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Knowledge Intensive Processes Innovation: A Case in a Peruvian Insurance Company

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Abstract*— Process innovation can add value by creating new technologies or improving existing ways of delivering valuable products to internal and/or external customers. Organizations are a set of processes, some of which can be knowledge intensive (KIBPs). Nowadays, knowledge is a critical factor of success for competitiveness in organizations and needs to be managed, even more in KIBPs. However there is a lack of theoretical-empirical studies about innovation in KIBPs considering knowledge management. Consequently, this study aims to explore how process innovation happens in a knowledge-intensive business process and what contributions can knowledge management provides to it, using a case in a Peruvian insurance company to understand how this phenomenon occurs in practice. A literature review was made to explore these concepts and their relationships, and then, a real case of innovation was analyzed in a core process within a large-sized Peruvian insurance company. According to literature, some findings were identified: 1) This study case demonstrated that, when well applied, innovation in KIBPs can produce improvements in three dimensions, such as efficiency, effectiveness and sustainability. 2) There are knowledge management processes within KIBPs that need to be identified, managed and, if possible, automated. 3) A KIBP innovation process requires highly commitment, some cultural conditions and a very close alignment with the strategy. 4) IT plays and strategic role in KIBPs innovation, supporting automation of knowledge processes and also providing other results such as flexibility, scalability, efficiency and valuable information.

***Index Terms*—Insurance, Knowledge Management, Knowledge-Intensive Business Process, Process Innovation.**

I. INTRODUCTION

In the new context of a globalized economy, knowledge is a critical factor of competitiveness [1], [2], [3], [4]. The existence of a good or service provided by organizations is always supported by knowledge and a set of processes [5], [6]. A business process is knowledge-intensive when it has "high task complexity and high knowledge intensity" [7, p.282] and relies on extensive human knowledge and involvement [8]. Nowadays is widely accepted that innovation provides competitive advantage to companies [9]. When it happens in the process, it can lead to better firm efficiency, effectiveness and sustainability [10] therefore better performance and competitive advantage [9]. The concept of process innovation was proposed by Schumpeter [11] and was explored by many researchers focusing on understanding the own concept, its types and some methods [10], [12]-[17]. Despite this, there is a clear need to consider knowledge while managing knowledge-intensive business process, but there is lack of theoretical-empirical studies about an effective application of knowledge in process innovation [18]. This study will explore how process innovation happens in a knowledge-intensive business process and which contributions knowledge management can provide to it. Thus, the objective of this study is to describe the characteristics of knowledge-intensive process innovation and to interpret how this phenomenon occurs, particularly in a core process of an insurance company.

II. METHODOLOGY

This research has a pragmatic philosophic conception because it is intended to understand actions and its consequences towards real life practices [19]. Considering the adopted paradigm, this study uses qualitative methods to describe and analyze data and results, in a set of steps oriented to produce a flexible and descriptive final report [19]. Two technics were used to implement this research: literature review and case study. First, a literature review was made to characterize how innovation occurs in knowledge-intensive business processes, and to identify how these concepts are related to knowledge management. Then, the set of categories and relations found in the literature review were used to analyze an innovation case in a core process in a large-sized Peruvian insurance company, that is called company A. Data was collected from two interviews, with the IT project leader and the business project manager involved in the innovation case. On the other hand, historical documents were collected from project office repository in order to complement and explain the mains issues discussed in the interviews.

III. LITERATURE REVIEW

A. *Knowledge Intensive Business Processes (KIBP)*

A process is a set of people, resources and materials in work-activities logically connected that produce a result of value for a customer. For Harrington [5] a process makes use of organizational resources, receives an input and delivers a valuable product for an internal or an external customer. In the business context, business processes supporting the organization's goals using a set of resources in order to produce value for the customer. Business processes have two basic characteristics: They are inter-functional - because they cross boundaries of functional areas -, and they have customers, internal or external - because they deliver a product to "someone" [6]. The existence of a good or service is always supported by a set of processes. For that reason, business processes are value flows that must be identified, analyzed and continuously improved to meet customer needs

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[5], [6]. Hence, an efficient business processes management will have direct impact on the quality of products provided by the company, and consequently, will increase its competitive advantage. "Knowledge intensive" (KIBP) is a particular type of business process with high task complexity and high knowledge intensity [7]. According to this, for Isik *et al.* "KIBPs rely on extensive human involvement and knowledge, whereas in non-KIBPs expert knowledge is less critical" [8 p. 516]. But, what is knowledge? According to CEN, "Knowledge is the combination of data and information, to which is added expert opinion, skills and experience, to result in a valuable asset which can be used to aid decision making. Knowledge may be explicit and/or tacit, individual and/or collective" [20, p.6]. In summary, knowledge is a valuable asset that is born as a result of conscious processing of information through an individual process in a specific context [21]. The available literature converges towards the notion that knowledge is the most critical resource in KIBPs. Considering this, successful knowledge management, promotes and increases the probability of successful KIBPs management. Before being managed, a KIBPs needs to be identified. There are not clearly boundaries between KIBP e non-KIBP but academic literature identifies a set of characteristics about KIBP that can help any identification process (Table 1). Complexity and need for high creative to manage KIBP are two key characteristics for identifying this kind of processes [8].

Table 1 - Comparison between KIBP and non-KIBP characteristics. [8]

KIBP	non-KIBP
Mostly complex	Simple or complex
Mostly hard to automate	Mostly easy to automate
Mostly repeatable	Highly repeatable
Predictable or unpredictable	Highly predictable
Need lots of creativity	Need less creativity
Structures or semi/unstructured	Structured

When identified, a KIBP can be analyzed with a holistic and critical view in order to be improved. Managing a KIBP involves the identification and management of the critical knowledge in the process, and consequently, Knowledge Management area must be considered.

B. Knowledge Management (KM)

Knowledge Management (KM) is a multidisciplinary area of study that can be defined in many different ways. Wiig provides one definition, stating that KM is "to understand, focus on, and manage systematic, explicit, and deliberate knowledge building, renewal, and application, that is, manage effective knowledge processes (EKP)" [22 p.1]. In his study, Dalkir [23 p.3] explores many KM concepts from different areas, and one of these definitions affirms that Knowledge Management is the deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation. This coordination is achieved by creating, sharing, and applying knowledge as well as by feeding the valuable lessons learned and best practices into corporate memory in order to foster continued organizational learning. Another prescriptive approach about KM was delivered by the European KM Framework, which describes KM as "the management of activities and processes for leveraging knowledge to enhance competitiveness through better use and creation of individual and collective knowledge resources." [20 p.6]. The Framework developed by CEN [20] considers three main layers as: 1) The Business Focus, that should be in the center of the KM initiative, 2) The core knowledge activities such as identify, create, store, share and use, 3) The enablers that facilitate and effective knowledge handling, these enablers can be personal or organizational. In the same line of thought with CEN, some KM processes are identified and presented by Dalkir in his Integrated KM life cycle, as a result of the literature review about KM cycles. First, the process of knowledge capture and/or creation develops a knowledge base that will be accessed by the knowledge sharing and dissemination processes. After that, the knowledge is contextualized in order to be understood and used in the knowledge acquisition and application processes. After knowledge is used, the organizational knowledge base is updated and the cycle starts again [23]. In this study KM will be considered as a set of processes and practices that can be used for understanding, managing and uses knowledge in a consistent way to achieve organizational objectives. Thus, knowledge management aims to put information and knowledge in effective action, focusing in valuable results. The previous section stated that a successful KM facilitates the management of KIBPs. But, what does successful KM mean? According to Jennex *et al.*, a successful KM "is defined by capturing the right knowledge, getting the right knowledge to the right user, and using this knowledge to improve organizational and/or individual performance" [24 p. 174]. The same author points out that this concept is measured considering some dimensions, such as: impact on business processes, impact on strategy, leadership, and knowledge content. Many researches explore the relationship between Knowledge Management and Innovation [3], [25]-[30], [51]. As a resource, knowledge is an innovative process input. On the other hand, Knowledge Management, specifically knowledge creation is a process that supports and usually occurs during innovative process.

C. Innovation

Through the last few decades, there has been a growing interest in innovation, its inputs and its outcomes. The world has changed: globalization took place, markets expanded and competition extended overseas. In this context, it became a prime necessity for companies to innovate, answering customers' demands and taking advantage of opportunities provided by new technologies and changing markets [17]. Nowadays it is widely accepted that innovation provides competitive advantage to companies, and it is perhaps one of the few sustainable ways of continuously achieving it [9],

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[18], [21]. Innovation per se can be a very broad concept. Over the years, some efforts were made in order to narrow it down. It is a multidisciplinary concept, and many different authors from many different disciplines have defined and categorized it. Some of these disciplines are: Economy [31], [32]; Entrepreneurship [33], [34]; Business and Management [14], [35]-[37]; Marketing [38]; Technology, Science and Engineering [39]-[41]; and Organization Study [42], [43]. The first author to introduce the idea of innovation was Schumpeter [31]. He outlines innovation as being one or many of the following: the introduction of a new good or the introduction of an improvement to an existing one, the introduction of a new production method, the opening of a new market, the finding of a new source of supply, and the happening of a new economic condition. Porter also provides some definitions for innovation and the way companies approach it [38]. He describes the manifestation of innovation being a "new product design, a new production process, a new marketing approach, or a new way of conducting training" [p.75], being training an emphasis to the one correct way of doing something. He states that "successful companies approach innovation in its broadest sense, including both new technologies and new ways of doing things, perceiving a new basis for competing or finding better means to compete in old ways" [p.75]. Tidd, Bessant and Pavitt defines innovation as "novelty and change" assuming a variety of forms [13]. They present what is called the "4Ps" of innovation: product, process, position and paradigm innovation. Product innovations are changes in a company's products/services; process innovations are changes in the way products/services are manufactured and/or delivered; position innovations are changes in the context that products/services are introduced to the market; paradigm innovations refers to changes in the mental model of a company that drives its core business. They also state that "novelty is very much in the eye of the beholder", which leads to an understanding that, even with all the efforts made to define what innovation really is, some part of its perception is left to the stakeholders, being them inside or outside the company (e.g. customers or shareholders) [13]. A multidisciplinary approach definition for innovation is proposed by Baregheh, Rowley and Sambrook: "Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, services or processes, in order to advance, compete and differentiate themselves successfully in their marketplace" [17, p.1334]. Regardless of the great variety of definitions, there seems to be a consensus among the authors about the dimensions of innovation, or the areas where it can take place, particularly about the product and process dimensions. Sawhney, Wolcott and Arroniz developed a framework called "innovation radar" where they list twelve dimensions where a firm can innovate. Four of these dimensions are considered the key ones: "the offerings a company creates, the customers it serves, the processes it employs and the points of presence it uses to take its offerings to market" [15, p.30]. Considering the objectives of this study, the concept and implications of process innovation will be explored in the following section.

D. Process Innovation

Process Innovation plays a very important and strategic role in companies nowadays. Being able to accomplish things that no other competitor can or doing it in a better way are competitive advantage sources. It means finding and implementing new ways of manufacturing and delivering goods, faster, cheaper and more customizable than any other competitor [13], and includes process improvement and re-sequencing, better use of resources and benchmarking, among others [44]. Also, it can be viewed as innovations that are used in the same sector as those in which they are produced [45 p.345] and that enables companies to perform a work activity in a radically new way [46 p.96]. Process Innovation can be categorized in two different types: incremental, referring to a process innovation that is new to the firm but not new to the industry; and radical, referring to a process innovation that was developed by the firm and is new to the industry [47]. While incremental process innovations can help by reducing costs through optimization and loss mitigation, radical process innovation enables complete new ways of doing things [13]. Long-term thinking, process innovation is a key source for a company to achieve competitive advantage. By improving its way of working, a company can have both efficiency and effectiveness gains. Therefore, it is very important to have means of studying and analyzing what can benefit or hold back process innovation in companies, and what can be its results. Frishammar *et al.* proposed a conceptual framework to analyze the antecedents and consequences of firms' innovation capability (Figure 1) [10]. Strategy, collaboration and culture are cited as higher-level antecedents. Strategy is very important, especially during the strategic decision making, which can shape the success of process innovation when firms take a proactive stance towards it. It is also important to align process innovation and product innovation activities because new products often require new (or different) processes, and new processes can enable the conception of new products. Collaboration, internal and external, can enhance a firm's learning process and ensure that the expertise of internal departments, as well as from suppliers and partners, are incorporated to the activities, bringing in the desired combination of skills and competences [10] therefore there is knowledge being used, combined and created. The combination of different knowledge and the ability to create new knowledge has a positive effect on process innovation, which leads to better firm performance [50]. Culture is a high-level antecedent of a firm's innovation capability because "innovation climate […] and sufficient support from a firm's top management is a prerequisite for successful process innovation" [10, p.524]. "Flexibility values foster a culture of experimentation and empowerment [...] and enable operators to engage in creative problem solving" [16, p.882]. As the outcomes of process innovation, the authors present

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efficiency, effectiveness and sustainability.

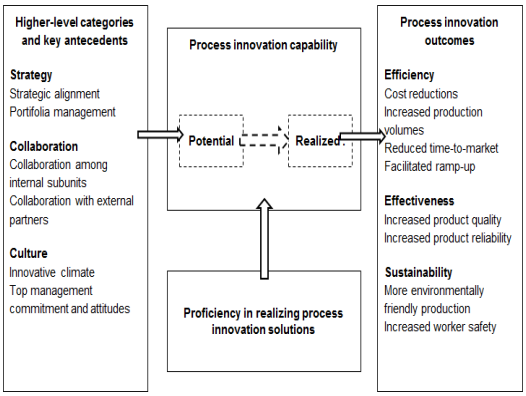

Fig 1 - Conceptual framework of firms' process innovation capability [10]

As mentioned before, process innovation can lead to better performance and provide competitive advantage as the firm starts experiencing "doing different" and/or "doing better". Cost reductions, increased production volumes and product quality, reduced time-to-market and increased product reliability are some of the benefits that a firm can achieve with process innovation. Also, more environmentally friendly production and increased worker safety can be achieved as well [10]. The induction of extra productivity growth as a result of process innovation can occur at any stage of the firm age. Also, even though there's a tendency that while a firm ages its productivity growth rate will meet average growth rates for its specific sector, constantly fostered process innovation can break this trend [12]. Considering the objectives of this study, it is relevant to further explore the change/creation of a (new) process as a result of process innovation. Although the idea of business process reengineering (BPR) is not widely used anymore, [48] presented a study where the relationship between BPR and information technology (IT) is examined. When it comes to BPR, it is interesting to notice that one of its results can be a different (and better) way of doing something, therefore, a process innovation. The work provides some guidelines of how IT can initiate and sustain reengineering, before and during a process (re)design, and during its implementation. It is particularly interesting some of the IT roles in the "before" and "during" process (re)design phases. For instance, before the process design, IT can foster process thinking and identify process for redesign in organizations; during the process design, IT can bring complex analytical methods to bear on the process, transform unstructured processes into routinized transactions and reduce/replace labor in a process [48 p. 587]. Considering all the concepts reviewed and described before, the next section presents a case study about a Peruvian insurance company and its efforts to improve one of its operations processes, which resulted in an innovation.

IV. PROCESS INNOVATION IN A PERUVIAN INSURANCE COMPANY

The company A had revenues for approximately US$ 1.2 billion during the year 2011, and is the leader in the Peruvian insurance market. The company A operates many types of insurance products (Life, Health, Car, Casualty, Unemployment, Accident) through its different sales channels (direct sales force, brokers, agents, banking retail, department stores, etc.). Sales channels such as banks and department stores constitute "alternative channels". In this type of channels the priority is to commercialize massive products such as Accident, Unemployment and House insurance. The critical success factor is to have a competitive cost of distribution and operation, and also to have simple products in order to facilitate sales processes [49]. Business models in alternative channels there are two business partners or 'players'. The bank or sales department, called partner, use their clients database and distribution channels (agencies, sales force, sales processes) to sell the insurance policies, and sometimes, to provide the front end to customer service. In retribution, the partner receives a commission for insurances policies sold. On the other hand, the insurance company receives information from the partner on every insurance policy sold (usually electronically), and starts an operative process in order to validate some business rules and register the sales. This way, the insurance company receives a premium for taking the risk about the insurance object. In 2011, company A had revenues for about US$ 220 million per year by selling in alternative channels, and it had a 14 percent of average annual growth calculated from 2005 to 2011. On the other hand, the company was facing an increased number of difficulties produced by a set of structural operative problems. These problems around the operative process become evident through several signs such as:

- Poor standardization: One product one process. Every product commercialized through every alternative channels, had his own and particular flow and his own set of technological support, user procedures, inputs and outputs. Thus, there were 192 products and consequently 192 different ways to operate.
- High human resources demand. Processes weren't totally automatized, so they needed human control in all activities. In addition, the knowledge needed to operate every product was very high because of the poor standardization and poor IT support. These elements increased significantly the cost of operation when sales were growing.
- High Risks: Business rules were implemented in different ways in every product, and there is not a central business rules repository, and consequently, there is not a standardized IT architecture for business rules. Consequently, IT process becomes inefficient and unstable when high sales volumes are processed.
- Poor service: Problems above produced frequently non-fulfillment in the service level agreement with the partners (banks or department stores).

The alternative channels sales' operation process is knowledge intensive (KIBP), because general knowledge

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about the client and expert knowledge about business rules and products, is combined and embedded in every activity inside the process [7], [8]. Considering the described context, a project was planned and implemented in order to improve the alternative channels sales' operation process. A subset of 18 products were selected from the universe of 192 product offered in alternative channels, these 18 products represents the 92% of total revenues in the alternative channels business. According to Frishammar *et al.* some key-antecedents were identified before the project [10]:

- Strategy: Improve this operative process had a strategic alignment with the company A plan for 2010-2014. This plan stated that growing in alternative channels more than 20% per year would be one of the main objectives.
- Collaboration: An inter-functional team among internal subunits – such as Massive Operations, Organization Development, Process, IT - was created for developing innovative and systemic alternatives in order to solve the problem. Also, a communication bridge with some external key partners was developed in order to take important 'customer knowledge' and incorporate their needs in the final solution.
- Culture: The project was born from a high top management commitment, allocating all the necessary resources and the people with the right expertise for this project. Also, top management transmitted to the team a very high motivation for being creative and innovative when developed the new process.

Considering the key antecedents, some critical success factors were defined. These factors are: Scalability, simplicity, maintainability, and standardization. Knowledge was identified as a key resource embedded in the process, so knowledge management was considered to design the final solution. The figure 2 shows the architecture for the new process.

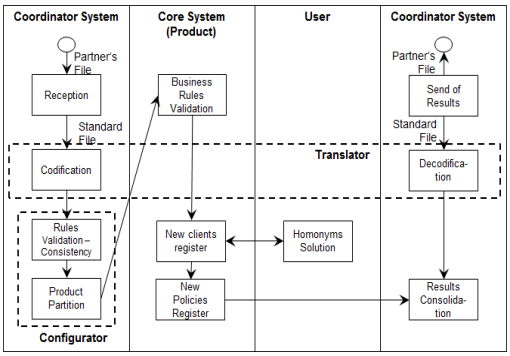

Fig 2 - Architecture for new operation process for alternative channels sales (source: the authors)

First, the processes of the 18 products were unified in a new one. Second, the process was totally supported by IT, except one activity about "homonyms solution" that needs a user expertise and was not automatized in this project. Third, every activity started to have a set of result and control reports. Thus, and according to Attaran, IT played a key role to achieve objectives in this innovation process [48]. In the first part of the process, managed by the new coordinator system, occurs the reception of the consolidate file with sales sent by the partner for all the products commercialized. In this step, the objective is basically to register and to control some security protocols. Then the file, with a set of sales records with different structures depending of the product and the channel is codified by an automatic translator in order to obtain a new file with standardized type of record that is easily recognized and processed in the next steps. This action gives the process flexibility, making it independent of the channel file format. After that, the file with standardized records has a first level of validations in order to confirm data format (numbers, size of strings, dates and positions) and also to confirm complete data required for the product sold in every record. Immediately, even in the coordinator system, the file received was partitioned in one file for each product in order to address each resulting file to the right core system. The validation and partition logic represent an important knowledge that was embedded previously by a channel/product configurator, in other words, a knowledge application occurs [23]. Technological knowledge and knowledge about the product also are applied automatically in the next step. In the core system for each product, the new file is validated against a set of business rules. The file is validated in a vertical way, a IT technique that validate rules to each data field for all registers, minimizing from 200 thousand to 200 the number of transactions used for a file with 1 thousand records and 200 business rules. Records that don't pass the validation are saved as rejected. Records that accomplish successfully the validation are used to register the client and finally register the policy in the core system. Some clients have a homonyms problem, in this case, the process triggers a report in order to notify the user who is expected to solve this problem. After all homonyms are solved the process continuous automatically. In the final part of the process, in the coordinator system, results are consolidated again in one file and de-codified in order to send them to the partner in the 'same language' they were received. Also are sent to the partner a set of personalized reports about correct e incorrect records, including the reasons in the incorrect ones. As demonstrated, in the translator, external knowledge about each partner is embedded as a set of rules for codification and a set of criteria for designing the final reports. This knowledge is combined with internal knowledge generated in the process for giving to the partner a personalized and valuable product. Consequently, according to Dalkir [23], a knowledge acquisition process occurs when the translator is configured, and a knowledge application process during the operation supports the delivery of a better product. Process innovation means finding and implementing new ways of manufacturing and delivering goods, faster, cheaper and more customizable than any other competitor [13]. It includes process improvement and re-sequencing, better use of resources and benchmarking [44]. Also, process innovation enables companies to perform a work activity in a radically new way [46 p. 96]. Considering the definitions of process innovation,

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and the case described above about innovation in a knowledge intensive business process, it is pertinent to review the process innovation outcomes for this case, categorized by Frishammar *et al.* in three dimensions: efficiency, effectiveness and sustainability [10]. Efficiency was improved in different ways. There were cost reductions for maintaining and for operating the new process. One person began to operate nine products instead of four before the new process, and expert knowledge required to operate each product was embedded to the process/systems, becoming independent of the person. On the other hand, processing times in servers decrease about 90% by using new processing techniques and a standardized process, and also IT area has now one process to maintain instead 18 processes before the solution. Implementation of new components such as the configurator and the translator, give more flexibility to the process and improve dramatically the time-to-market for new products. This time-to-market decreases from 22 days for five days, counted since the product is defined until the product is implemented and ready to operate. Effectiveness was traduced mainly in an accomplishment of the service level agreement with partners in a 98% percent from less than 50% before the new solution. Additionally a more valuable product was offered giving a set of rich information to solve operational problems and to develop some improve projects in the sales process inside the partner. In the sustainability criteria, it is important to highlight that the new process facilitates the user´s work, reducing manual tasks and also reducing stress for error or noise in the old processes. Thus, this process innovation case accomplish its critical success factors, showing results according to the dimensions of Frishammar *et al.* [10], and putting knowledge as a core resource in both KIBP and innovation process. Also, some tasks in the new process uses IT for enhancing results in terms of efficiency, effectiveness and sustainability.

V. CONCLUSION

This paper presented a case of innovation applied to a knowledge intensive process in a Peruvian insurance company. The case demonstrates that knowledge processes must be considered when designing and implementing the new process and its elements like routines, roles and technology support. In that context, and because people is the core element in every knowledge activity, a KIBP innovation process requires highly commitment for collaboration, some cultural conditions, and a very close alignment with the strategy. During the KIBP innovation process, IT plays a key role. The case demonstrates that, although this type of processes usually cannot be completely automated, important gains in efficiency and standardization can be achieved by bounding and automatizing most parts of the KIBP process. Some limitations need to be settled. The study aimed to deepen prior knowledge about the characteristics of knowledge-intensive process innovation in order to understand how the phenomena occur in the real world and to improve the knowledge basis for new researches. Despite this, the results and relations identified in this case cannot be generalized for other insurance companies, other industries or other cultural contexts. Consequently, the study of new cases of innovation in KIBP processes, in different contexts is suggested. In future studies, in a similar way to this research, it is strongly recommended to identify and analyze the elements presented in the Frishammar *et al.* framework [10] and the knowledge processes involved.

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