews was if and how the model could apply to more specific or different types of issues.

The first aspect it was important to clarify was that the model was built to assist with post Covid-19 crisis specifically. As different crises hold unique and complex characteristics, it was important to narrow down the scope of this research. Once this point was clarified, there was still the question on how the last stage could help with future crisis. An interesting conclusion gathered from the interviews with the first and third interviewee was that even though future crisis might have very different characteristics than Covid-19, to some extent suffered consequences might be similar, or even the same. In addition, having documentation on different knowledge strategies and past KM projects can help mitigate consequences of future crisis, even if in a small scale. Furthermore, the third interviewee (HR specialist) added how having this type of planning does provide enterprises with tools to keep flexible and adaptable – which when it comes to crisis is a very important part of the solutions. As such, we concluded that the model does provide the intended support for future crisis.

As far as further applicability of the model, interviewees two (Information Management specialist) and three (HR specialist) were wondering about other more specific issues the model could help mitigate. As can be seen in the presentation (Appendix 1), the examples given are broad and generic, as we wanted to demonstrate easy and understandable applicability of each stage of the model. During these discussions, the case scenario proved to be quite useful. Both interviewees raised the question of how the model could help for instance with the problem of welcoming newcomers virtually, a struggle they had gone through in this crisis. The case scenario presented in the demonstration phase of this research provides more specific examples of the model's applicability, the example presented by the interviewees included. Once we presented the example, it was much clearer for the interviewees the broad applicability of the model.

However, this gave rise to another point of discussion: how the model provides a good macro view but might fail on guidelines for specific issues. In particular, the second interviewee was wondering exactly what solutions could be provided for each issue. The conclusion in this point was that indeed the model's objective is to provide a good macro set of guidelines. However, very specific issues will depend very much on each organization's context. Since the model is meant to have a broad applicability on enterprise management, it was impossible to provide very specific knowledge solutions – in this case, knowledge strategies and KM programs – to each problem. The interviewees understood and agreed that on the macro level the model does work.

An additional and valuable discussion was on if knowledge resources are in fact all the resources necessary for mitigation of issues. The first interviewee highlighted on how other important areas such as legal aspects, security actions and communications are equally relevant for problem mitigation. This was an interesting point of discussion, as actually knowledge resources also entail legal, security and communications knowledge. It is necessary to understand that knowledge influences all areas of an organization. Knowledge Management projects can be implemented in all sorts of areas, depending on key knowledge and issues in question. This discussion proved once again how relevant it is for organizations to properly understand what knowledge and knowledge resources they possess depending on the surrounding environment and working context. The importance of the definition of

knowledge has been highlighted in the Assumptions which the model bases off. For a broader view on the definition of knowledge, the Literature Review chapter of this dissertation provides a good summary of scholars' definition of knowledge for enterprise management.

One last relevant point was raised by the second interviewee, the Information Management specialist. This specialist mentioned how it should be part of every workers' job to keep updated on new tools. From their experience working with several information management tools and providing different areas within the organization with knowledge solutions, they found it essential for everyone to keep updated on new tools and provide ideas for management improvement. The last stage of the model proposes to ask for feedback to workers, keeping them engaged in knowledge solutions. This is crucial for Knowledge Management to work, as also highlighted by interviewee three, the HR expert. They said that during the Covid-19 crisis, what they have found most useful was to ask for and provide worker's constant feedback on improvements.

In brief, the results of the interview confirmed the model's usefulness, with overall agreeableness by interviewees. It clarified that presenting the case scenario together with the model is relevant so the public understands more concrete examples of the model's applicability. For the model to be properly implemented, two necessities highlighted are: to get a good understanding of what knowledge means for each organization, as well as what are the key knowledge resources; to invest on worker's participation in Knowledge Management solutions. In addition, the results confirmed the model works as a high-level set of guidelines, providing a macro solution. Further detailed solutions are dependent on issues specific to each organization.

## **5. CONCLUSIONS**

This dissertation sought to integrate Knowledge Management theory into Crisis Management, with the final objective of providing a solution for enterprise management after Covid-19 crisis.

### **5.1. SYNTHESIS OF THE DEVELOPED WORK**

The development of this research started with the identification of the problem of how the Covid-19 crisis had negatively impacted enterprises normal workstyle. Based on this problem, a decision was made on a process to follow in order to find a solution, recuring to the Design Science Research methodology. The final goal was to create an artifact that presented a Knowledge Management solution to dealing with post-Covid 19 crisis impact. In order to create this artifact, extensive literature review was made on the areas of Knowledge Management, Crisis Management and the Covid-19 crisis. From the information obtained during the literature review process, it was possible to create a theoretical and macro model composed of four stages that could be applied during the post-crisis moment of Crisis Management by enterprises, incorporating a Knowledge Management solution. In order to simulate the model's practicability, a case scenario was created with the model applicability. For further validation of the model, interviews were conducted to professional experts that worked closely with knowledge resources during the Covid-19 crisis. Feedback was gathered and conclusions were made regarding the model in agreement.

The intermediary objectives stated in chapter 1 of this dissertation were reached as the Literature Review collected provides an overview of the information necessary in order to build the final model. The model was successfully constructed and evaluated.

### **5.2. LIMITATIONS**

During the evaluation stage of this research, it was possible to gather main limitations of the model. The model's first limitation is that although it provides a complete broad view on a macro level, it does not offer specific micro-level knowledge solutions for each problem potential problem. This limitation is related with the fact that each issue will be specific to each organization, as well as the proper knowledge resources to help mitigate it.

The model was not tested on a real-life case scenario – as the simulation made was a fictional case. As such, and although it was based on scholar's literature review and evaluated by professional experts, the model ceases to prove as a valid adaptable solution for all possible scenarios within a company.

Another limitation is the fact that the model was prepared for the very specific scenario of the Covid-19 crisis, failing to provide a valid solution for other types of crisis. Conclusions from the interviews suggest that aside from the fact that solutions obtain via model's application can help mitigate future issues, it is still possible some issues will be completely different and unrelated. In such cases, the last stage of the model will cease to provide support.

Lastly, the results from the interviews suggest that to fully explain and clarify the model applicability and usage, it is of significance to present the case scenario and assumptions that accompany the model. This might limit the model's understanding if not presented together with example scenarios.

### 5.3. RECOMMENDATIONS FOR FUTURE WORKS

Following the limitations presented, there are three recommendations we gathered for future investigation.

Firstly, it would be useful to further validate the model's applicability in specific different enterprise contexts, withdrawing conclusions on model's viability, future improvements, and potential changes. In addition, such validation would allow to draw conclusions on specific solutions this model does not yet cover.

It would also be interesting to investigate the model's adaptability to other crisis, by developing further research on other types of crisis and either incorporating this investigation to the model or adapting the model to other crisis types.

Lastly, it would be noteworthy to investigate how worker's adaptability skills and behavior towards crisis can be assessed and improved so that the model can be most efficiently implemented.

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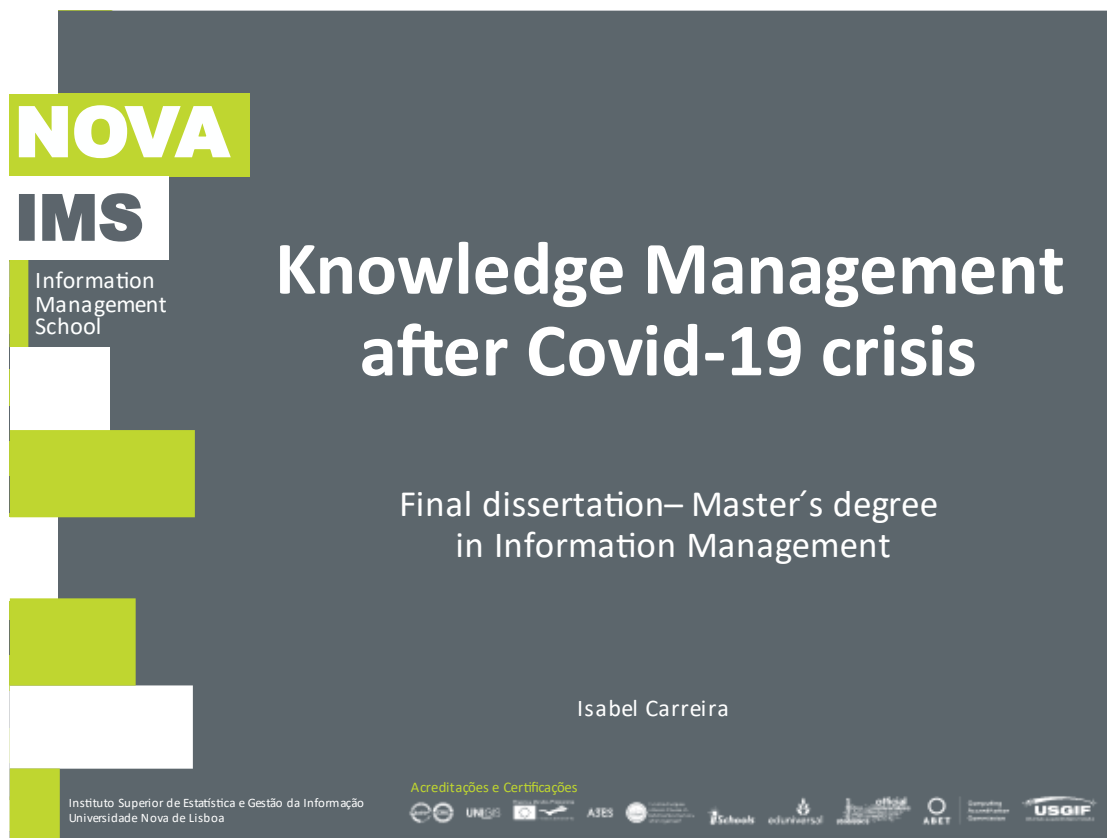
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## APPENDIX

### Appendix 1



**NOVA**  
**IMS**  
Information Management School

# Knowledge Management after Covid-19 crisis

Final dissertation– Master’s degree in Information Management

Isabel Carreira

Instituto Superior de Estatística e Gestão da Informação  
Universidade Nova de Lisboa

Acreditações e Certificações

EFMD EQUIS ACCREDITED  
AACSB ACCREDITED  
AMBA ACCREDITED  
UNISYS  
A3ES  
EFMD EQUIS ACCREDITED  
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ABET  
USOIF

## NOVA IMS Information Management School

### Research context

#### What was the purpose of this research?

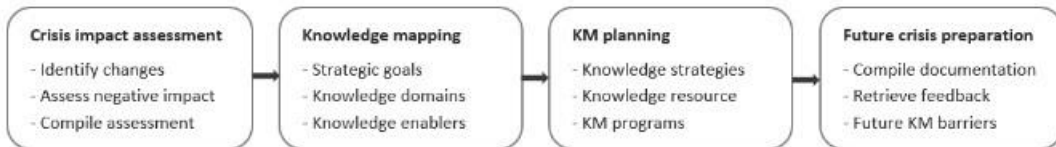
The final objective was to find a solution to provide support for efficient enterprise Knowledge Management after the Covid19 crisis.

#### Why?

Knowledge Management is a useful way of dealing with crisis, as threats can be prevented, or impact lessen if knowledge of influencing factors is better managed. In addition, Knowledge Management provides right knowledge resources allocation to when and where is most needed.

# Model presentation

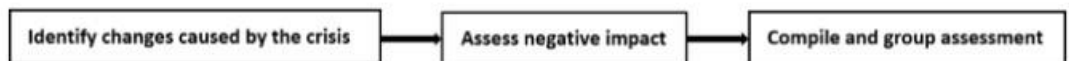
The model consists of four main stages:



- Incorporating Knowledge Management in post-crisis stages of Crisis Management
- Implemented by a Team of workers selected based on availability and expertise

# Model presentation

## 1) Crisis impact assessment



<b>People</b>
Change of attitude – more fearful towards unknown conditions. Changes to overall levels of mental and physical health. Feelings of loneliness as compared to before. Lack of work engagement as compared to before. Change in work life balance – overworking/underworking In the case of change to working from home, being more or less productive.
<b>Organization</b>
Changes in leadership style – more effective and directive orders, less flexibility and space for creativity. Changes in organizational culture – core common values and beliefs. Change in physical and virtual working space. Changes to workers training programs.
<b>Information Technology</b>
Change of communication tools used between workers – channels being used more or less than before. Changes to hardware used by workers. Changes in the process management tools. Changes in information repositories. Changes in information structures.
<b>External environment</b>
Changes in partnerships, stakeholders and/or shareholders.

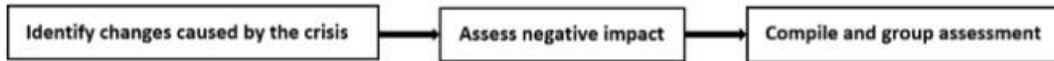
impact assessment  
summary table (example)

Components	Why	Change	Impact
People	Mandatory WFH	Workers are lacking healthy work life balance	Takes more time to reach same objectives/ loss of productivity
Organization	Business objectives shift	More effective orders	Less space for flexibility and creativity
Information Technology	Mandatory WFH	Change in communication tools used by workers	Slower/ loss of easiness of communication between co-workers
External Environment	Partner had to close business due to the crisis	Loss of a partnership	Loss of specific relevant knowledge

WFH\* – Work from Home

# Model presentation

## 1) Crisis impact assessment



Components	Why	Change	Impact
People	Mandatory WFH	Workers are lacking healthy work life balance	Takes more time to reach same objectives/ loss of productivity
Organization	Business objectives shift	More effective orders	Less space for flexibility and creativity
Information Technology	Mandatory WFH	Change in communication tools used by workers	Slower/ loss of easiness of communication between co-workers
External Environment	Partner had to close business due to the crisis	Loss of a partnership	Loss of specific relevant knowledge

### Example of final grouping

Issues related with mandatory WFH:

- Workers lacking healthy work-life balance
- Struggles using virtual communication tools

# Model presentation

## 2) Knowledge mapping



**Knowledge domains** : keyknowledge holders (people), documents or platforms with important data, information and explicit knowledge. The knowledge domains can be either internal or external to the organization, in the case partnerships' knowledge is commonly leveraged by the enterprise .

**Knowledge enablers**: resources that allow for the creation and transfer of knowledge.

Knowledge Type	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and creation
Knowledge Application	Case Based Reasoning Help Desk Applications Customer Service Applications Service Agent Support Applications	Data Warehousing Data Mining Business Intelligence Management Information Systems Decision Support Systems CRM Competitive Intelligence	Intellectual Property Document Management Knowledge Valuation Knowledge Repositories Content Management	TQM Benchmarking Best Practices Quality Management Business Process Engineering Process Improvement Process Automation Lessons Learned Methodology	Skills Development Staff Competencies Learning Teaching Training	Communities Collaboration Discussion Forums Networking Virtual Teams R&D Multi-disciplined Teams

# Model presentation

## 2) Knowledge mapping



### Example of knowledge resources map

Change	Impact	Knowledge resources
WFH – workers struggling with work life balance and making use of virtual communication tools	<ul style="list-style-type: none"> <li>- Takes more time to reach same objectives/ loss of productivity</li> <li>- Slower/ loss of easiness of communication between coworkers</li> </ul>	<ul style="list-style-type: none"> <li>- Workers that acknowledged to be less productive</li> <li>- Human Resources Expertise</li> <li>- People engagement initiatives</li> <li>- Communities and collaboration</li> <li>- Virtual communication tools (i.e. Microsoft Teams)</li> <li>- IT expertise on virtual communication tools</li> </ul>

# Model presentation

## 3) KM planning



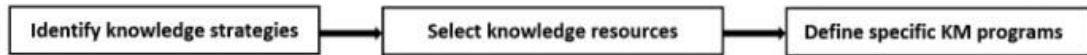
Knowledge strategies: exploration/ exploitation of knowledge resources

Example:

Issue	Potential knowledge strategy	Knowledge resources (internal/external)
WFH – workers struggling with work life balance and making use of virtual communication tools	<ul style="list-style-type: none"> <li>Leverage on Human Resources knowledge/ external sources to give counselling to struggling workers</li> <li>Create initiatives to connect workers that easily adapted to workers that struggling with WFH (leverage on other workers knowledge)</li> <li>Leverage on IT expert's knowledge about virtual communication tools to provide training to users</li> </ul>	<ul style="list-style-type: none"> <li>HR expertise on people management</li> <li>Virtual communication tools (i.e. Microsoft Teams)</li> <li>Communities and collaboration</li> <li>IT expertise on virtual communication tools</li> </ul>

# Model presentation

## 3) KM planning

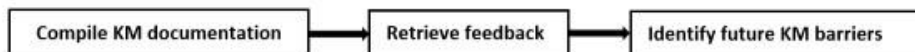


KM Programs:

Project	Description	Priority	Time frame	Budget/resources	Objectives	Responsible staff
IT training on virtual communication tools	Provide training session to workers on better ways to communicate making use of tools	High	2 months, bi weekly sessions for each team	IT team time allocation	Create more agile communication between co-workers	Project Manager & IT
Counselling on WFH healthy habits	Counsel workers on healthy work life balance habits	Medium	No finish date/ minimum 6 months, weekly personal sessions	HR time allocation OR X€ for external psychologist	Help workers to adapt to WFH so they can return to normal productivity levels	Project Manager & HR

# Model presentation

## 4) Future Crisis Preparation



<p><b>People</b></p> <p>Lack of time to engage in knowledge sharing The idea that "knowledge is power" and engaging in knowledge sharing will risk job security Lack of motivation from not understanding the usage of knowledge as an important strategic tool Lack of trust in the knowledge sources or recipients</p>
<p><b>Organization</b></p> <p>Poor organizational culture Strong hierarchical organizational structure that slows down knowledge sharing processes Sense of competition between different areas within the organization Lack of top management commitment/poor leadership directions towards a positive image of knowledge engagement activities Lack of formal and informal conditions and spaces to engage in knowledge processes (creation and transfer) Lack of rewarding and recognition systems to support knowledge sharing</p>
<p><b>Information Technology</b></p> <p>Lack of IT systems and processes integration Lack of technical support/maintenance when IT systems are not working, hindering normal communication and knowledge processes Individuals not knowing how to use the existing IT system/ lack of training Individuals' reluctance towards using knowledge IT systems due to lack of understanding towards their usefulness</p>
<p><b>External environment</b></p> <p>Relationships with partners, stakeholders and/or shareholders.</p>

## Questions for interviewees

- 1) Do you consider the proposed model is useful?
- 2) Do you agree with the presented model? If so, why/whynot?
- 3) In view of your work experience, would you have any recommendation or suggestions for further improvements of the proposed model?

**Thank you for your  
valuable contribution!**

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Acreditações e Certificações



