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Managing Knowledge Products: System Architecture addressed to Software Industry

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ABSTRACT

Software development organizations are dynamic and complex, so they need to continually renew their processes to excel in a highly competitive marketplace. The primary organizational asset for that matter is ‘the knowledge’ since it becomes a source of profit when directly related to the development of the final product. Furthermore, such knowledge is also used to address issues related to the management of people, processes, technologies, and products. Besides, knowledge is essential to increase sustainable competitive advantage and profit, as well as help in decision making. This is the scenario in which software industry organizations are looking for ways to manage their organizational knowledge. Thus, Knowledge Management (KM) emerges as a practical alternative which offers processes for the capture, storage, sharing, and application of organizational knowledge, aiming at improving the performance of the organizations, and bringing benefits such as innovation and sustainability. The individual knowledge within the software industry is explicit through different knowledge products, namely software artifacts. So, investigate means for knowledge products’ availability for the whole organization is relevant once it enables them to increase their solving problems capability, keeps their processes updated, and grow into more profitable products. In this sense, a system architecture offers robust and integrated features essential to aid the organizations in knowledge products availability, indexing, and management. In addition, a system architecture solves the challenge of the knowledge fragmentation, which causes knowledge loss and difficulties in the use of organizational knowledge. Therefore, this paper presents a system architecture addressed to manage the knowledge products grounded in the KM process to capture, storage, sharing and use the organizational knowledge. Such the system architecture is

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essential to help organizations within the software industry improve their KM on their knowledge. Then, it is exploratory research with mixed methods (qualitative and quantitative) that, as a result, presents a system architecture for the management of the knowledge products of organizations belonging to the software development industry.

Keywords: Knowledge Fragmentation. Components. Technologies. Knowledge Management.

1 INTRODUCTION

Knowledge has become a critical intangible asset of great value to organizations, especially in the search for competitive advantage. Managing such knowledge is relevant for decision-making within particular software development organizations since its understanding is essential to provide the innovation and sustainability (NATALE; NEVES; CARVALHO, 2016). Knowledge Management (KM) is a cyclical and dynamic process defined by different and interdependent stages and related to the creation, acquisition, dissemination, development, and application of knowledge which generate value to their products and services (LAVERDE; BARAGAÑO; DOMINGUEZ, 2003; TAKEUCHI; SHIBATA, 2006). The Brazilian software industry has been growing and looking for solutions to manage its organizational knowledge (LOURENÇO et al., 2016) effectively. KM comes as a set a of principles, concepts, processes, practices, and tools to support the knowledge application or use (DOROW; CALLE; RADOS, 2015). KM allied with technology provides an efficient and structured environment (MARIANO; CARREIRA, 2010) which improve the organization's competitiveness and sustainability (OLIVEIRA et al., 2016). However, in the software companies, the organizational knowledge tends to get fragmented when is not well managed (TENÓRIO et al., 2017). So, the literature present different strategies to manage well the organizational knowledge based on systems (CHOY et al., 2018; KING; MARKS, 2008), ontologies (BARÃO et al., 2017; ALFREDO SÁNCHEZ et al., 2012), and system architectures (CISLAGHI, 2008; FREITAS JÚNIOR et al. 2017; NARTEH, 2008; OLIVEIRA; PINTO; TENÓRIO, 2017). Considering those different strategies, a system architecture is the most which provide robust means to capture, store, share, and use organizational knowledge (THOMAS; HETTIGE, 2012). Moreover, due to the importance of the knowledge product for the software development (OLIVEIRA; PINTO; TENÓRIO, 2017) there is a lack of proposals specific to manage the knowledge in the knowledge products, *i.e.* software artifacts, built by the software industry. In this sense, the research question for this work is: *Which sort of components and technologies support a system architecture to manage the knowledge product for the software industry?*

Therefore, this paper presents a system architecture called KP-Arch (*i.e.*, Knowledge Product Architecture), which is addressed to manage the knowledge products grounded in the KM process of knowledge capture, storage, sharing and use. The system architecture was built based on previous researches and validated by three experts. For this, the work is organized into five sections. Followed by this introduction, section 2 presents a literature review showing the theoretical basis of the research. Section 3 gives the research method used in this research. Section 4 points out our results and followed by discussions. Finally, section 5 presents our conclusion and the references cited in this work.

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2 LITERATURE REVIEW

We start this literature review introducing KM concepts and showing how the software industry handle its knowledge. Following, we present the idea of systems architecture, and we show different KM cycles performed in the literature. Afterward, we present the KM adopted to support this research. Finally, we present the concepts regarding knowledge products.

2.1 KNOWLEDGE MANAGEMENT AND THE SOFTWARE INDUSTRY

At the end of the 20th century, it was evident that knowledge became the primary factor of production for organizations, is responsible for structural and productive changes (SANTOS et al., 2016). As a consequence, there was a significant growth of information by the organizations that, in turn, establish methods to identify, manage, share and maintain the knowledge within their environment (NORTH, 2010).

Laudon (2011) states that if knowledge is not shared, organized and applied, it will have no value to the organization. Thus, the organization that manages its knowledge benefits from it and has higher possibility to innovate products and services, remaining sustainable in the market in which it operates. In this context, knowledge started being managed within organizations so that they could conquer a prominent place in the market, improving their performance, maximizing their business opportunities and minimizing their risks of losing opportunities (SCHIUMA; CARLUCCI; LERRO, 2012). In addition, knowledge management ensures the well-being and long-term viability of organizations (WIIG, 1997). Knowledge is one of the critical resources for organizations in this industry to continue to offer differentiated products and services that can add value to customers and their businesses (GASPAR; DONAIRE, 2016). Therefore, KM should be considered as a facilitator of the transformation of knowledge into assets aimed at the viability of continued and sustainable growth (CARRILLO; ANUMBA, 2005).

The fact is that KM has become relevant within the organizational environment, promoting the creation of a knowledge base together with individual competences, thoughts, innovations, and ideas (DALKIR, 2011). According to Wiig (1997), KM seeks to make organizational actions intelligent, building an organization capable of transforming, organizing, deploying and using knowledge resources, and continuously renewing them. This process remains the same within software development organizations since these organizations have a peculiar characteristic that distinguishes them from other organizations. This means that they perform knowledge-intensive activities, generating high added-value products (BJØRNSON; DINGSØYR, 2008).

In this sense, KM should be supported by a set of practices aimed at the creation, dissemination, and application of knowledge within the organization (KEBEDE, 2010). These practices should consider both the tacit knowledge, that is, the one related to the experiences and insights of individuals, and the explicit knowledge that, in some way, has been articulated in some record, which can be composed of media, documents, manuals, among others. (TAKEUCHI; NONAKA, 2008).

However, the primary challenge within software development organizations is to use knowledge to address management and other organizational issues. In this sense, KM becomes the organizational learning facilitator, to improve the organization's ability to learn from its environment and to incorporate knowledge into its processes (AURUM; DANESHGAR; WARD, 2008).

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Therefore, organizations that recognize knowledge as an essential strategic and productive asset increase their need to create, store, distribute and retain more efficiently the existing knowledge (CARDOSO; MACHADO, 2008). When organizations know how to identify and use knowledge strategically and innovatively, they become able to perform better in their routines, profits, productivity, and sustainability, in addition to becoming competitive in the market in which they operate.

2.2 SYSTEMS ARCHITECTURE

Systems architecture, also called as software architecture, is one of the primary enablers regarding providing useful gains in agility and efficiency in the maintenance and evolution of corporate information systems, a preponderant factor for competitive environments (SORDI, 2006). For Richardson et al. (1990), a systems architecture should not be seen as a formal solution to every technological problem, since the goal of architecture is to interrelate data and make hardware, software and communication resources available. Also, according to the authors, an architecture must be able to produce information and support a variety of domains of human activity. For Shaw and Garlan (1996) a systems architecture establishes what a system is in terms of computational components and the relationships between these components. Thus, systems architecture can be considered a set of statements that describes the software components and assigns system functionalities to each of them. Therefore, it represents the technical structure, limitations, and characteristics of the components as well as the interfaces among them (SORDI, 2006), being the 'skeleton' of the system and, therefore, becoming the highest-level plan of the construction of each new system (KRAFZIG, BANKE; SLAMA, 2004).

In order to serve organizations, the systems architecture must be: simple (so that all its actors can understand and use it); flexible (so that it can accommodate in time the dynamic changes required by the business environment); reuse-generating (mainly software blocks); and able to unlink business functionalities from the technologies used for their execution (SORDI, 2006). The primary use of systems architecture can have an impact on at least five aspects of its development. For Garlan and Perry (1995), these aspects are:

- Understanding: to understand large systems at a level of abstraction in which design can be understood by the those involved;
- Reuse: to know how to reuse components that have been utilized in other architectures, at various levels;
- Evolution: to expose the dimensions to which a system should evolve to understand the changes within it better, if necessary. Also, estimate the costs of these changes;
- Analysis: To provide new analysis opportunities, including a high level of abstraction and also check the consistency of the system as a whole;
- Management: To improve the feasibility and specification of system requirements through the implementation of an architecture.

In addition, a systems architecture is essential to reduce app development costs and increase the potential of the different connected components of products (MEDVIDOVIC; TAYLOR; SOCIETY, 2000). Thus, an architecture model for knowledge products aligned with KM processes such as capture, storage, sharing and use, defines the aspects of an innovative and sustainable organizational vision. Thus, knowing how to capture, manage, maintain and share knowledge products that exist

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within the organization is of great importance, since organizations gain agility to solve problems that may occur, in addition to becoming more competitive and profitable, keeping their processes always renewed and increasing competitiveness and sustainability in the current market.

2.3 KNOWLEDGE MANAGEMENT CYCLE

KM cycles are processes formed by some procedures that seek to capture, store, share and use knowledge efficiently. The literature presents different KM cycles, as shown in Table 1.

Table 1 – Different KM cycles present in the literature.

Authors	**Knowledge Processes**
Wiig (1993)	Build, retain, distribute, apply
Meyer; Zack (1996)	Acquire, refine, store and retrieve, distribute, present
Davenport; Prusak (1998)	Generate, encode, transfer
Alavi; Leidner (2001)	Create, store and retrieve, transfer, apply
Bukowitz; Williams (2002)	Acquire, use, learn, contribute, access, build and support, discard
McElroy (2003)	Produce, integrate, feedback
CEN (2004)	Identify, create, store, share and apply
Narteh (2008)	Convert, route, disseminate, apply
Liyanage *et al.* (2009)	Identify, acquire, transform, associate and apply
APO (2010)	Identify, create, store and apply
Tenório *et al.* (2017)	Creation/capture, sharing/dissemination, acquisition and use

Source: The Authors.

For this work, we used the cycle shown in Figure 1 because they are the fundamental knowledge management processes that a software development organization can use when dealing with knowledge products. The capture process involves the acquisition of knowledge, which can be acquired through external and internal data of the organization. That is when individual knowledge becomes organizational knowledge for the organization's employees. For Dorow et al. (2015), capture relates to activities in which the organization identifies knowledge gaps, and creates or incorporates new knowledge from those gaps, that can be improved through an existing knowledge base. The storage process has the function of ensuring that the knowledge that has already been captured in some way is stored in some repository so that it is safe and accessible to the employees of an organization. The sharing knowledge process is understood as the distribution of knowledge among the employees of an organization. After being stored, this knowledge must be distributed so that people can make use of it. This process can be defined as activities through which knowledge is transferred to the right place, at the right time and with the right quality, maintaining its adequate context and, almost always, using information technology support (CEN, 2004). According to Tenório et al. (2017), the use process of knowledge refers to the flow of the knowledge captured or created within the organization to be used by people in diverse situations, such as decision-making.

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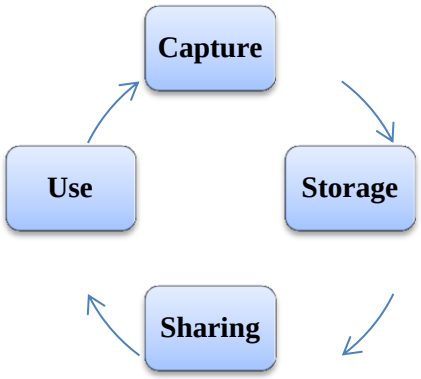
Figure 1 – KM cycle on which the proposed architecture is based.



Source: The authors.

Once knowledge is created, stored, and shared, it is available to be used by individuals. This use process helps the application of knowledge in various situations of the organization's routine.

2.4 KNOWLEDGE PRODUCTS

Knowledge products can be useful to the organization for acquiring knowledge collaboratively and cooperatively, being able to capture, store, share and use such knowledge products. People are essential in a knowledge creation process, within an organization, but it is necessary to understand that they are not mere processors of information, but must be considered creators of knowledge (MAGALHÃES, 2005). This way, knowledge products are generated through the knowledge of the individuals inside the organization. Such knowledge can be disseminated based on knowledge products such as documents, software artifacts, videos, podcasts, articles, among others (SCALABRINI et al., 2016). According to Pressman (2005), a software artifact is any device that supports the understanding of everyone involved in the software development process. Dalkir (2005) states that a shared repository within an organization assists in the storage and sharing of knowledge products and communication among an organization's employees.

Thus, software development organizations regularly generate knowledge products through the software artifacts created during the development or maintenance phase of a product. A software artifact corresponds to documentation, such as a template, or another object of value created during development (AZEVEDO JUNIOR; CAMPOS, 2008), e.g., diagram of use cases, class diagram, activity diagram and requirements documentation, among others.

Thus, documents generated within a software development organization can be considered products of knowledge. When organizations have methods for capturing, storing, sharing and using knowledge products, they can increase their productivity, sustainability, and competitiveness in today's market by streamlining their decision-making based on such products.

3 METHOD

To present a system architecture addressed to manage the knowledge products within the software industry, we carried out in-depth bibliographical research which gave us insights regarding the architecture. In addition, we validated the architecture with three different experts. The bibliographic research was carried out regarding KM

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cycles and using the following scientific databases: Portal of Periodicals of CAPES, Science Direct, Web of Science and Google Scholar. The keywords used were in Portuguese 'arquitetura de sistemas' and 'gestão do conhecimento' and 'produtos do conhecimento'; and in English 'knowledge management' and 'system architecture' and 'knowledge product'. During our insights, we chose the components and technologies of the system architecture carefully to support knowledge products and software development organizations.

Moreover, we considered the structural and technological aspects proposed by Oliveira et al. (2017) and Tenório et al. (2017). Finally, we validated our proposal by interviewing two KM expert and one software engineering during August of 2018 to identify the strengths and weaknesses of our proposal. In addition, we used the content analysis, proposed by Bardin (2010), in which a set of systematic techniques and procedures is proposed so to that the inference of relational knowledge can occur. Finally, the empirical material of the interviews was analyzed as suggests Creswell (2013, p. 245).

4 RESULTS AND DISCUSSION

In this section we present our results followed by the discussions and our system architecture proposal for knowledge products of the software development organizations based on a KM cycle.

4.1 SYSTEM ARCHITECTURE GENERAL TECHNOLOGIES

A study by Oliveira, Pinto, and Tenório (2017) presents the comparison of the technologies that can be used by a systems architecture that creates, stores, shares and uses knowledge products aimed at software development organizations. Such technologies are presented in Table 2.

Table 2 – Technologies focused on the systems architecture aimed at the KM cycle.

Proposal	**KM Processes**		
	Capture	**Storage and Coding**	**Application and Use**
Martins; Omar; Diban (2002)	Data Mining	Data Warehouse	Organizational memory
Cislaghi (2008)	Data mining	Data Warehouse; Data Mart	Services
Biz (2009)	GED; e-mail	Database	Web-based access system
Freitas Júnior et al. (2017)	External Applications	Repositories	A knowledge portal

Source: Adapted from Oliveira et al. (2017).

Martins, Omar, and Diban (2002) present a system architecture for KM that has the following components: Data Mining, Data Warehouse, and Organizational Memory. According to the authors, such components make it possible to obtain reliable information for decision making through the management of organizational knowledge. The Data Mining component is responsible for capturing and filtering organizational information. The Data Warehouse component is responsible for storing the information in a large enterprise database, which is composed of useful knowledge that is going to be used by the organization in the future. Finally, the Organizational Memory, which is part of the Data Warehouse environment, has the function of facilitating the use of knowledge through its dissemination. Although the authors' architecture is quite robust, there are few details regarding the technology to be used, which can be a barrier to its

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implementation (e.g., data mining algorithms and the Data Warehouse model could be presented in detail as an implementation guide).

The architecture presented by Cislaghi (2008) consists of three components. The first component is Data Mining to generate useful knowledge for the organizations. The second component is a Data Warehouse, which is a database addressed to store and structure the information in a suitable format for it all to be queried. Finally, the third component consists of services such as video conferencing, forum, and search, which enable the use of the knowledge generated by the organization. Biz (2009) offers two components to data collection in which one is responsible of extracting data from electronic documents and storing it in a local database, and another one responsible for extracting data of sending and receiving messages. Although both components provide access to organizational knowledge, the solution is limited by data collection of electronic documents and e-mail, since applications such as Skype, WhatsApp, Slack, among others, also provide knowledge flow. Finally, Freitas Júnior et al. (2017) present a system that uses as components external applications, data repository and a knowledge portal. It is possible to perform the creation and the capture of the knowledge through the applications. The data repository is responsible for storing the data that has been captured in the previous step. Finally, the knowledge portal is used to apply the knowledge within the organization. However, the authors' architecture does not discuss or present the technological aspects which are essential to system architecture, or software. This makes it difficult to implement the architecture in technological terms. It is also observed that none of these architectures is specific to software development organizations and based on elements designed to deal with knowledge products.

4.2 KP-ARCH – THE KNOWLEDGE PRODUCTS ARCHITECTURE

Given the KM systems architectures presented in the previous section, even though none of which addresses an architecture focused on the knowledge products of organizations belonging to the software industry, which is essential for capture, store, share, and use knowledge within the organization. Table 3 proposes the components and technologies which a knowledge products architecture, namely KP-Arch, should have. The process of capturing knowledge products within a software development organization can be accomplished, in the proposed architecture, through the integration with software development support tools. In this process, some kinds of tools can be highlighted, such as project management tools, bug tracking system and version control system. In this sense, tools such as Redmine, MS-Project, Subversion, among others, were identified by Tenório et al. (2017) in order to support software development processes. Those tools store product knowledge through a variety of products that have been created, e.g., software modeling, requirements, and manuals. According to Falbo and Travassos (1996), this environment seeks to combine techniques, methods, and tools to support the software engineer in the construction of software products, covering all activities in software production, such as planning, development and quality control. To integrate the systems with the components used in the architecture can be adopted standards such as XML, CSV, JSON, among others. With those components, the KP-Arch is able the knowledge products capture can be more dynamic for software development organization.

For the KP-Arch, the process of storing and sharing knowledge products in a software development organization can be accomplished through the text mining component, which is responsible for finding relevant terms in the stored knowledge products' text documents. This is relevant to establish the standards and relationships

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between the documents, based on the frequency and thematic of the terms found (SERAPIÃO et al., 2010). Observing the proposals of the Oliveira et al. (2017), Pinto et al. (2017), and Tenório et al. (2017), we find out that data mining component is essential for KM systems. Therefore, the text mining component is relevant for KP-Arch since it classifies text-based knowledge products which are very common in software development organizations, e.g., system requirements and user manuals.

Table 3 – Technologies and components of the proposed architecture.

KM Processes	**Technologies**	**Architecture Components**
Capture	XML, CSV and/or JSON integration standard	Integration between following software development tools: project management, version control, and bug tracking systems
Storage	Data warehouse, relational database, cloud drives	Text mining, knowledge maps, metrics and measures collector
Sharing		Coporate portals, communities of practice
Use	Intuitive and available interfaces to the web and mobile technologies	Search engines and indicator monitoring

Source: The authors.

The knowledge mapping component aims to locate essential knowledge regarding knowledge products to later publish and disseminate for the users, where they are found. According to Batista (2004), knowledge mapping makes it possible to record all organizational knowledge in documents because, whether a collaborator is absent from a specific organization, the knowledge he has acquired can be recorded in documents through which the other employers can access it. However, in the literature, we observed that none of the architectures use this component, which is essential for the KP-Arch since it supports the storage and sharing processes of knowledge products.

The metric collector component intents to collect metrics and measures that can then monitor knowledge products through indicators. That way, team leaders, managers, and directors can access information such as the most commonly accessed knowledge products, how many knowledge products are created in a given period, what communities of practice the software development team are part of, and so on. This component assists the organization's tactical and strategic level in decision-making, for example, which is the most developed 'knowledge' within the teams, which is the least developed one, which area needs training, among others. So, this component enables KP-Arch measure the organizational knowledge allowing, for instance, the implementation of KM diagnoses.

Different technologies are required to support KP-Arch components. Thus, our architecture suggests three sorts of storage means such as a data warehouse, a relational database, and cloud drives. According to Batista (2004), the data warehouse can be defined as the process of tracking data arranged in relational databases, allowing versatility in the manipulation of large amounts of data. The relational database is designed to create relationships between two or more tables with different knowledge products. The storage of knowledge products can be done through the use of cloud drives, which can be Google Drive, Dropbox, OneDrive, which keep these knowledge products safer and have greater mobility for accessing products. In this sense, two of those KM architectures presented in Table 2 are based on data warehouse technology, and one of them is based on database technology. Then, those technologies are essential to KP-Arch supports knowledge product storage process.

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In the KP-Arch we include the corporate portal component which addressed to integrate several information systems for sharing of the knowledge products. This is important for knowledge dissemination across the organization's employees and enabling the exchange of experiences among them (GORDON, 2002). When analyzing the architectures presented in Table 2, we figured out that none of them suggest a corporate portal. However, the focus of those architectures was not on the software development organizations and the knowledge products, but on general KM architectures instead. Therefore, the corporate portal is relevant for KP-Arch because it allows the reduction of costs and the improvement in the relationship between employees and clients.

The community of practice component is responsible for having an organization's employees come together to improve what they do, or to exchange experiences with one another. For Batista (2004), the community of practice is characterized by interest meetings, seeking transfer of best practices, access to specialists and, also, the utilization of models, knowledge, and lessons learned. That way, the team, project manager, architects, among others, can learn more from exchanges of experiences and lessons assimilated, in addition to sharing knowledge products. So, the KP-Arch has a community of practice component in order to improve both organizational learning and knowledge sharing.

We suggest search engines in the KP-Arch to standardize the users seek for a knowledge product stored within a knowledge database. Tasca et al. (2010) highlight the importance of a minimum standardization of the search engines on databases or the internet has given several possibilities of the search. None of the architectures presented in the literature (Table 2) suggest search engines find and use knowledge products. Thus, search engines are relevant to KP-Arch once the search for knowledge products becomes faster and more efficient for users, after its standardization.

Finally, the KP-Arch presents a monitoring component of knowledge product indicators, which has the role of monitoring knowledge products. Thus, software development organizations can achieve higher productivity and competitive advantage in the current market because the use of IT associated with KM, creates a process which can create, store, share and use knowledge products. In addition, the architecture needs an intuitive interface for the user. Braga (2004) defines an interface as the point at which a user, task, and tool communicate, interact and become a single element. With an intuitive and user-friendly interface, users can do their work more quickly and efficiently to search, use, share, capture and monitor knowledge products. Figure 2 presents the KP-Arch and its respective components and technologies.

We validated the KP-Arch with three experts, two of them KM practitioners and another one software engineering. The KM experts observed that the architecture did not preview the knowledge creation process in which is essential for the organizations. However, we explained to them that the knowledge creation process is the result of the whole architecture cycle since the knowledge is created before the combination presented by the SECI model of Nonaka e Takeuchi. Thus, the knowledge creation occurs by mean of conversation, documents (i.e., knowledge products), meetings, computer networks (e.g., internet and intranet). All of those means can provide to individuals with new knowledge and insights (TAKEUCHI; SHIBATA, 2006). A KM expert also observed that the architecture could facilitate the knowledge flow once it offers a structure to the individuals access the organizational knowledge. In this sense, Stewart (1998) presents the organizational needs to build structures that make available the knowledge for the whole organization getting a strategic resource. Finally, the software engineer observed that the components and technologies used in the

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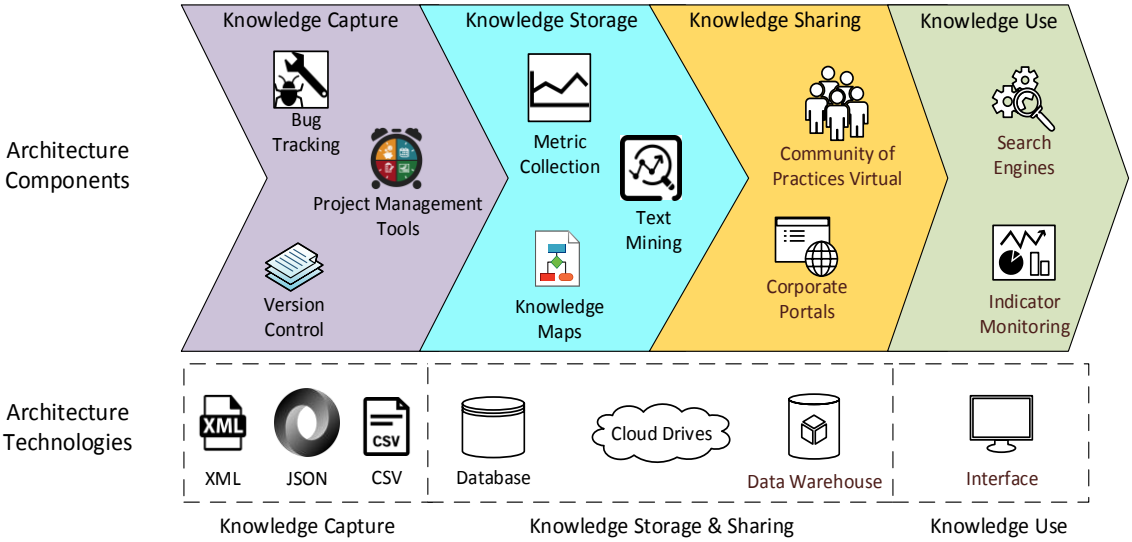
architecture are well aligned with the current technological reality of the software industry. In this way, de Martins, Omar and Diban (2002), Cislaghi (2008), Biz (2009), Freitas Júnior et al. (2017) also use some of those components and technologies.

Figure 2 – KP-Arch: The knowledge product architecture for software industry.



Source: The authors.

Therefore, KP-Arch encompasses components that aim to satisfy the processes of a KM cycle geared to software development organizations. With this architecture, knowledge products can be created, stored, shared, and used within the organization, making the organization more productive, profitable, and useful in its processes**.**

5 CONCLUSIONS

This paper presented a system architecture so-called KP-Arch for the creation, storage, sharing, and use of knowledge products addressed to the software development organizations based on literature review and exploratory research. Therefore, KP-Arch offers a set of components for the integration of tools to support software development, text mining, knowledge maps, metrics and measures collector, corporate portals, communities of practice, search engines and indicator monitoring. In order to support such architectural components of KP-Arch, we suggested different technologies such as XML, CSV and JSON, data warehouse, relational database, cloud storage and intuitive web or mobile interfaces. Moreover, KP-Arch was validated by two KM experts and one software engineering. Although the KM experts observe that KP-Arch does not explicit the knowledge creation process, the entire architecture converges to knowledge creation. In addition, KP-Arch is able to improve the knowledge flow within the software development organizations and is built with current components and technologies used by the software industry. In this way, our proposal is essential to enable decision-making of the software engineers, as well provide a structure that stimulates the knowledge reuse and avoid the knowledge fragmentation. Manage knowledge products is fundamental to the software industry since individual knowledge becomes collective and can be shared with all people, applied in the whole organization, and enhances its processes and products. Therefore, this paper breaks new ground offering the researchers an interesting material to implement the architecture here presented in order to support knowledge products, avoid knowledge fragmentation, and collect knowledge metrics useful in decision-making within the software industry.

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