



Universiteit Leiden

ICT in Business

Systems of Engagement: “Smart Process Applications”
Managing collaborative activities

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Acknowledgements

Writing a thesis assignment is never an easy task. It demands dedication, persistence and patience to reach a satisfying conclusion. After all, it is a great accomplishment, the end of your academic career and the threshold to the rest of your professional life.

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Enjoy,
George

Abstract

As the size of complexity of today's most modern business challenges increase, new techniques are being developed to effectively address the organizations' need for more human involvement and collaboration. Smart Process Applications (SPA) is a new frontier software concept that aims to establish awareness, agility and transparency among the parties involved into human-centric business activities. This study researches the connections of three different areas; science, technology and business sector.

The thesis assignment explores the transactional software applications, their problems in regards of the time of execution of the linearly executed business processes, introducing also the term "domino effect" to describe the phenomenon. Then, it is argued that the Systems of Engagement that encourage peer interactions, and especially the upcoming Smart Process Applications (SPA) concept, can contribute to the management of transactional processes, reducing their time of execution in an end-to-end approach. Based on this hypothesis, a virtual workspace network approach is examined to identify the potential SPA benefits of awareness and flexibility among the different stakeholders. To support the Workspace solution, three main concepts were examined. The Value Net theory is introduced to academically establish the benefits of creating a business network, the antecedent-process-outcome framework to complement the value net theory and establish the collaboration process into the right foundation and finally the Dynamic Case Management concept to support and organize the Workspace functionalities with the market best used practices.

The Workspace solution, through the validation process of interviews, meets the identified requirements and enables collaborative features in the transactional software applications as an extra module into the company's application landscape that the research is conducted.

Keywords: Domino Effect, Smart Process Applications, Transactional Software Applications, Value Net Theory, Antecedent-Process-Outcome Framework, Dynamic Case Management

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Chapter 1 - Introduction

1.1 Context

The basic idea of this thesis assignment is to research how to enable collaboration in the transactional software applications, commonly used as information pools with the specific lack of interaction among the users.

The literature journey starts by exploring the transactional software applications, such as the Enterprise Resource Planning (ERP) systems, continues with the new technology concept of Systems of Engagement and especially the upcoming trend of Smart Process Applications and ends with the well-established collaboration theories like the Value Net theory and the Antecedent-Process-Outcome framework from Wood and Grey (1991). Moreover, the Workspace literature will be explored because the solution design is based on this concept.

Nowadays, new collaborative techniques are explored to support complex business processes. The research will approach the collaboration challenge from different perspectives. From one hand, new technologies will be explored such as Systems of Engagement, Dynamic Case Management and Virtual Workspaces. On the other hand, the collaborative theories will be into the research's microscope in order to establish a theoretical background for the new technologies appeared in the market (Smart Process Apps). Therefore, these concepts will set the border lines and the context of this research from a technology but also from theoretical point of view.

1.2 Problem Statement

Having set the context, the following section will explore the main reason that the research is conducted. Based on the literature study, the transactional applications, as commercial software packages, enable the integration of transaction-oriented data and business processes throughout an organization [51]. These systems are able to handle all in house functions in order to deliver goods and services but rather invisible to the customers [54]. The main focus of the so called Systems of Record is to serve the needs of the employee and support their daily operations.

Though, these systems are focusing in data-oriented processes, the competitiveness in the market turned the organizations to look other ways to explore how these systems can be enhanced with collaborative features. The new functionalities will be able to support processes that demand users' collaboration in order to be executed in a faster and more efficient way.

The main axis of the thesis is collaboration. Therefore the approach was to firstly identify the particular problems of the transactional software applications in respect of the lack of collaboration, explore the collaborative technologies' techniques and how can be integrated in transactional software applications.

1.3 Contribution

The contribution of thesis assignment is three dimensional.

- **Literature:**

This research will contribute to the existing literature with a case study based on the theories of the antecedent-process-outcome framework, Value net theory and the transactional software applications.

These theories are the roadmap for the final solution design; the Workspace. Therefore, a case study will be added in the literature pool of those concepts, highlighting their broad use, importance and adoption, answering at the same time how the transactional software applications can be enhanced with collaborative features.

- **Technology:**

The Systems of engagement, along with their representative Smart Process Applications, are new software concepts available in the market. Limited case studies are conducted so far. This research will add a case study in the literature pool that combines the Systems of Engagement with well-established collaborative theories. It is important to highlight also the contribution to the Dynamic Case Management (DCM) literature and techniques. The Workspace functionalities are based on the DCM principles and that creates a unique connection of how those principles can be applied to a solution design like the Workspace. Last but not least, the Workspace's literature and solution designs will be enhanced by the case study results, which offer a new way of approaching this subject.

- **Exact:**

This research will also be beneficial to Exact. It will be a deposit in their practices, offering a new perspective upon their applications and adding a valuable solution as it was proved by the interviews that were conducted in the final stage of the research. The research provides also a detailed analysis of a case study from the financial department and a functional design of the Workspace that can be used as a roadmap for further exploitation.

1.4 Research Questions

The research questions to address the problem statement are:

Main Research Question:

To what extent, collaboration can be enabled in transactional software applications?

Sub-Research questions:

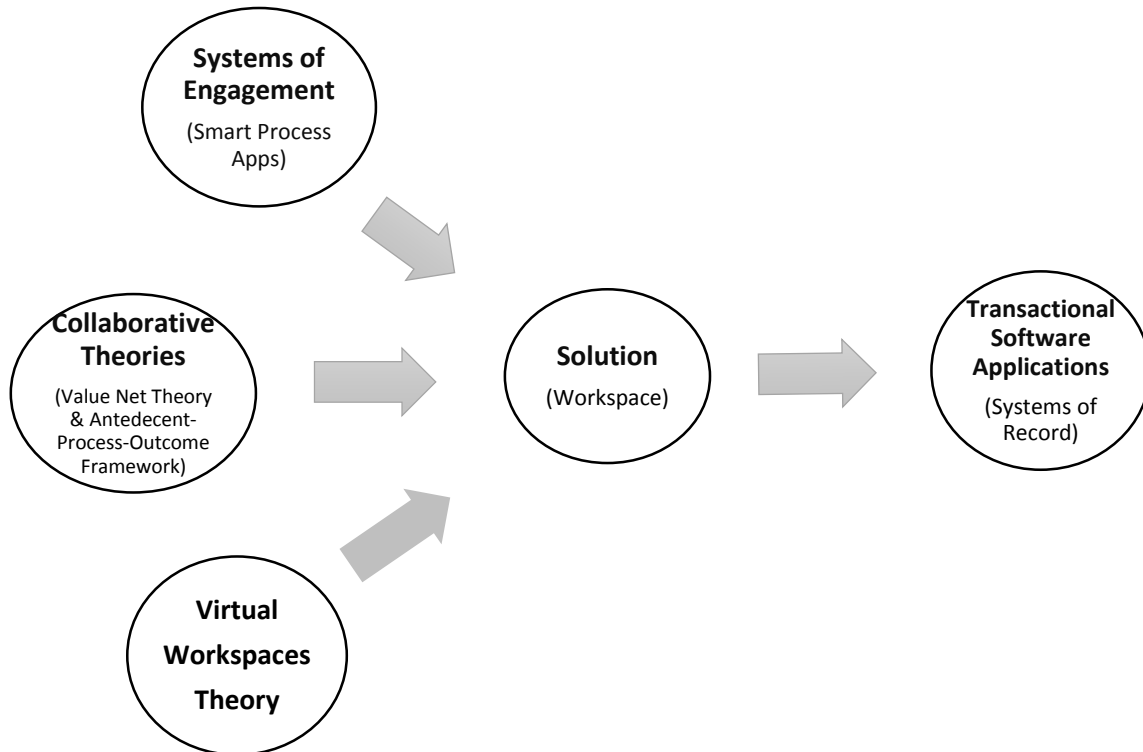
In order to address the research question, a set of refinement questions are defined:

1. *What are the main challenges of transactional software applications regarding collaboration in theory and practice and what are their similarities?*
2. *How can the combination of Systems of Engagement and collaborative theories provide a sustainable solution for the identified challenges in the Systems of Record?*

1.5 Methodology

1.5.1 Theoretical Approach

The theoretical approach of the thesis assignment is depicted below:

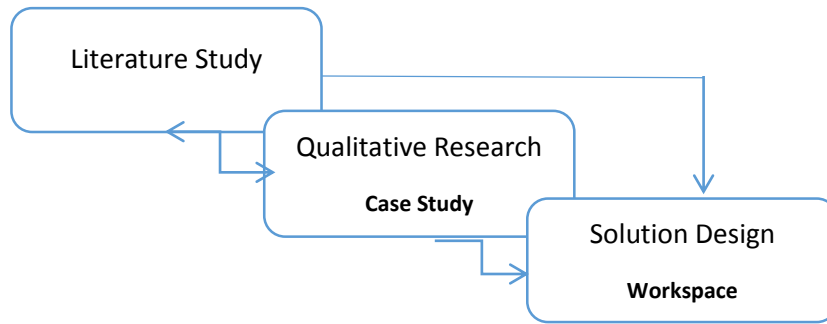


The framework contains three main concepts; the transactional software applications, Systems of Engagement, like Smart Process Applications concept, that enable the collaboration and also the well-established collaboration theories.

Different connections will be explored. At first, the main challenges of Systems of Record will be identified as well as their differences with the concept of Systems of Engagement. Having established their different focus, the research will describe the theoretical point of view of collaborative theories and how they can support the Systems of Engagement. Then, along with the Virtual Workspace theories, a Workspace solution will be explored in order to offer a potential solution to the transactional applications' challenges.

1.5.2 Research Methods

This qualitative descriptive research is conducted in respect of the new software concept, Smart Process Applications (SPA). The chosen direction of the research methodology was the exploratory case study option, concluding to a solution design. The case study took place at Exact and explored how Smart Process Apps could provide an alternative point of view in the company's practices. The methods that will support the case study are: the literature research, similar case studies in other companies and from Exact's organizational knowledge pool, interviews and a solution design.



Case study

The main goal was to identify potential challenges of Exact, realize how SPA can solve them and finally create a solution based on specific requirements. Therefore, the very first step was to define different areas in Exact that SPA could be useful. Several interviews took place with different people from different departments. The interviews results were transcribed and evaluated. Then, we excluded the different options and we turned our focus in one specific area, the Professional Services of Exact online, gathering the requirements in order to create a potential useful solution.

In the meantime, we have researched the different SPA solutions already existing in the market. The SPA market research provided strong insights of how the major competitors are approaching the same challenges and which are the potential directions that we could follow.

Furthermore, several interviews took place to identify the current challenges of the Professional Service department focusing on collaboration issues. There, specific issues were risen, explored and analyzed. Afterwards, based on the results a literature study took place. The main focus turned to the transactional software applications like the CRM, ERP etc., their characteristics but also their challenges. Analyzing the transactional software applications, the literature study continued of how the Smart Process Apps could provide different approaches to their challenges, exploring their characteristics and their so far contribution in the market. Collaboration theories were identified to support the collaboration concept of Smart Process Applications.

The data consolidation led to the conceptualization of the Workspace solution that combines theoretical and practical concepts.

1.5.3 Research Objectives

General objectives:

- *Explore the transactional software applications landscape and identify their challenges in respect of collaboration and their differences with the systems of engagement.*

The research in the first chapter will explore the transactional software applications and highlight their collaboration challenges. Moreover, the collaborative concept of the systems of engagement will be introduced as well as collaborative theories that can support the collaboration process.

- *Support the transactional software applications with collaborative features.*

Based on the literature study of the transactional software applications and the concept of Systems of Engagement, the Workspace solution was conceptualized. This solution is not limited to the company

that the case study was conducted but it can be also beneficial to other companies with the same profile as Exact.

Specific Objectives:

- *Identify potential challenges at company Exact:*

Exact is researching, implementing and maintaining transactional software applications like Enterprise Resource Planning (ERP) systems. These applications mostly lack collaborative features that could enhance and support complex and human -centric business processes. Therefore, the research objective is to identify potential challenges in their product that could be translated to requirements for the final solution that this research will offer.

- *Propose a solution for company Exact*

The research aims to conceptualize a solution that could be integrated at the systems of Exact. The solution will be based on the gathered requirements, the system of engagement concept and also collaborative theories and practices that have been explored in the literature study phase.

1.5.4 Research Limitations

There are two important categories of limitations related to the research design and the research solution.

- **Research Design**

The Smart Process Apps are now emerging as a new category of the software applications designed to provide solutions for the unstructured and collaborative activities. This is a limitation itself. Limited literature papers and even less case studies may become an inhibitory factor to the effort of extracting the “rich” information. Moreover an inherited limitation or risk for this new technology is that suffers from a nonspecific architectural design or implementation process. Moreover, coding and interpretation of the interviews’ material will be also challenging. Persistence and accurate selections of the knowledgeable people will be a necessity. Last but not least, the investigator’s experience should be in line of the interviewees’ experience in order to comprehend the complexity of the subject.

- **Research Solution**

Taking into consideration the size of Exact and also the time of the research assignment, the solution design is limited to validation. There was no implementation of the conceptual solution, therefore the interviews were the only way to validate the concept. The interviews were twofold; from the people that the requirements were gathered by and from the research team that I was part of.

1.6 Thesis Outline

Chapter 1: Introduction: Introduction of the research-topic and its relevance. Main and sub-questions will be given. Also the main research goal is set.

Chapter 2: Related Literature: Introduction of the three main concepts; Transactional Software Applications, the Systems of Engagement with the Smart Process Apps and the collaborative theories of the Antecedent-Process-Outcome Framework, the Value Net theory and Virtual Workspaces.

Chapter 3: Results: The current challenges of Exact will be introduced and explained with use cases and process maps. Then there will be an analysis of where the current solutions of Exact stand in the theory and where the new software concept (SPA) can approach the current challenges of Exact. Moreover, in this chapter the proposed solution of the Workspace will be explained. It will be also explained how theory supports the workspace as a valid approach and how the workspace was built under these requirements.

Chapter 4: Conclusion: In this section the research questions will be answered.

Chapter 5: Discussion: In this section, a retrospective will reflect the main challenges, findings and results during the research. Moreover the weaknesses will be discussed and recommendations will be given for further research.

Chapter 2 - Related Literature

Introduction

In the previous section, the theoretical framework of this research has been introduced, composed by three main pillars; the business sector, a frontier technology and a scientific approach. All three of the concepts are revolved around a basic axis of interest, collaboration. The second chapter is organized in three main parts. In the first part, the transactional software applications are explored; where they are located in the business processes spectrum and which their main characteristics are.

In the second part, the Smart Process Application concept is examined and especially its ability to support business activities that are people intensive and highly variable. Moreover, in the second the virtual workspace theories will be described. At last, the third part will introduce two collaboration theories; the Value Net theory and the antecedent-process-outcome collaboration framework. This chapter will establish the theoretical foundation of the thesis.

Part 1 - Transactional software Applications

2.1.1 Definition

Transactional application nomenclature is diverse in the scientific and nonscientific literature. Different names used to describe the functionality of these systems, from transactional applications to back office operations and later on as systems of records as Geoffrey Moore categorized them (Moore, 2011).

To begin with, Markus et al. defined the transactional applications as commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (Markus, Axline et al. 2001). One of the main transactional software applications, which were flourished and widely adapted in the 1990s and further, is the enterprise resource planning system (ERP). The ERP is an accounting oriented information system for identifying and planning the enterprise wide resources needed to take, make, ship and account for customer orders (American Production and Inventory Control Society, 2001). Esteves and Pastor stated that the ERP systems are a composition of human resources, sales and finance modules that can provide cross-organization interaction through embedded processes (Esteves and Pastor 2001).

The transactional systems are also referred as back office operations. Back office operations are engineered to meet specific operational needs and handle the transactional volume of the business processes. The basic characteristic of the back office operations is to handle all in house functions in order to deliver goods and services and rather invisible to the customers their successful management leads to the success of the business and eventually to customer satisfaction (Verint whitepaper).

Some years later at 2006, a new name was used to describe the transactional software applications; the systems of records. Geoffrey Moore has firstly introduced this term to explain the transactional applications and differentiate them from the upcoming systems, Systems of Engagement. According to data warehousing expert Bill Inmon, every system of record shares the following characteristics: it provides the most complete, most accurate and most timely data, it has the best structural conformance to the data model, it is nearest to the point of operational entry and it can be used to feed other systems ([Systems Of Records Definition](#)). Systems of record, that were the IT backbone from 2000 for a

vast number of companies, represent an authoritative source of an organization's data, but provide little to enable the employee interaction to create and use this data. The human involvement parameter was used to distinguish the different systems and their functionality. The systems of records are aiming to eliminate as much as possible the human involvement in the business processes, in a way that they processes will become eventually fully automated. As Forrester stated the transactional applications automate business processes by eliminating paper, reducing the (time-consuming and error-prone) role of people, and serving as electronic systems of record (Bartels, Moore, Forrester 2012).

2.1.2 Main characteristics and areas of Systems of Record

Forrester reports that the main target of Systems of Record is the employees. These systems serve all the daily data-oriented needs of the employee, consolidating all the data available for their working activities. Therefore, large databases and ERP packages are used to support these activities and support the business processes. In extend, Systems of Record are able to record transactions and accounting data as part of core business processes of the organization, maintain them, report the status and the history of the processes. Because of the diverse data and broad functionalities, the ERP type systems can either work as stand-alone units or several modules can be combined together to form an integrated system and therefore may suffer from a long development and deployment cycles. Here is a consolidated overview of the systems of record characteristics:

Variables	Systems of record
Focus	Transactions
Governance	Command and control
Core Elements	Facts, Dates and Commitments
Value	Single source of truth
Performance standard	Accuracy and completeness
Content	Authored
Primary record type	Documents
Searchability	Easy
Usability	User gets trained on system and follow-on support
Accessibility	Regulated and contained
Retention	Permanent
Policy Focus	Security (protect assets)

Table 1: Systems of Record characteristics (Moore, 2011)

Taking as example the ERP transactional software system here are some of the core ERP modules and areas of interest:

- Accounting management
- Financial management
- Manufacturing management
- Production management
- Transportation management
- Sales & distribution management
- Human resources management
- Supply chain management
- Customer relationship management

- E-Business

2.1.3 ERP and Business Processes

As we have already mentioned, the ERP system is the flagship of the transactional enterprise software applications. The ERP system is mainly focused on five areas: Finance, Human Resources, Manufacturing, Sales/Marketing and Logistics. They consolidate all the valuable information in order to support all of the above areas. The software, if implemented fully across an entire enterprise, connects the various components of the enterprise through a logical transmission and sharing of data (Norris et al., 2000).

The ERP systems are not only a unique source of information but also they do have a huge impact on the business processes that they are supporting. Implementing an ERP system is thus not only about implementing IT; it is also about implementing processes, which implies organizational change (Beheshti 2006; Yeow & Sia 2008). They wrap organizational processes into one end-to-end application and as Beretta mentions contributes with integration in two ways, process and data wise: “the uniqueness of the database and the adoption of workflow management systems support the integration of the information flows that connect the different parts of the firm” (Beretta 2002, p. 257). Davenport stated that ERP systems are good tools for ensuring standardization of data and measurements but also influence business processes through their promotion of “best practices” that results in standardization of processes (Davenport, 1998).

From the management point of view, the ERP systems provide an IT map of the company’s investments and choices because of the system’s ability to integrate the core business processes of an entire company into a single software. Customers, suppliers and business partners are consciously included in the business process, systems operation and systems development (Nah, 2002).

2.1.4 Business Processes

As it is mentioned in the previous section, the transactional application systems handle all the information that is essential for the business processes that they serve. They are explicitly designed to support the business processes and ensure that the information is secure and available to all the employees. But, what processes can actually the systems of record serve and at what extent they actually support them?

What makes a process?

A business process is the definition of the tasks and the sequence of those tasks to fulfil a business objective. Essentially there are four key features to any business process:

1. Predictable and definable inputs;
2. A linear, logical sequence or flow;
3. A set of clearly definable tasks or activities;
4. A predictable and desired outcome or result (Zairi, 1997).

The process strategy group defines the process as a combination of steps and activities that create some output or result. It represents the flow of work and information through an organization. It is the mechanism for creating and delivering value to a customer. Thomas Davenport defined a process as follows: ‘Simply a structured, measured set of activities designed to produce a specified output for a

particular customer or market. It implies a strong emphasis upon how work is done within an enterprise, in contrast to a product focus's emphasis on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly identified inputs and outputs: a structure for action (Snabe et al, SAP Roadmap).

Business Process Problems

In the previous sections, we discussed the importance of coordination and the vital role that is playing for the process efficiency and effectiveness. But even if the definitions are clear and complete does not mean that the business process will be perfect. We stated that the business process has an input, an output and a purpose. It also has stakeholders and their interaction is as crucial as the structure of the process itself. If one part is missing of the puzzle, certain problems appear. Process Strategy group lists several causes why a process will be considered as a broken one.

The structure of the process could be major issue, if the processes are fragmented and dispersed throughout different departments and different software systems. Secondly, the lack of coordination over the business processes drives the process to low performance rates and poor end results. The clarity of roles and responsibilities is essential in order to tackle this particular phenomenon. Moreover, monitoring the processes is also another essential part. Inadequate measurements may lead to misconception of the current situation and blocks the visibility in the activities chain of an end-to-end process. Last but not least, lack of knowledge for different parts of the process like document, analysis and improvement may influence the employee satisfaction and eventually the customer satisfaction. (Process Strategy Group)

Is there more?

So far, the definitions refer to the process as a structured, pre-organized with pre-defined steps that need to be executed in a specific order. Paul Harmon exploring the business process problems mentions that not only does a process have inputs and outputs but also stakeholders (Harmon, 2014).

Stakeholders are the people that are directly or indirectly related to the business process and linked via the inputs and the outputs. Rob Davis in his article "what makes a good process" complements Paul Harmon's statement and provides a holistic view of what a process should include. He defines certain criteria to evaluate the process and he states that a good process should deliver at first something of value to someone outside of the process. Secondly, the process should create value for the organization operating the process and finally the process should be aligned with corporate values and strategy (Davis, 2009).

Therefore, a good process must describe:

- the definition of tasks,
- the sequence of tasks,
- the resources needed to operate them,
- the environment in which they operate,
- The business objectives they fulfil (Davis, 2009).

2.1.5 Transactional Business Process

To begin with, IBM defines the transactional business processes as: "the activity that takes place between the parties involved in a business process that work toward the larger business goal.

Sometimes, the entire business process is considered to be a transaction. Other times, it is the smaller series of transactions that, when added together, create the whole". What's more, in order a business process to be named transactional needs to be one transaction for each individual activity in the process and each activity must commit its operations before execution continues.

Collaborative/Coordinating Business Process

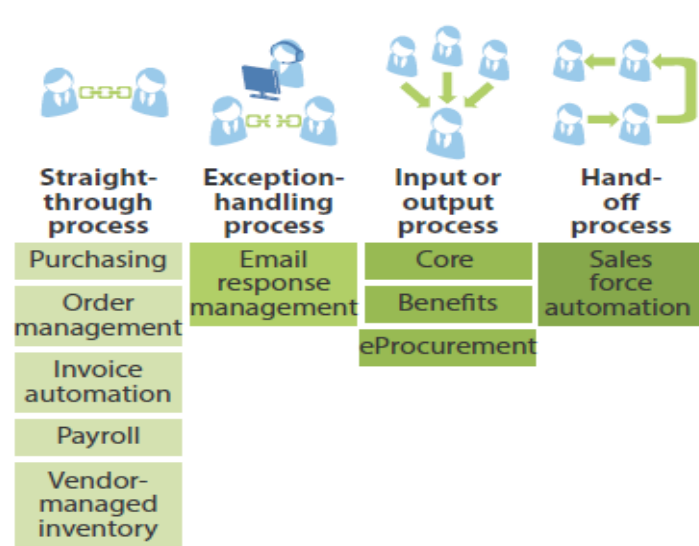
Business processes extends the strict definition of the structured step by step activities and embrace also other parameters. The surrounding of the process is also critical for the right execution of the process. The business processes can be large and extended trying to capture the end-to-end flow of the information and the tasks need to be executed but on the other hand they need to be flexible and dynamic to serve the customer needs and the market conditions. The term of the business process encapsulates also the technical nature of the process. Therefore, the IT processes are also included in the business process definition and support larger processes involving both people and computing systems (Fingar, Smith, 2003).

Smith and Fingar in their article keenly express that although the strict definitions are very helpful; hardly begin to explain the true nature of collaborative and transactional business processes. They also mention that at the very least the word coordination is missing and they define they business processes as the complete and dynamically coordinated set of collaborative and transactional activities that deliver value to the customers (Fingar, Smith, 2003). They also support that if the activities are collections of individual tasks then it is the synchronization and coordination of those tasks and activities that make them business processes.

Therefore, the business processes does not only include structured business activities but they should also support the unstructured or collaborative ones.

Collaboration in transactional processes applications

In a transactional process app, the end goal is as little human involvement as possible. The ideal is a fully automated process. People may of course initiate the transaction (such as a purchase) or be a recipient of the results of a transaction system. They may also be involved in handling exceptions, though the goal there is to minimize that over time. Examples would be applications for core human resource management, eCommerce, sales force automation, invoice automation and procurement, core financial management, and the like (Bartels, Moore, Forrester 2013).



Picture 1: Transactional software applications categorized based on the human involvement parameter (Bartels, Moore, Forrester 2013).

As we mentioned, business processes are not only the structured, pre-defined with the least human involvement business activities but also business processes should include the collaboration among the stakeholders of the business processes. Nowadays, collaboration is an essential accelerator, in the context of the business processes, for the organizations to reach the ultimate target of customer satisfaction. Forrester research defined the spectrum of where the transactional software applications are most valuable and in what processes they are focusing on. Human involvement plays significant role in order to understand the transactional applications. Less the people involved in a business process, the more the transactional software applications are most in use. Therefore, there are four categories of processes that these systems offer the most of value; the straight through process, exception handling process, input/output and hand-off processes and all of them can be grouped in one, the so called straight through processes. The basic characteristic of these kinds of applications is that they demand the minimum of human involvement in order these processes to be executed. Transactional software applications also include applications where human involvement is to deal with exceptions that the system could not handle, because a design goal for these applications is to reduce the number of exceptions that require human involvement (Bartels, Moore, Forrester 2012)

Therefore, the outcome of Forrester research is that transactional software applications, like ERP systems as we defined them earlier, fell short to cope with the increased complexity when more than a specific number of people are involved and also when the process variability is very high.

2.1.6 Systems that support business processes

In the history of process management, three major waves were flourished to deal with business process. The first attempt of process management started at 1920's with the Taylor's theories and then decades late, while the technology was improving, the second wave appeared at the beginning of 1990's with ERP systems. The ERP software system managed to provide an integrated real-time view of the core business processes using an extended database system to support the visibility and the information flow in the whole business processes' spectrum. Some years later, Howard Smith and Peteringar (2003) time stamped the third wave at the 2000's with the rise of BPM. BPM aimed to become the ultimate

tool to automate the business process landscape, add flexibility and adaptability to change the core activities when it is necessary rather than focus on one optimal process design that would be the panacea solution for the business complexity (Snabe et al, the SAP Roadmap).

BPM and ERP systems co-existed almost in the same period. Both of ERP and BPM techniques are trying to streamline the business activities of an enterprise, reduce the costs and workarounds but the question is what their differences are and if they can complement each other in the same business environment.

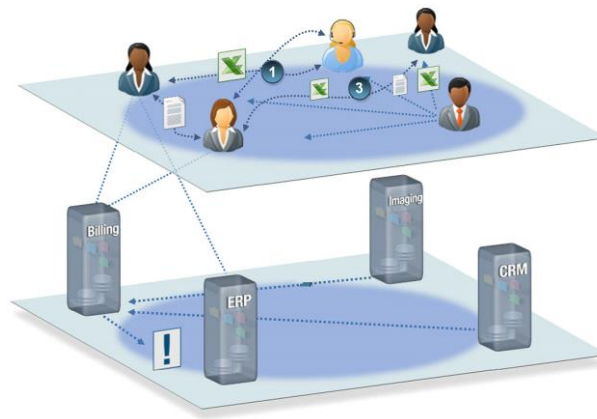
ERP and BPM

Gartner refers to BPM as a set of management disciplines that accelerate effective business process improvement by blending incremental and transformative methods. He continues mentioning that BPM's management practices provide governance of a business process environment toward the goal of improving agility and operational performance. BPM is a structured approach that employs methods, policies, metrics, management practices and software tools to manage and continuously optimize an organization's activities and processes. (Gartner, Cantara and Hill, 2008).

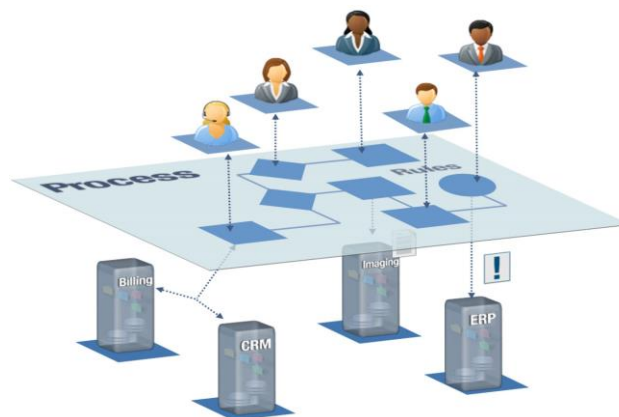
One of the most fundamental characteristics of BPM technique is that they build to serve continuously improvement of the business processes (Rosing et al, Whitepaper). Rosing M. et al define BPM as the management solution that focuses on the management of the business process lifecycle, outlining the way the organization can and will execute its competencies. On the other hand, as we already mentioned in the previous sections, ERP handles a massive amount of information of different organization functions trying to link all the business modules, creating the overview map of the business process landscape. ERP is a source of visibility, efficiency, standardization and collaboration for organizations of all types and sizes, in terms of designing, executing, monitoring and optimizing the actions utilized to run an organization (Castellina, 2013).

ERP is an essential technology for the enterprises in order to consolidate and streamline their data across the organization, while BPM on the other hand is practice that can be supported from the ERP systems and offers a process-oriented approach. From a bottom up approach, ERP is the base line technology to support the core business activities in the supply chain, and BPM is the practice to automate the business processes in those core business functions (picture 3). Even if, ERP systems are offering workflow functionalities in order to configure the steps of a process, they can't offer the flexibility of the BPM solution. In regard to flexibility, Aberdeen research revealed that 75% of companies that are the biggest users of ERP systems cited that ERP systems don't provide the needed flexibility, yet, on the other hand 33% of the companies stated that weren't constrained by its use.

From:



To:



Picture 2: With and without Business Process Management (Peisl, 2012)

ERP ultimately becomes the method which the processes designed in BPM are tracked and executed (Castellina, 2013). Or in a different perspective BPM stands for the front end operations and ERP for the back-office operations (Aberdeen Group, 2007). Therefore, it means that ERP and BPM are strongly related when the organizations are willing to invest both in supply chain visibility with ERP and a flexible automated business process solution with BPM.

Problems in ERP systems

Though ERP is a reliable technology to streamline organizational information and support the supply chain core business processes, there are several drawbacks out of the implementation of the ERP system. As we mentioned, ERP systems are the best of the transactional application's breed and they can support the business processes to have a beginning, middle and end. ERP systems were defined as a back office system, which means that they fell well short at the connections with the customer or the main business goals due to integration challenges and inflexibility (Forrester Research, 2013). ERP systems are the backbone of the enterprise but they actually fail to support the customers' problems, which is the main goal of every organization.

One of the main issues of the ERP systems is the integration problem (Linthicum, 1999), as it is also supported by the Forrester research group. Integration challenges prohibits the organization to seize

most of the value of the ERP systems, because of the proprietary packages, legacy systems or the so called untamed processes which are part of many business processes (Forrester Research, 2013). Forrester's research states that even software oriented architecture supports the ERP systems the integration challenges remain and these systems cannot support the complete customer journey.

A second major issue of the ERP systems is the flexibility or customization problems (Glass and Vessey, 1999). ERP system is a concrete information tool but really difficult to implement changes and innovate in its core capabilities in order to differentiate the business and gain competitive advantage out of others. Sumner mentions ERP systems suffers from the inability to follow organizational changes and it resists to follow the pace of business process evolution (Sumner, 1999). What's more, ERP solutions may lead to information silos, while the spread in the whole spectrum of the business processes. In Forrester research is mentioned that even if a common vendor is used in the ERP solutions, multiple installation and even different software versions may cause several problems which will lead to isolate the information from one department to another. Finally other problems are mentioned in the literature of ERP systems like implementation complexity (Martin, 1998), over budget and late projects (Davenport, 1998) misalignment with business strategy and competitive advantage (Davenport, 1998).

Problems with BPM

Business process management is a discipline that combines software capabilities and business expertise to accelerate business process improvement and to facilitate business innovation, as IBM states in its red paper of the smart role in Business Process Management. BPM evolved through the years in different directions. There are still traditional ways to implement it but also new opportunities around this discipline, like the new concept of BPM suite that intends to consolidate many applications of business processes in order to tackle the governance issues of BPM itself. Even though, the evolution of the BPM was remarkable several problems are identified in this technique. One fundamental difficulty to apply BPM is always to define the business processes the organization wants to support with software tools.

Business processes can be structured but also unstructured, in which BPM is still struggling to face this new concept. In the age of the customer as McGregor mentions in his part of the OpenText paper, the demands of the customers have been increased and BPM tools have been directed mostly at the automation of more transactional work rather than to serve the real unstructured business process that would serve the customer demands. Rob Davis in his article suggests that BPM needs to turn his attention to deal with the concept to market idea. In the Age of Customer, the focus has turned from the internal needs to the external ones in order to reach the customers' expectations.

The roll of "Concept-to-Market" is to generate new product ideas that meet customers' needs, align with business strategy, and reuse the corporate infrastructure (Sumner, 1999). The concept to market represents the business strategy, where it is identified that BPM falls too short to align with the established business goals. Understanding the specific business goals to be implemented, the extent of the implementation of those goals and which business processes are used to achieve the goals, are some of the challenged BPM needs to face (Peisl, 2012). What's more, IBM reveals that BPM also needs to bridge the issue of understanding what technical integration work is required for automated execution of the business processes, including both existing and new IT applications and IT systems.

In 2007, a research was conducted about the problems BPM is facing and some interesting results were published. In the following table are the main findings:

Strategic	Tactical	Operational
Lack of governance	Lack of standards	Lack of tool support for process visualization
Lack of employee buy in	Weakness in process specification	Perceived gaps between process design and process execution
Lack of common mind share of BPM	Lack of BPM education	Miscommunication of tool capabilities
Broken link between BPM efforts and organizational strategy	Lack of methodology	

Table 2: Major Issues in BPM at Different Organizational Levels, as noted by BPM Experts (Barbara et al, Paper)

It is important to state that BPM since 2007 was evolved and new techniques and technologies flourished around the BPM concept. Though, many of these problems still exist in the organizations that are implementing BPM techniques. Of course, the BPMN tool provided a solution at the operational problem of the lack of tool to support the process visualization. What's more, BPM suites are offering more and more governance resolutions and a holistic view in the business process spectrum. Even though, BPM is internally focused and is unable to play a more strategic role to meet the customer's demands and manage the lifecycle of a specific customer transaction. There is a little linkage with other processes, that might be going on for that same customer at the same time and often BPM offers little context for performing that transaction (OpenText, 2012).

2.1.7 Summary of Part One

The epicenter of the part one of the first chapter is the transactional software applications and mainly the ERP system that expresses most of the capabilities of the other transactional applications and the preference of most of the organizations. The bibliography is diverse; several definitions used from the most modern like the systems of records to the most common ones. The first step was to define them and list their main characteristics. Thereupon, we explored their connection with the business processes and we went through their definitions. We identified the main characteristics of the business processes and categorize them based on the human involvement factor. Most of the articles about the business processes were describing the processes as structured and predefined activities, but in the most modern articles, we found that the business processes encapsulate in their definition one more characteristic, the collaboration. It is essential to consider the business processes as a multidimensional activity and not as one-dimensional process that focuses only in the definition of the process steps execution but also the interaction of the stakeholders for this particular activity.

Therefore, we pressed the matter to consider the business processes also as collaborative ones and we categorized them based on the human involvement. Then, based on the Forrester categorization, we placed the transactional software application at the spectrum of the business processes in the straight forward processes, where these systems offer most of the value. We explored also the Business process management perspective and how they support the business processes. What's more, we found the correlation with the transactional applications and how they can co-exist in the same business environment as well as what are the main problems of these most common used technologies.

The purpose of the first part of the first chapter is to identify the possible gaps of the transactional applications with regard of business processes and collaboration. ***The outcome was that the transactional software applications like ERP, CRM etc. fell short to deal with the collaborative processes and ultimately offer a holistic solution to the increased customers' demands.*** This first part is the forerunner of a new technology concept; the systems of Engagement and one part of them the Smart process Applications, defined by the Forrester.

The inability of the transactional software applications to cope with the most complex business processes and include the collaboration axis in their repertory, gave birth to new technologies that will be able to provide solutions where the human involvement is a prerequisite and the process variability very high. The purpose of the second part is to explore the alternative solution that the Systems of Engagement offer. One part of them is the Smart Process Applications, a new software solution designed to support business activities that are people-intensive, highly variable, loosely structured and subject to frequent change. In the second part of chapter one, we will explore this new technology, its main characteristics and contribution and its emergence as the new next frontier for software.

Part 2 – Systems of Engagement and Smart Process Apps

In part one of this chapter, we highlighted that the business processes can be either structured or unstructured, or in other words transactional and collaborative ones. For several years, the organizations explored several techniques of how to automate structured business processes, which means they have gained most of the benefits available in this area (Chappell, 2012).

The business market is taking a shift. Living in the Age of Customer, the demands have increased substantially and pushed the technology a step further to scale this dynamic of the market. In the organizations' microscope, the unstructured activities are taking their turn. Having automated the most of the structured activities, now there is room for innovation, pushing the software to its limits. Of course, unstructured activities cannot be fully automated; it comes along with the expertise of people that are handling them as well as the interactions among these people. Therefore, the main idea is to support the employees' with software that can partially automate unstructured activities, helping them to execute their daily operations (Chappell, 2012).

The organizations are expanding, making affiliations and acquisitions, which means that the software landscape or the business foundation is really diverse. This force demands the organization to align business processes, people interactions and software capabilities; therefore the businesses have become more collaborative than ever before (Moore, 2011). Customer satisfaction, nowadays, is the ultimate goal and IT becomes the enabler to support the market conditions. Organizations implement significant strategically changes. Their focus is no longer investing in automating the first task workers at the edge of the enterprise to support the customer satisfaction, neither to inform the executives at the top of the enterprise with various business intelligence applications, instead their focus turned in the middle section of the enterprise. In that way, enterprises are empowering employees to communicate and collaborate across business boundaries, beyond global time zones, languages and cultural barriers, by using a next-generation IT applications (Moore, 2011).

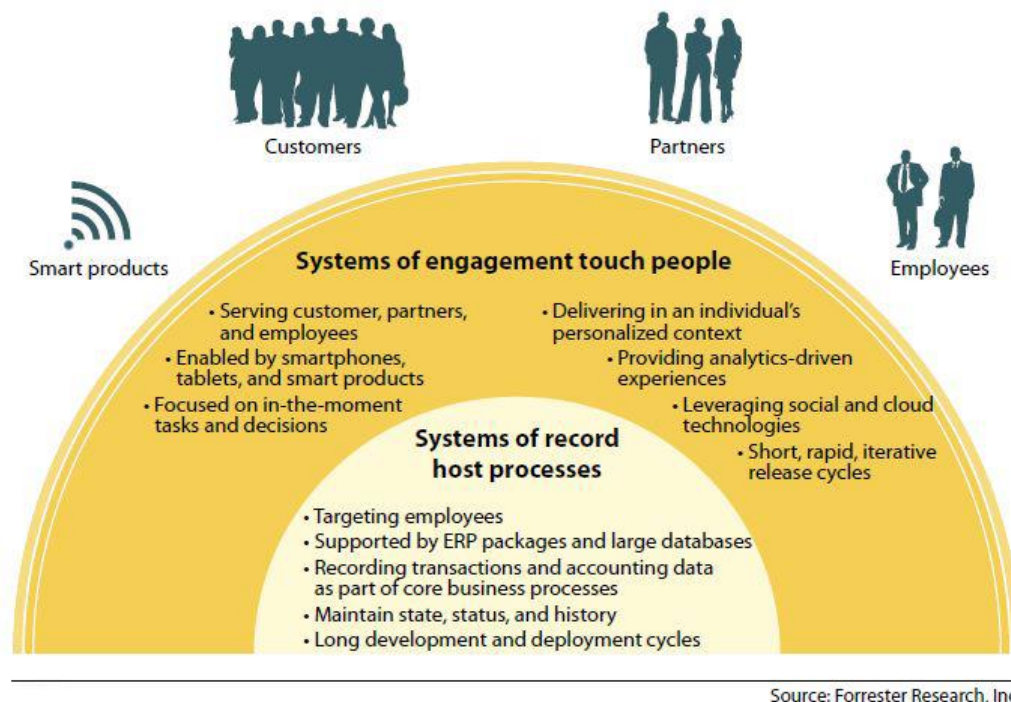
Geoffrey Moore suggests in his paper of 'A sea change in Enterprise IT' that in order the companies to succeed the transformation and adapt in the new market conditions, they have to invest in the Systems of Engagement to elevate the investments in the systems of record. Systems of engagement are the new

frontier technology concept that will connect people in real time, use smart and geographically-aware mobile devices and ubiquitous and cheap bandwidth. There are two basic systems of engagement, Smart Process Applications from Forrester and Business Process as a Service by Gartner.

In the following paragraphs, the concept of the systems of engagement is going to be explored as well as their differentiation out of the systems of records. We will focus on the Smart Process Applications trend, its main characteristics and their contribution to collaborative business processes.

2.2.1 Systems of engagement

So far, we have described the Systems of Record and their characteristics. It was emphasized that these systems fell short to efficiently support the collaborative processes and their main goal is to reduce the human involvement on the business processes, by automating most of them. In 2011, the first revolution burst with the separation of the software systems to systems of engagement and systems of record by Geoffrey Moore (picture 5). In 2012, a new software wave appeared with the introduction to the business market of the Smart Processes Applications by Forrester.



Picture 3: Systems of Engagement by Forrester Research Inc.

According to Moore, the systems of engagement will engage the organization with its customers, business partners and even more its own employees. It will become a “connected company” internally and externally (Johnsen, 2013). The organization that will thrive to translate these connections with the outside world to systems of engagement, and in extent as Forrester suggests to smart process applications, they will win the race of competitiveness under this globalizing pressure in the business world.

This shift from the back office operations and traditional boundaries will enhance the communication across the business departments and introduce new collaboration capabilities to tackle also the untamed business processes that so far were out of the scope. The systems of engagement capture different concepts, as CV Harquail suggests. Firstly the systems of engagement include any kind of tool that focuses on engaging any stakeholder around a business processes or an organization in the broad context. Secondly, these systems encompass all forms of social media and highlight the complex, recursive and dynamic nature of the tools and processes they support. Lastly, they focus on any kind of engagement possible in order to leverage the people's relationship and involve creative elements of the work that they do (Harquail, 2011). Here are some of the main characteristics of these systems:

Characteristics of Systems of Engagement in B2B:

- Make meetings work better across time zones
- Address complex issues collaboratively
- Keep collaborators connected for faster decision making
- Mine community content to extract insights to enhance the business
- View collaboration and social systems in context

Characteristics of Systems of Engagement in B2C:

- Use social media to attract and hold customer attention
- Use social media to extend and improve customer service
- Use social media to develop deeper brand relationships and customer insights
- Integrate social media with systems of record to provide a better end user experience
- Mine metadata to personalize offers for greater relevance and conversion (Aiim, 2011)

2.2.2 Systems of Engagement vs. Systems of Record

Systems of engagement refers to the transition from current enterprise systems designed around discrete pieces of information ("records") to systems which are more decentralized, incorporate technologies which encourage peer interactions, and which often leverage cloud technologies to provide the capabilities to enable those interactions (IBM).

A system of record (SOR) is an ISRS (information storage and retrieval system) that is the authoritative source for a particular data element in a system containing multiple sources of the same element. To ensure data integrity, there must be one -- and only one -- system of record for a given piece of information (Data Quality Glossary, 2013).

The new trend differentiates itself from the systems of records but their relationship must be kept tight. These systems complement and support each other for a composed and complete software solution for the business challenges. The Systems of Record with their ability to focus on cost, quality, contractual commitments and data, are a necessary tool for the organizations to perform global commerce. While, the systems of records offer efficiency, the systems of engagement create effectiveness. They can address the complexities of the global business relationships, focusing on time, innovation and personal commitments (Moore, 2011).

The systems are interrelated. On one hand the systems of record need the systems of engagement to provide solutions on complex and exception conditions and on the other hand the systems of record will

provide access at the relevant data base and historic data for a specific case. Both of the systems are essential to the organizations and can co-exist in a specific architecture of where the systems of engagement will operate on the top and in touch with the systems of records, serving different functionalities from the back office operations to the front-end customer requirements (Moore, 2011).

Consideration	Systems of Record—Enterprise Content Management	Systems of Engagement—Social Business Systems
Focus	Transactions	Interactions
Governance	Command & Control	Collaboration
Core Elements	Facts, Dates, Commitments	Insights, Ideas, Nuances
Value	Single Source of the Truth	Open Forum for Discovery & Dialog
Performance Standard	Accuracy & Completeness	Immediacy and Accessibility
Content	Authored	Communal
Primary Record Type	Documents (Text, Graphics)	“Conversations” (Text-based, Images, Audio, Video)
Searchability	Easy	Hard
Usability	User gets trained on system and has access to follow-on support	User “knows” system from consumer experience
Accessibility	Regulated & Contained	Ad Hoc & Open
Retention	Permanent	Transient
Policy Focus	Security (Protect Assets)	Privacy (Protect Users)

Picture 4: systems of engagement vs. systems or record (Moore, 2011).

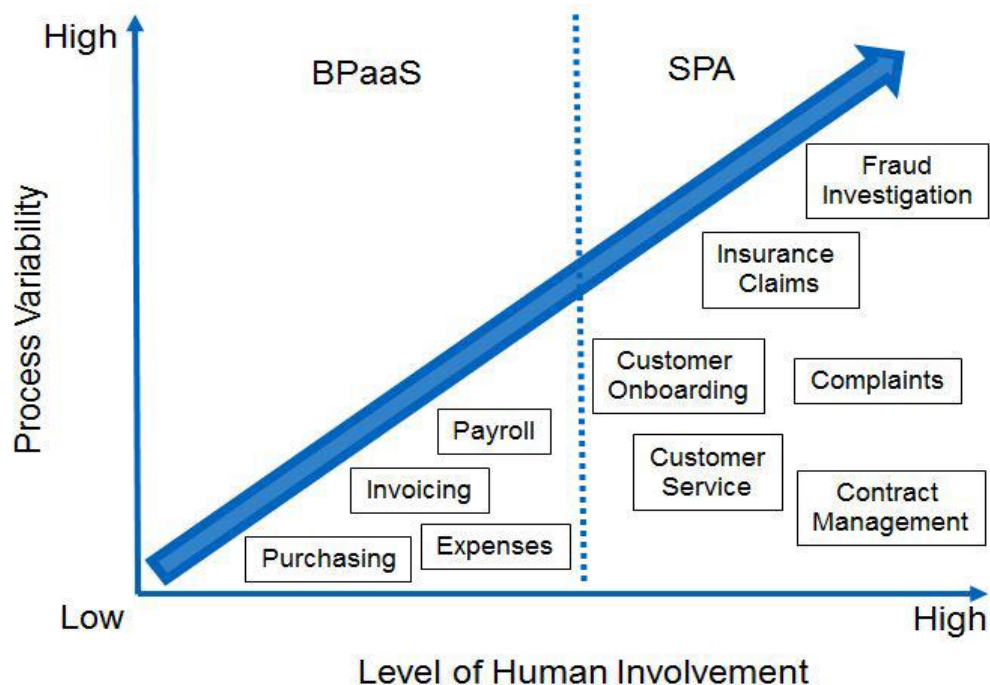
2.2.3 Current Systems of Engagement

There are two main technologies that express the new wave of systems of engagement, or systems of collaboration as Forrester suggested, the Smart Process Applications by Forrester and Business Process as a Service (BPaaS) by Gartner. The BPaaS concept was firstly though introduced by Wang et al at 2010 in their paper of Process as a Service (Wang et al, 2010).

On one hand, Business process as a service (BPaaS) is a term for a specific kind of Web-delivered or cloud hosting service that benefits an enterprise by assisting with business objectives. In the general sense, a business process is simply a task that must be completed to benefit business operations. Using the term (BPaaS) implies that the business process is being automated through a remote delivery model (Janssen, BPaaS). BPaaS is a cloud computing model similar to Software as a Service and focuses on how the enterprise can model, utilize, customize and execute business processes (Whibley, 2013). What’s

more, BPaaS applications are high volume, transactional highly standardized on demand processes (Whibley, 2013).

On the other hand, Smart Process Applications (SPA) is a new category of application software designed to support industry-specific business activities that are people-intensive, highly variable, loosely structured, and subject to frequent change. SPAs automate both structured and unstructured work activities in support of collaborative processes (Bartels & Moore, 2012). SPA can be deployed both in cloud and on premise, but the cloud solution will boost SPA's capabilities, making them easier to deploy, support and continuously improve. A value chain of cloud delivered processes is beginning to emerge from high volume, standardized transactional BPaaS processes to lower volume, variable SPA processes with higher levels of human involvement (Whibley, 2013).



Picture 5: BPaaS and SPA (Bartels & Moore, 2012)

Systems of Engagement and its market representatives offer several benefits out of their implementation. Both of the technologies are mostly deployed on cloud, which means that the organizations can bare the cloud fruits of low start off costs, reduced business risk and the option to pay on demand with the safety valves of elasticity and scalability. Therefore, outsourcing the non-strategic back office functionalities, they can focus on their core competencies and areas of differentiation (Whibley, 2013). What's more, startup companies or middle sized ones can easily have access on business process solution and industry best practices that would be unable to develop in house.

Both of the technologies are offering the opportunity to the organizations to maneuver in the market and choose the most suitable solutions for their business challenges. This flexibility in the market opportunities releases them from long-term and handcuffs contracts from specific vendors and broaden the market solution field.

2.2.4 Smart Process Applications

Introduction

Systems of engagement have changed the business game. Now, collaborative activities are in the front line for the organizations to gain competitive advantages against the others. Smart process applications advance the arsenal of the organizations in the internal and external battle of improvement. Modularity, flexibility, continuous improvement, customer satisfaction are more than words in the organizations' vocabulary and they can turn into flesh with the new software concepts. The IT agility that this concept encapsulates in its own definition, drives the organizations to reconsider their IT strategy and adapt in the new software conditions.

IT will not only support the business applications but also will enable the business to play a more active role in those front-end apps (Accenture, 2014). Moving forward from the transactional applications, having grabbed all the possible opportunities, the organizations will shift to automate and support as much as possible the front end collaborative business processes. "Now, the rise of the SPA is not just another platform shift. It will profoundly change how people live and work and how companies operate" as Jonathan Sapir and Peter Fingar comments in their book Smart Process Apps (Sapir & Fingar, 2013).

Smart Process Applications

Smart Process Apps (SPA) are a new generation packaged applications that are being created specifically for collaborative business activities and fill the gap between the systems of records and systems of communication (Bartels & Moore, 2012). They provide order in the chaotic collaborative business processes by automating them, while retain at the same time the basic concepts of automating the structured and predefined business processes.

Smart, as Peter Fingar mentions, stands for the ability of these applications to serve the knowledge worker's needs. Any tool that is to meet their needs must be capable of incorporating their knowledge throughout the execution of the solution they build (Fingar, 2013).

The second word in the definition, Process, can be translated as the transactional oriented perspective of SPA. They encapsulate also the automation of the transactional structured business processes following the Business Process Management techniques. The focus of Spa is on people, not systems, yet SPA's must leverage the power of BPM system, especially the intelligent BPMS (Fingar, 2013).

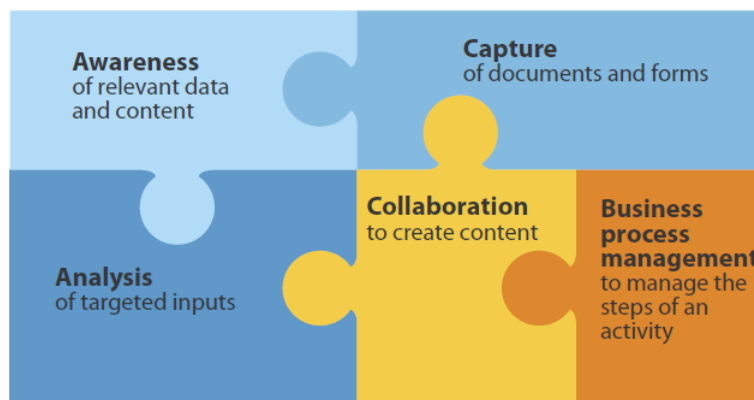
The third word, Applications, stands for the SPA's recognition of the mobile and cloud influence. SPA are trying to take advantage of the cloud expansion and acceptance from the organizations and create small, dynamic and user driven apps that will perform specific tasks at the time and place they need (Fingar, 2013).

Human factor is more essential than ever. Organizations ever since were trying to overpass the human activity with software but SPA offer will support the human activity rather than replacing it and eliminating its contribution. The desire goal is to make people more evolved and productive as far it concerns the business processes and on the other hand to take initiatives for engagement in order to establish more powerful task oriented relationships. Improving human based activities, SPA will bridge the gap with the outside world and engage the clients more in their business processes, as a result to

create unbreakable and trustworthy bonds that will lead to a long life commitment. Therefore, SPA concept is focusing more in the human intensive processes that demands information density and are highly variable, unpredictable, subject to change and collaborative.

Characteristics of SPA

Smart Process Apps are consisted by five different elements; Awareness of relevant data and content, Capture of documents and forms, Analysis of targeted inputs, Collaboration to create content and Business process management to manage the steps of an activity. Due to the range of the business processes SPA wants to cover, in those five elements two main streams exist. The first one, the collaboration, aims to tackle the untamed and unpredictable business processes and the second one intends to automate the structured ones. The other three elements support this initiative in order the app to become more information intensive and flexible.



Picture 6: Smart Process Applications' characteristics (Bartels & Moore, 2012).

The five categories:

1. Awareness of Data:

This functionality serves the need of a specific input for discussion upon a matter as well as the real-time information that the stakeholders need for making better and faster decisions. The more the information available, the more flexible the stakeholders become to tackle the obstacles in a specific case (Bartels & Moore, 2012).

2. Document Capture:

Most of the collaborative activities suffer from a mound of incoming paper that requires manual work. Smart Process Apps will provide an integrated document capture solution in order to tackle this paper burden (Bartels & Moore, 2012).

3. Embedded Analytics:

Measurements tools are essential for the stakeholders in a specific process. SPA will support analytical tools that will provide insights in the past or future state of a business process, making the stakeholders able to understand in depth the problem, identify the threats and have a holistic view of the case (Bartels & Moore, 2012).

4. Collaboration platform:

This functionality supports the human activities. People will be able to communicate, be proactive and engaged with other people upon specific business processes. They will become part of the problem, share ideas, comment on other people's work and stay ubiquitous engaged given the mobility that SPA will offer (Bartels & Moore, 2012).

5. Business Process Management tools

While the collaboration will be enhanced of the other features of the application, the people will be able given the BPM tools to plan the specific steps to execute the business process. Workflow functionality, Dynamic Case Management and process modeling capabilities will be part of the SPA solution in order to provide the needed structure, governance and continuous monitoring over the business process (Bartels & Moore, 2012).

What boosts SPA?

Smart Process Applications steam their power out of four key technologies that amplify and drive their evolution and growth; IT consumerization, Cloud, Mobile and Smart computing.

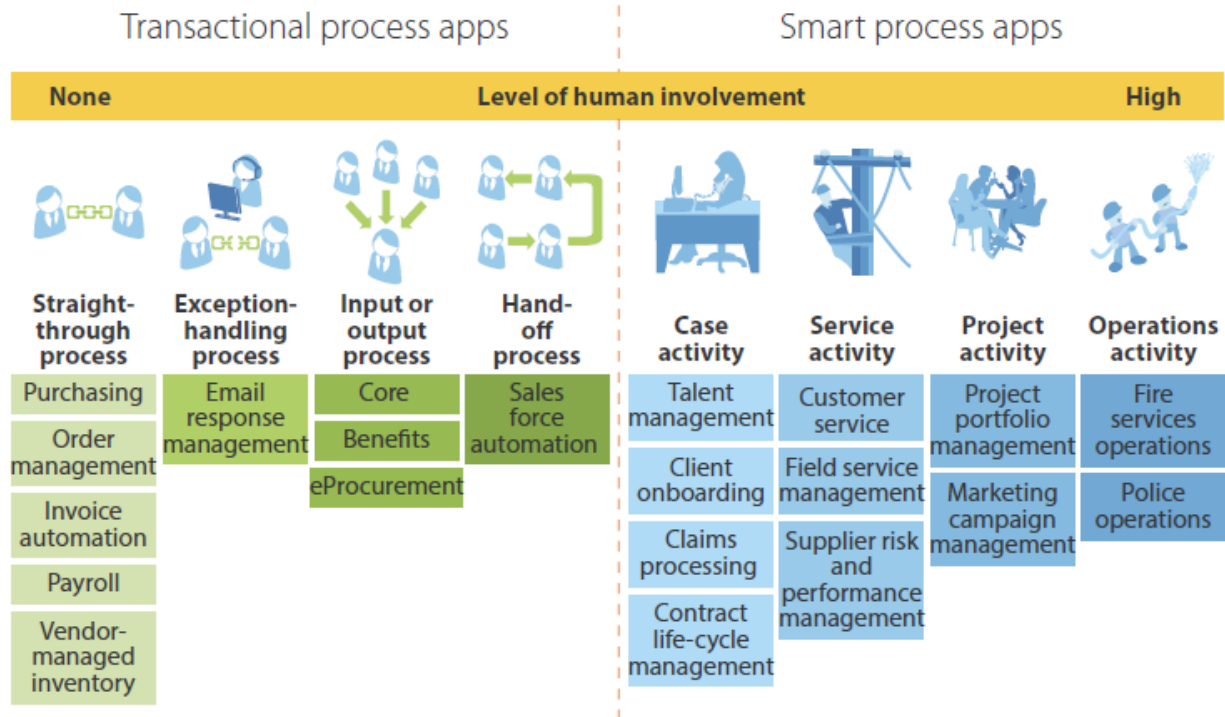
Cloud computing enjoys the significant and wide adoption of several organizations in the Age of the Customer. It became one of the main technologies commonly used in the organizations especially in the small and mid-sized because of their convenient features. Cloud computing offers the capability of ubiquitous access and the shared infrastructure, supports the collaborative activities among the parties involved and functions without any firewall protection to cause access control issues (Bartels & Moore, 2012). In respect of the Forrester research, Smart Process Apps and SaaS type applications have a strong relationship and it is suggested that from one hand SPA is founded upon the cloud concept but on the other hand SPA will boost the broad use of SaaS apps even more in the future.

In the systems of engagement era, mobility could not be absent. Mobility is one of major technologies evolving even more since the support more and more business functions. Nowadays, mobile computing tends to be a standard offer from the organization and basic feature in their product portfolio. Smart process applications as business apps need or even must support mobility in order to serve the external and internal people's need. SPA and mobility combined will establish the foundation of an effective collaboration by people, wherever they may be (Bartels & Moore, 2012).

Bring your own device (BYOD) is a widely adopted concept as well. "IT consumerization empowers employees to take the lead in modernizing collaboration" as Forrester describes. Collaboration becomes a large part in their daily activities and critical to get their work done in the most efficient way. What's more, smart computing is another important factor of the SPA's evolution and growth. Advanced analytics or predictive models, business intelligence and text analytics will be part of the Smart Process Applications solutions in order to help employees in their daily work to make decisions faster and more accurate.

Business processes and SPA

So far, we have explored the business processes and their separation to unstructured and structured ones. We have also added two new parameters to categorize them, the human involvement and the process variability. The transactional software applications, or the so called systems of record, cannot efficiently support the collaborative business processes. Therefore a new wave is created; systems of engagement and their representative Smart Process Applications (SPA). SPA is offering solutions that could tackle the untamed processes with their customizable functionalities. Based on the Forrester's research, Smart Process apps are more appropriate to handle the intensive human involvement and high variable business processes (picture 8). Case activities, service or project oriented and even more operations activities that demand coordination, collaboration and engagement, Smart Process Apps can offer a solid solution to these collaboration issues.



Picture 7: SPA and level of human involvement (Bartels & Moore, 2012).

Though, the separation of the systems is quite clear, a grey area in between does exist [20]. There are some business processes that demand collaboration but they are characterized as transactional processes. This grey area highlights that business processes are not clearly defined or demand collaboration features in order to be executed efficiently. When collaboration appears to be an essential ingredient in a business process even if it is practiced by two people, then also Smart Process Apps is considered to be an effective solution to these specific problems.

2.2.5 Connections with other technologies

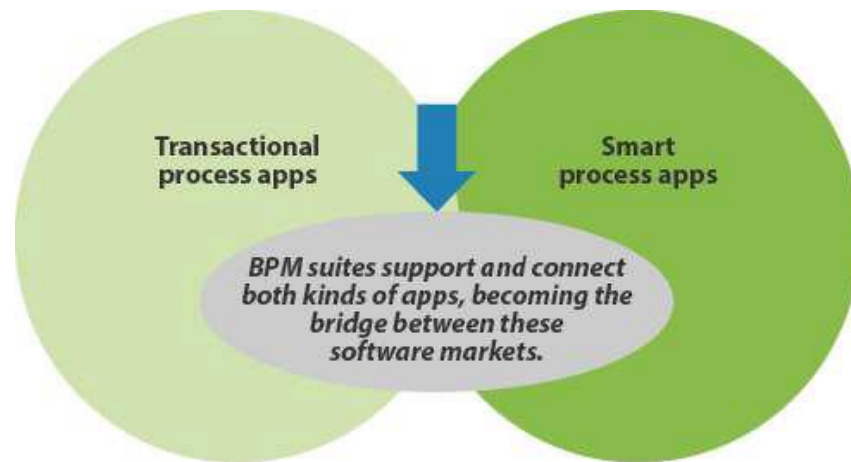
Smart Process Applications are tightly related to other existing software applications like Business Process Management and Dynamic Case Management. Generally, there are three basic categories of SPA implementation and deployment.

1. BPM suites that allow companies to build their own, custom smart process apps (22% of the SPA market in 2012).
2. Vertically-oriented smart process apps that will be built on BPM platforms (7% of the SPA market in 2012).
3. Existing smart process apps that have emerged as complements to transactional apps (71% of the SPA market in 2012) (Bartels & Moore, 2012).

Commonly, BPM suites include dynamic case management features on their solutions but also there are also specific dynamic case management platform that can host smart process applications.

Business Process Management Suites

From 2000 and so on, Business Process Management suites are evolving. Besides the traditional ones, Gartner introduced a new BPM suite, the iBPMS, in order to upgrade the functionalities of the traditional ones with intelligent capabilities. A traditional suite supports a complete set of integrated composition technologies for managing the interactions among all the resources — people, software systems, information, business rules and policies — that contribute to operational process outcomes (Sinur et al, 2012). BPMS is a process centric technology that is considered to be an application development environment with model driven techniques and mostly used to create process oriented applications with more traditional software development methodologies rather than collaborative ones. BPM suites can access different systems of record functions and data in order to structure the processes around these traditional applications and ultimately provide a configurable structured process application above these systems. As it explains the following picture, BPM suites are able to host both types of the application and be the foundation of a holistic business process solution.



Picture 8: Business Process Management suites (Forrester Inc.)

In the new digitalized era, BPMS also expanded to cover the ground of upcoming technologies and be able to address new and complex business issues, helping the business managers to make faster and better decisions. Visibility, flexibility and transparency are ever-existed issues that iBPMS, introduced by Gartner, wants to tackle. Intelligent business operations (IBO) will be the new ingredient of these management suites. Therefore, an iBPMS expands the traditional BPMS by adding the new functionality needed to support IBO, such as real-time business analytics, deep complex-event processing (CEP), social media to support social behavior and collaboration, and expanded technologies to support growing requirements for mobility (Sinur, 2012). This initiative aims to add more human involvement characteristics in order to enhance the human interactions and support the collaborative processes with more informational and collaborative tools.

Even though, the most modern suites can provide more sophisticated functionalities to support the business processes, they have little linkage with other more collaborative ones and often provide little context about the business process they want to structure (OpenText, 2012). The collaborative nature of the business processes is still missing and there is where SPA integration that plays a crucial role. SPA can elevate the usage of BPMS to a more holistic level of handling the business processes, proving

solutions that include the collaborative nature of the business processes and their context. There are several advantaged by integrating Smart Process Apps technology into the BPM suite, like:

Advantages:

- Provides the benefits of traditional package solutions but with greater flexibility afforded by BPMS based systems.
- Reduce system implementation times, while supporting a more collaborative environment and providing a ubiquitous access to systems (OpenText, 2012).

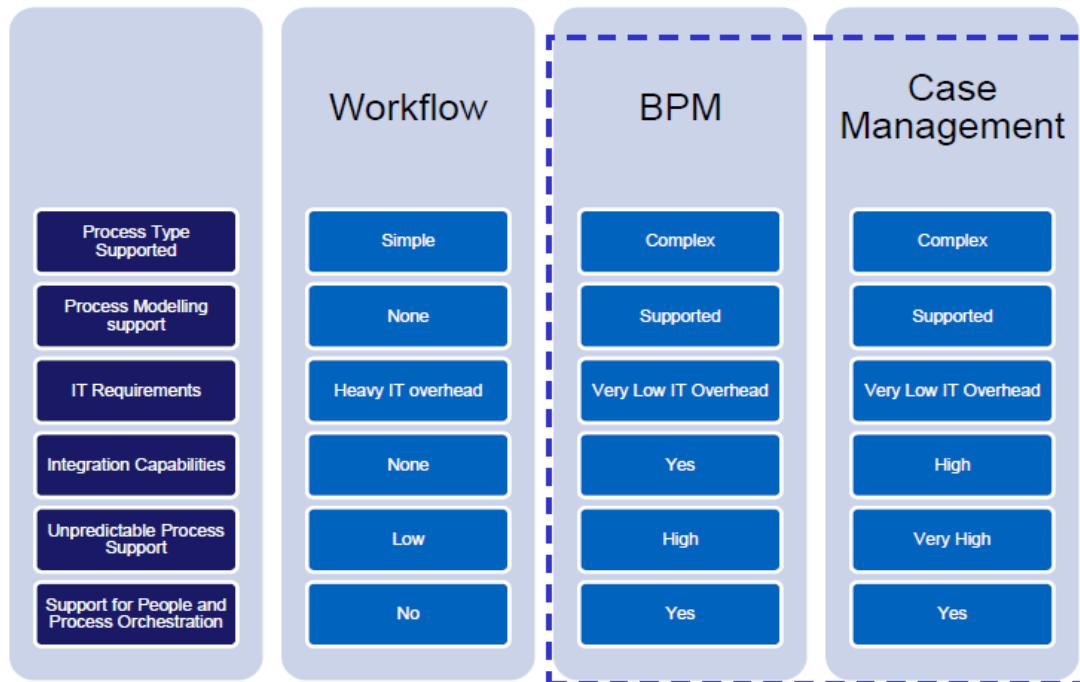
As Forrester explains in the SPA research, the new smart apps especially those for vertical industry processes and untamed horizontal apps, will be built on these platforms (Bartels & Moore, 2012). BPM suites are expanding to integrate more sophisticated and focused solution and smart process apps will be the new generation technology hosted on the suites.

Dynamic Case Management

Dynamic case management (DCM) is quite different form the traditional BPM, but it can be included as part of the business management suite solution. Forrester defines them as a combined technology that includes predictive and content analytics, document capture, enterprise content management, BPM tools, business rules, complex event processing, mobility, and social collaboration tools (Bartels & Moore, 2012). DCM is suitable for case and knowledge driven business processes that are mostly unstructured and collaborative. DCM differentiates its approach from BPM by supporting the ability to run multiple procedures against a given case of work (Clair & Miers, 2011). What's more, DCM is specialized to associate different types of objects like processes, documents, resources and other with a case. This solution offers a unique end-to-end experience of the specific case, making the stakeholders able to track and trace any information related the specific case, with accessible mechanisms that allow them to handle variation. Furthermore, DCM provides the agility that workers demand by providing mechanisms to selectively restrict changes on a specific process (Clair & Miers, 2011).

The main characteristics are:

- Collaboration and high speed change for dynamic, ad-hoc, unstructured operations but with high productivity, efficiency and governance
- Better decision support without constraints whilst retaining flexibility and control
- Fully integrated cases with the data, systems & documents for an actionable single view of case across the enterprise
- Automation of what makes sense to reduce the workload for “commodity” processes (Swenson, 2013)

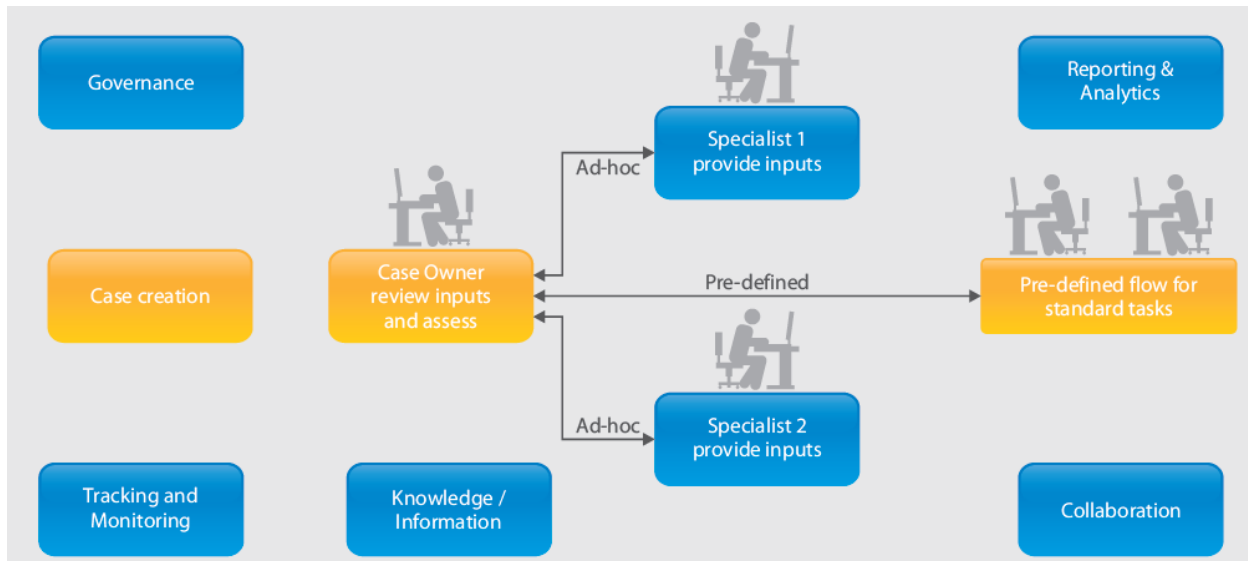


Picture 9: Difference of BPM and Case Management (Bartels & Moore, 2012).

Dynamic Case Management and Smart Process Apps

Dynamic case management was emerged by the more human centric business process management vendors. It is a differentiation from the main BPM practices to turn the focus to the unstructured and more collaborative processes (Clair & Miers, 2011). DCM is based on the same principles, as the SPA, of the dynamic business applications; design for people and build for change. Even though Smart Process Apps are mainly deployed in Business process management suites, not all of them are appropriate for SPA deployment. The most valuable characteristic of the BPM suites for SPA deployment is the dynamic case management module. SPA and DCM are interrelated and share the same principles but they serve different purposes.

DCM is able to define the overall case structure as a set of coarse-grained states, which every state has different levels of security and flexibility. What's more, DCM offers a very flexible configuration of the business process definition. They can instantiate the process with fragmentation techniques in order the users afterwards to be able to make changes and configure them anyhow he wants. Finally, DCM is capable of running multiple processes against a given case of work. From one hand, the users can follow the prescribed process without the need of changing something in the process, but also, on the other hand, in some phases of the process changes are necessary to be made, the user can apply changes giving the opportunity to get his work done based on the situation (Bartels & Moore, 2012).



A diagrammatic representation of the case management process flow

Picture 10: Dynamic Case Management

Smart process apps are the front-end software to apply several combined techniques. While for the structured activities, BPM is the major concept commonly used in the SPA solution, for the unstructured activities, SPA is following the DCM principles. The case driven concept of the DCM is a major breakthrough of how to deal the unstructured activities and SPA will be the front end application of applying these techniques. Particularly DCM vendors will provide their platforms for firms to build their own smart process apps (Bartels & Moore, 2012).

2.2.6 Workspace

The Systems of Engagement are closely related with Knowledge management. Knowledge management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge (Davenport, 1994). It refers to a multi-disciplined approach to achieving organizational objectives by making the best use of knowledge (North California University, 2013). This section is about to explore the workspace literature and their benefits in knowledge transferring.

Virtual Distributed Teams

Entering the Knowledge management sphere, it is important for the organizations to understand how to facilitate the use of contextual information in their Knowledge Management systems. Contextual information is the whole picture of small pieces of information. It is extremely essential for the reader to full comprehend and understand knowledge (Ahn et al, 2004). Without proper contextual information, knowledge can be isolated from other relevant knowledge resulting in limited or distorted understanding (Ahn et al, 2004).

It is common for organizations to create *virtual distributed teams* to manage their knowledge intellectual assets and encourage innovation (Malhotra & Majchrzak, 2005). Distributed Teams (DTs) can be defined as groups of people who interact through interdependent tasks guided by common purpose, and work across space, time, and organizational boundaries primarily through electronic means (Lipnack

& Stamps 1997, Maznevski & Chudoba 2000). Basically, the virtual teams are project focused. They are formed when a project is initiated and disbanded when the project is completed (Ahn et al, 2004).

H.J Ahn et al obtained all the characteristics of the virtual teams in one table [101]. The characteristics are:

<i>Characteristics</i>	<i>Description</i>	<i>Key implications</i>
<i>Project-Based Organizations</i>	Project focused [52]	Possible loss of context information due to dynamic changes of organizations
	Low team history [57]	
	Temporary teams [34, 52]	
	Greater switching of tasks [20]	
<i>Distributed & heterogeneous teaming</i>	Physically distributed members [57]	Limited sharing of context; loss of context from inefficiency of communication
	Cultural heterogeneity [57]	
	Across space time and organizational boundaries [38, 40, 44]	
	Functionally distributed [20]	
<i>Non-routine knowledge intensive tasks</i>	Ad collection of individuals [52]	Needs for more thorough understanding of knowledge
	Novel and non-routine tasks [51, 57]	
	Interdependent tasks [38]	

Table 3: Virtual Teams' characteristics (Ahn et al, 2004).

There are six ways that contribute to grounding communication based on Clark and Brennan (1991).

1. Co-presence (see and hear what the others are doing)
2. Visibility (see others reactions)
3. Co-temporality (receive others' utterances without delays)
4. Simultaneity (receive and send simultaneously messages)
5. Auditability (take note of intonation in others' voices)
6. Sequentiality (stay in intended sequence)

Applying Clark and Brennan's theory to distributed groups, Kraut et al. (2002b), Hinds & Kiesler (1995), Greenberg & Roseman (2003) and Owens et al. (2000) suggest that virtual workspaces can support these six grounding needs by facilitating synchronous communication among all members, and promoting immediate clarification and intense back-and-forth interaction.

Virtual Workspaces

DTs work upon **virtual workspaces**. Virtual workspaces are an integrated set of tools that offer a variety of communication support capabilities including a well-organized and searchable common team repository and group discussion forums (Lipnack & Stamps 1997, Maznevski & Chudoba 2000). They

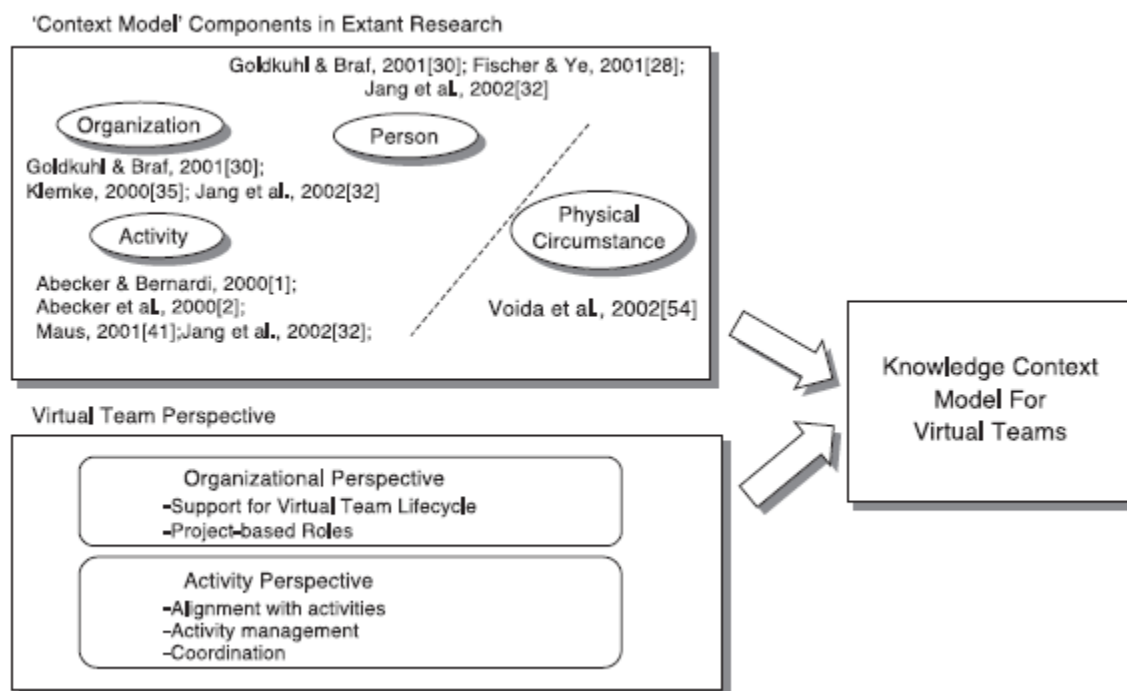
provide historical referents, enhance situational awareness, and facilitate multi-channel interactions (Hinds & Bailey 2003, Greenberg & Roseman 2003, Malhotra et al. 2001).

The utilization of contextual information in virtual collaboration environments is very significant for the three below reasons.

1. Contextual information can be lost or isolated because of the dynamic changes that can occur among the participants of the virtual teams in the collaborative environment
2. The virtual communication is more difficult than the face-to-face collaboration, because Internet is a narrower channel for accumulating context
3. The virtual teams are focusing to non-routine and knowledge intensive tasks, which require a high level of contextual information for better understanding (Ahn et al, 2004).

Based on Ahn et al, there are three main components in a virtual collaboration environment; organization, person and activities. Moreover, they obtained the following requirements for a sustainable virtual collaboration environment:

- Organization Requirements:
 - Virtual teams have a unique life cycle
 - The organization of teams for temporal goals
 - Collaboration until the goals are achieved
 - Disbanding
 - Projected based roles of virtual team members should be considered
- Activity Requirement
 - Activity should be aligned with collaborative activities, otherwise knowledge will be isolated



Picture 11: Components of a virtual collaboration environment (Ahn et al, 2004).

H.J Ahn research developed a knowledge context model for virtual collaborative work, the KC-V to facilitate the creation, management, and utilization of knowledge. Their solution is built around the activity entity. They support that the activity entity is the main component and all the contextual knowledge (document, milestone, discussion and coordination) should be attached on this entity.

The benefits of their model as they supported are:

- Evolutionary accumulation of knowledge in natural alignment with collaborative activities
 - Items placed along with the hierarchy activities
 - Creating knowledge items can automatically update the status of activities
 - Coordination of activities can result in the accumulation of knowledge
- Supporting virtual team lifecycle
 - Search for similar project
 - See the end-to-end procedure
- Improved understanding by rich navigation paths
 - From knowledge items –Knowledge context- Further information like docs, activities, projects etc.
- Searching for knowledge with similar context
 - From a project or an activity, users can find similar projects and activities based on the knowledge context.

One main observation out of the H.J Ahn et al model is that it has great similarities with the Dynamic Case Management (DCM) structure and practices. The DCM proposes that every project should be called and organized in a virtual case file to consolidate all the information around it. In the H.J Ahn et al model the virtual case file is the activity entity. As a result, both of the frameworks are introducing the consolidation of information in a contextual knowledge model.

Smart Process Applications and Workspaces

Harrison-Broninski, via his Human Interactions book in 2005, explores the human interactions into human based processes. His book is based on the knowledge management system, HumanEdj, which he developed along with his team. The HumanEdj is a virtual workspace and a well-organized contextual information system. Peter Fingan in his BPTrends report aligns the Harrison-Broninski's initiation with the Smart Process Applications in a way that both systems are exploiting information technologies to structure the untamed human based activities. He stresses also the transition from the information processing to commitment processing of the information systems, because of the human collaboration need among the participants.

2.2.7 Summary of Part two

In the second part of the chapter one, we explored the new software concept of the systems of engagement and we focused mainly on the Smart Process Applications as a potential solution for the highly complex activities with high human involvement and process variability. Based on these two factors, human involvement and process variability, we completed the business processes' spectrum and the software applications that support them. Besides the SPA characteristics and definition, we examined also its connections with other technologies like the Business process management suites and the Dynamic Case Management.

A Smart Process Application is a consolidation of the best practices of Business process management and Dynamic case management in to one application. If the Smart process apps are deployed upon the BPM or DCM suites, they can extract the most of the value. Many BPM suites have integrated DCM functionalities but there also exist separated DCM suites in the market.

Combing all the concepts together we found that the SPA are standing at the end of the chain as a front-end application that can be deployed upon a BPM suite with DCM capabilities. From one hand then, we have the BPM practices of the SPA and from the other hand we extract the DCM flexibility to reorganize the business processes based on specific case requirements and the offering of one collaboration platform.

Moreover, the Virtual Workspaces were explored. The main focus turned to the Virtual Workspace designed by Ahn et al, where they introduce the Workspace as a Knowledge Management solution to consolidate contextually all the information around the activity entity.

Part 3 – A. Collaboration Theories

2.3.A1 Introduction

Smart Process Apps are the new frontier technology that introduces solutions to the market for collaborative business processes. The organizations now focus more than ever to automate as much as possible the untamed business activities in order to create value and sharp their competitive advantage. Organizations are no more closed internally focused entities but collaborative ones, customer focused and externally oriented, creating networks with other organizations and strong relationships. In this section, we are going to introduce well established collaboration theories in order to explore the tendency of creating value networks and their competitive advantage. We have explored so far the transactional software applications and how they react to the collaborative processes, while also we have explored the concept of the SPA and their main value proposition.

Our main research is focused of how the organizations can react the best in the collaborative business processes and seize the most of their value. In the literature pool, different concepts appear as the right model in order the organization to collaborate in a more efficient and effective way. In this section we will introduce two main theories of collaboration, the Value net theory and the Antecedent-Process-Outcome framework. Value net theory stands as a business model of how the organizations can create value out of the collaboration and on the other hand the framework explains how to handle the collaboration processes and their basic characteristic in order to be efficient and effective.

The organizations can be viewed as a value network, especially with the rise of e-commerce that has encouraged the interest in e-webs and business webs (Allee, 2000) and inter-organizational exchanges (Biem & Caswell, 2008). In the Age of the Customer, the customer demand of more sophisticated and elaborated products and services has increased substantially and organizations are trying to cope with the changes. From the ever internal focus, the enterprises are placing now the customer into the center of their business activities to offer products and services that can meet the customer expectations. Networking increases the collaborative business process complexity to the chaotic level, making it difficult for the organizations to react on time and efficiently. Therefore, the organizations need to have a better insight of what the collaborative activities are, analyze them and confront them.

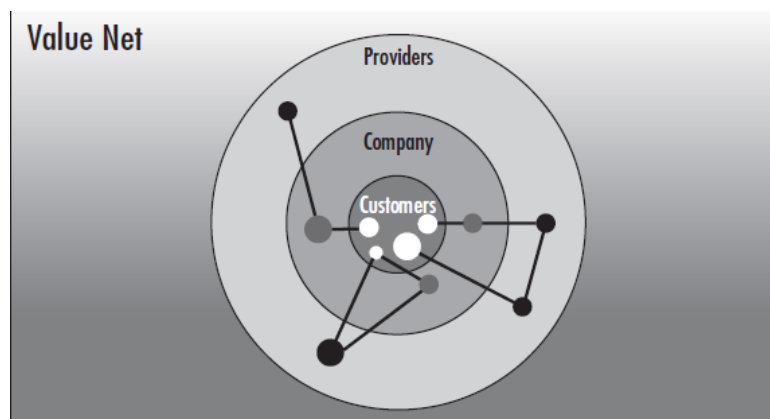
Passing through the threshold of the impenetrable silos, the business processes need to be flexible and adaptable in the often occurring changes in the organization environment. Smart Process Applications, focusing on automating the collaborative activities, offer software solutions in the complex business processes to cope with the pace of changes in the business network. The driving force of collaboration pushed the organization to be engaged in different networks. In order, though, the networks to be valuable, the collaboration among the different actors has to be efficient and well-defined.

2.3.A2 Value Net Theory

Definition

The value net theory introduces a new business model. A value net is a fast, flexible system aligned and driven by customer choice (Bovet & Martha, 2000). Though is customer oriented, the main purpose of the network is not to supply but to create value for all the actors of the network. This dynamic ecosystem replaces the traditional approach of the value chain business design that its main focus was to manufacture products and deliver them through distribution channels. Allee defined the Value networks as: “the value network is any web of relationships that generates tangible and intangible value through complex dynamic exchanges between two or more individuals, groups and organizations” (Alee, 2002).

The new business model is not about the concept of demand-supply but beyond that to the actual demand of creating value. And the value is created when the customer can actually play a significant role in the transactions. In the value network, the customer has the power to decide about the services and the products that he desires and the organization need to be flexible and adaptable to these customer demands. There are no more pipelines but networking activities to reach the desired end result for the customer. The value net replaces the sequential links of the supply chain (see figure below) with a network that focuses on two-way customer/supplier relationships (Bovet & Martha, 2000).



Picture 12: Value Net (Bovet & Martha, 2000).

Value network is the child of the digital business era. Technology expands the organization's horizon in order to understand the customer needs in the best way possible. All the actors are connected to a

technology driven network, engaged in business activities, transactions and information flows. The end result is that the value net becomes a digital supply system (Bovet & Martha, 2000). This concept of digitalized networking is most applied in the Age of customer these days. The organizations have crossed the traditional boundaries of doing business and are seeking new opportunities of how to exploit the best of the technology in order to create value for them and also for the other actors in the network. The value network should be infinitely configurable rather than sequential and rigid. The organization should listen the customer voice and let them to be involved in their business processes in order to actually build the products and the services to meet the actual demand. Therefore, the value nets are demand pull oriented and strategic, looking for solution, rather than product driven and tactical, aiming to cut costs (Bovet & Martha, 2000).

Characteristics

The value network has five basic characteristics (Bovet & Martha, 2000), which are the following ones:

Customer-aligned: Customer is the king, the start and the end of the business practices. They can trigger processes and request for special customizations in order to the products and services that the organization offer to be aligned with their expectations. Customers command the value net.

Collaborative and systemic: Networking demands collaboration. Collaboration is the main characteristic of the value network and need to be exploited in the best way possible. The activities are delegated to the right participants that would be able to perform them and create value out of them.

Agile and scalable: The concept to market is now the main mentality of the organizations. They need to be fast and flexible to changes in order to cope with the increased demands. Value nets are responsive to changes in demand, new product launches and rapid growth. Working capital shrinks and process time is collapsed.

Fast-flow: The time of execution need to be reduced. The business processes need to be flexible in order to deliver fast and convenient, secure the interest of the organization and serve the customer demand and expectations.

Digital: E-commerce will be the key enabler and new digital information link of how business is conducted and become the force of redefining the value networks (Bovet & Martha, 2000 and Allee, 2002). C-commerce is the next concept where also the organization needs to absorb and exploit. Digital collaboration and automation creates value for the actors, making them to respond effectively in the market challenges. Connecting with the other participants is very essential, but the organizations now are diving into how the can exploit the collaborative activities as much as possible to create more value for them and the other actors.

Drivers

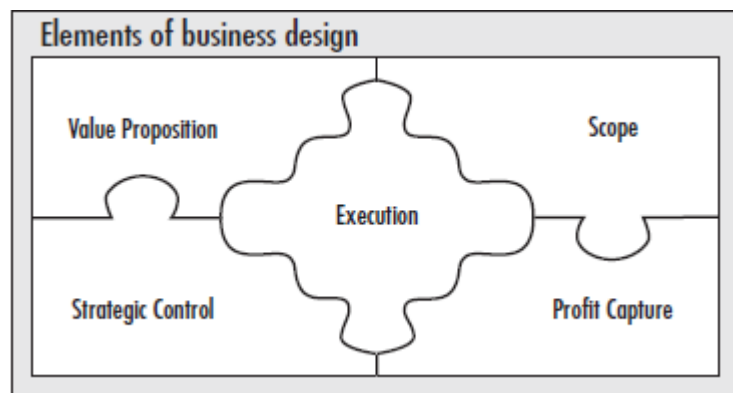
Martha and Bovet in their book identified the basic drivers that the organizations should be pushed in the network business model solution and replace the traditional value chain with it. The **demanding customers** are the cornerstone of their theory. Now more than ever, the customers have the power to make decisions and drive changes of how the enterprises are performing. In order to cope with the customer demand, rigid and inflexible business systems are out of the scope. The customer has the

expectations for the organizations to deliver fast, whenever and wherever the order may be placed either for services or products.

Secondly, the **digitization of the economy** is revolutionizing the way companies do business (Bovet & Martha, 2000). New techniques and technologies through innovation show the road for the organization to follow. The organizations need to follow the technological innovation to stay in the market cream, gain competitive advantage over their rivals and stabilizing their position in **the high market competition**. The digital technology is impacting every aspect of the business (Bovet & Martha, 2000). **Globalization** gave birth to a more furious competition over the market, opening on the other hand new opportunities for the organizations, expanding at the same time their network (Bovet & Martha, 2000).

Elements of business design

Nowadays, most of the companies are considered to be part of a value network. There are hardly rigid production pipelines for the organizations, detached from the customer feedback and only internally oriented. An organization can be part of a value network, but in order to create its own value network in respect of its customers, five elements must be considered (picture 14).



Picture 13: The five components of the value network (Bovet & Martha, 2000).

The first element of designing a value network is the organization's value proposition. Giving an ear on the customer's voice, the company's value proposition must be aligned on the customer demands. The value proposition is what a company can offer to its customers, most often a product or a service. The value of the proposition relies on three different dimensions; superior service, convenient solutions and customization. The superior service is translated in two main services, the rapid product delivery, where the products or the services are delivered the fastest possible, and the reliable product delivery, where the products or services are delivered exactly as ordered (Bovet & Martha, 2000). Furthermore, the superior service is also built around the concept of customization and in practical terms to a convenient solution for the customers. Customers need to feel important and the value proposition needs to make sure of it.

Based on "what before how" approach, structuring your value proposition and the strategy goals, the organizations in a value net need to consider also about the scope. More specific, the main consideration should be around which business activities must be performed to deliver the value proposition, the people that they are going to perform them as well as how to align the business processes with the value proposition in order to capture the profit (Bovet & Martha, 2000). The

organizations need to invest time and effort to streamline the business demands, the customers, the employees and the stakeholders of the product. Collaboration is an essential driver to reach the goal of alignment and profit capture. Enhancing the communication among the stakeholders is the base of the value network, where all the people involved are equally considered as important players and their opinion matters.

Profit is the gospel of the organizations, but there are different techniques to make it happen. The value net theory suggests that the profit will be captured if the organizations can focus in balance in the internal and external business, which is translated of what the customers want and how the business activities are performed to reach their expectations. A value net can deliver superior profits by using enhanced operating capabilities, which means providing a more complete solution for the customers, and by improving the company's costs and assets position (Bovet & Martha, 2000). The company's costs and assets positions can be improved by elimination inventory stockpiles, enhancing the operational effectiveness and bonding the stakeholders' relationships in order to succeed a business growth without capital investment, but outsourcing business activities (Bovet & Martha, 2000).

The forth element of the value net business design is the strategic control, which stands for the ability to protect and sustain the profit over time. The strategy turns from an individual task to a network concern. The network players need to plan a strategy that will support differentiation with a strong brand name in the market. A successful strategy must enhance the collaboration within the network, expand the network with potential members and bring innovation to the market (Bovet & Martha, 2000). Last but not least, there is the execution design step, which includes the network culture and digital information as a driven force to share information, differentiate and innovate faster and more reliable.

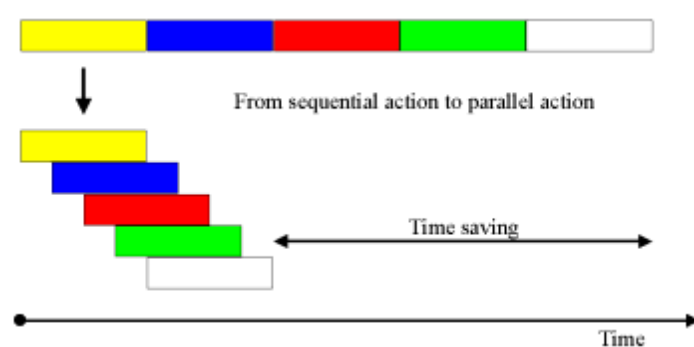
2.3.A3 Value of the Value Network theory

A value network is a web of relationships that generates tangible and intangible value through complex dynamic exchanges between two or more individuals, groups, or organizations (Allee, 2002). One of the main contribution of the value net theory is that helped in order the businesses' mindset to change, pinpointing the customer in the middle of the network, where everything starts and ends to serve the customer's interest. As Brown G. mentions in his article, "the businesses begin by capturing what is important to different customers and work back to physical production and distribution processes enabled by unifying information flow design – a business design that uses digital supply chain concepts to achieve both superior customer satisfaction and company profitability" (Brown, 2009).

Technology is a strong driver that pushes the organizations to change. Changes would be otherwise difficult to occur without the burst of the technology. Digitalization has reached a certain level of maturity and penetrated to the core of how the enterprises are doing business. The value net theory, since 2000, highlighted the importance of creating networks among different parties to unlock hidden profits, in which digitalization played a significant role. Over the years until now, the digitalization transformed the value networks into value information networks where the information flows real-time across the cooperating businesses and all the parties involved. The relationships became more dynamic and flexible and that is the source of the value net power, creating value by the combination and enhancement of services provided by all participants (Brown, 2009). Tapscott et al highlighted that "with regard to new internet services, value networks are often understood as a network of suppliers,

distributors, suppliers of commercial services and customers that are linked via the internet and other electronic media to create values for their end customers” (Tapscott, et al, 2000).

Value network theory introduces a new way of doing business. It moves from the rigid and transactional way to the more parallel and networking schemas to offer the opportunity to the parties involved to communicate and coordinate in a more efficient way. Creating value networks helps the parties involved to cope with the market changes faster and in more flexible ways. The result is time saving. Evolving the transactional thinking to the parallel one increase the speed of the business to react to the customer demands and supply faster to the market. The idea is the same when comparing sequential and multiprogramming systems in a computer and that is exactly what happens in the value networks (picture 15) (Ollus et al, 1998).



Picture 14: Making different actions parallel instead of sequential aims in time saving (Ollus et al, 1998).

George Brown mentions: “Consequently, Value Networks emerged to provide a platform for modeling non-linear complex set of social and technical resources, working together via relationships. In value networks, value is created through the exchange of resources via relationships between roles” (Brown, 2009).

Part 3 - B. Antecedent-Process-Outcome framework

2.3.B1 Introduction

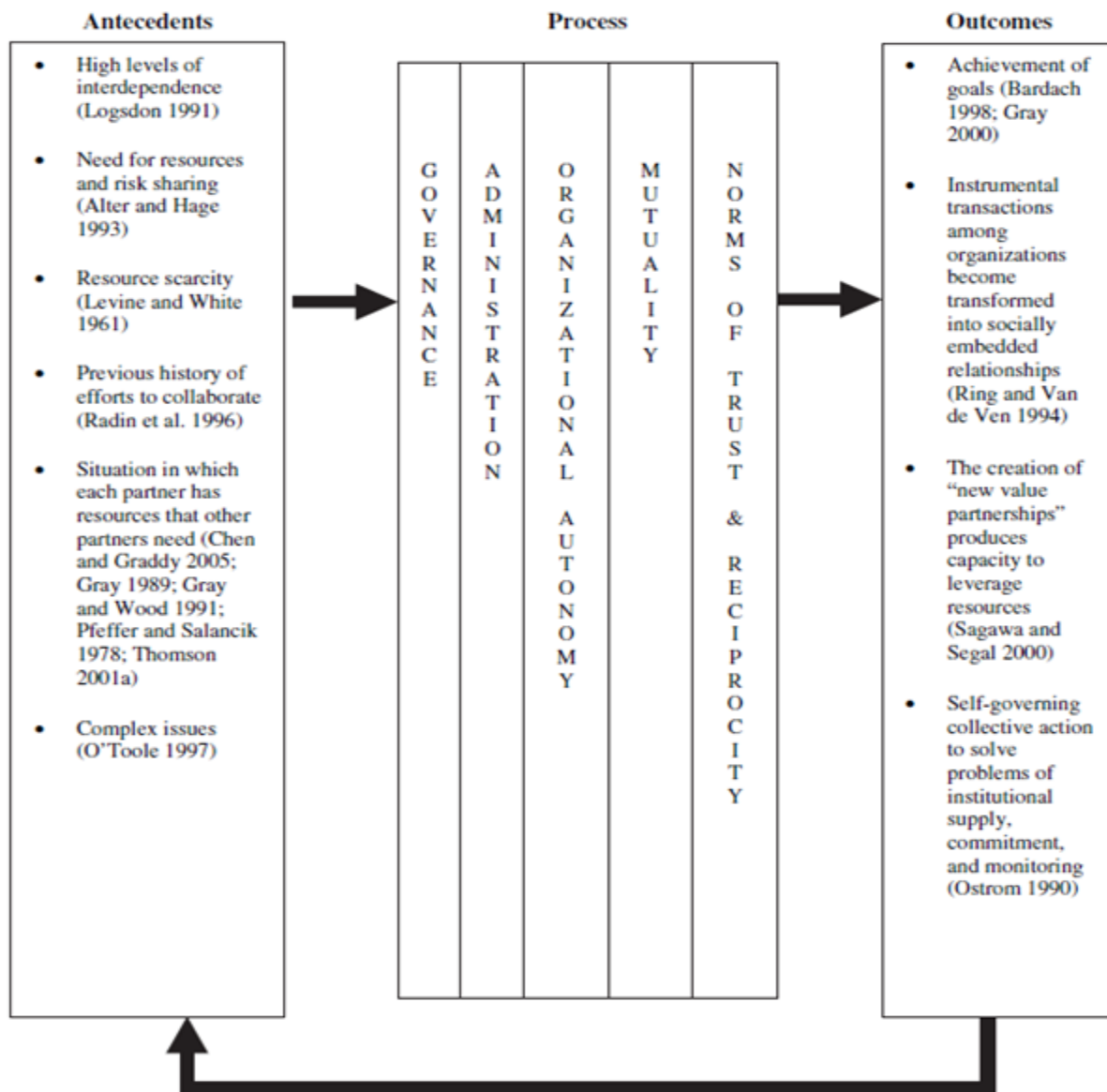
Value net theory suggests that if the organizations will be organized in a network form, hidden profits will be revealed. But what is the secret ingredient that differentiates it from the previous business formulations? The answer is: collaboration. Collaboration one of the most used words in the business dictionary, but still one of the most difficult one to implement. You can't provoke collaboration, don't even structure it or put in a box but guide the participants with the right analytical tools and guidelines to support collaboration and feel engaged in the business transactions. Value networks create value through the personal interest in the interpersonal relationships, where collaboration is most essential.

But while the value network analyzes how the business design should be, still collaboration is left in a black box. In addition, how to sustain collaboration or how to reach collaboration maturity left outside of the scope. This research proposes a combination of the value net theory and the antecedent-process-outcome framework designed by Wood and Grey in 1991, to provide a holistic exploration of the collaboration within the network. The value network theory analyzes the surrounding of the business to find the most suitable participants and create value out of their relationships. The collaboration

framework will complement the value network initiative and add the fundamental pillars of collaboration in order to make the network more concrete, efficient and sustainable.

2.3.B2 Framework definition

The value net theory suggests a new business design, with the collaboration to be the most essential ingredient. Diving into the business design, the participants must secure the collaborative processes and shed light upon how to coordinate and communicate. Several scholars examined the collaboration issue, setting the base study of the antecedent-process-outcome framework that adds the five pillars of collaboration theory and explains the possible outcomes (picture 16).



Picture 15: Antecedent-Process –Outcome Framework (Wood & Grey 1991).

Wood and Grey at their research colored the collaboration box, with guidelines and constants that define collaboration and provide a roadmap of how to perform collaboration and sustain it. The framework's input came from different studies. In the framework there are three areas the antecedent material, the process of collaboration and the results. Collaboration is a common used word but the least understood (Thomson & Perry, 2007) as Ann Marie Thomson et al argued in their research. In the first part of the framework some general conditions can be identified. Kreinbich categorized the antecedents to the following main categories: resources, transaction costs, goals, norms and external forces. Resource scarcity is an important driver for the organization to seek collaboration with other companies in their environment.

On the other hand, if the organizations share common interest about specific resources, they create relationships to protect the resources that may be depleted by others (Kreibich, 2013). What's more, organizations want to enter into inter-organizational relationships to reduce the costs of their operations, outsourcing business activities to maximize efficiency. In addition, existing norms influence the organization's behavior in order to be engaged into inter-organizational relationships and in general external ideological values encourage the initiatives for collaboration. Last but not least, external forces play a crucial role as a motivator to the organizations to create alliances with other companies. Institutional or environment forces, including governments, can ignite collaboration and legitimize relations for the benefit of the both sides (Kreibich, 2013).

On the other side, there are the outcomes of the collaboration process, which most of the scholars described as positive. Although, Alchian and Demsetz (1972) supported that collaboration can negatively contribute to the organization's performance because teamwork can affect the individual achievements and can facilitate free-riding and shrinking (Alchian & Demsetz, 1972). In the above framework, the positives outcomes are depicted stressing the importance of the collaboration process. It is supported that collaboration can build trust and boost efficiency. In their research Johnson and Johnson (Johnson & Johnson, 2001) suggest that creating inter-organizational bonds through collaboration, higher achievement and productivity can be accomplished. Self-governing collective action can solve problems of institutional supply, commitment and monitoring (Ostrom, 1990). Moreover, collaboration can be transformed into socially embedded relationships (Ring & Van de Ven, 1994) and also can enable organizations to bridge institutional and cultural differences (Cohen & Mankin, 2002).

2.3.B3 Collaboration Process

Wood and Grey pictured the collaboration process as a black box. Many scholars researched the collaboration but from the perspective of definition and before and after stage, while on the other hand Wood and Grey tried to open the Pandora's Box. With their research, they revealed the five pillars for a sustainable collaboration process which are: Governance, Administration, Autonomy, Mutuality and the Norms of trust and reciprocity. These five elements can be categorized in three main categories the structural that includes governance and administration, the agency that includes autonomy and the last is social capital with norms of trust and mutuality.

Governance

The participants that are engaged in a collaboration process need to understand how to jointly make decisions about rules that will govern their behavior and relationships (Thomson & Perry, 2007). Ostrom (1990) highlights the importance of the governance in the essence of a set of rules that will guide the participants through collaboration and will answer the questions of who is going to take decisions, what information needs to be provided or even how the costs and benefits are to be distributed (Ostrom,

1990). Joint decision is a dynamic procedure, threatened by individual contests or conflicts, and therefore balance between the personal interest and the group interest must be resolved. In the literature governance is explored and described as participative decision making, shared power agreements and problem solving (Thomson & Perry, 2007). Governance balances the people's behavior and reminds them their role in the group, which as Thomson (Thomson & Ann Marie, 1999) describes, it is not about reaching into the best possible decision but it is about willing to support the decision once it is made.

Administration

While governance is the first step to conceptualize the collaboration process, the administration is the next step to utilize it. Administration structure helps to translate the governance rules to action. The key administration features that were identified are clarity of roles and responsibilities, coordination, concrete achievable goals, capacity to set boundaries, communication and monitoring mechanisms. Collaboration is rather difficult to be implemented because of the autonomous parties and the voluntary participation of the parties, but a central position is still necessary for coordinating communication, disseminating information and keeping partners alert to the rules (Thomson & Perry, 2007). Therefore, collaboration can be translated as the right combination of administrative elements and the capacity to build relationships (Kreibich, 2013).

Autonomy

Organizations tend to collaborate in order to solve particular issues and extract the most of the possible value out of the alliances, but on the other hand, the organizations have their own identity, with specific goals and interests that could be opposite of the common interest. Therefore, there is a continuous battle between the organization self-interest and the collective interest. On the one hand, organizations need to keep their own identity and autonomy separated from the common interest but on the other they have to follow the fundamentals of collaboration by sharing information about the organizational operations (Wood, & Gray, 1991). Thus, it is not surprising the fact that collaborations' goals may conflict with the autonomous goals and in that state it is very likely that individual missions will trump collaboration missions (Thomson & Perry, 2007). Collaboration lacks formal authority hierarchies between the participants and that is the reason why Huxham states "that working relationships between individuals from different organizations can only be formed on a goodwill basis" (Huxham, 1996).

Mutuality

Mutuality is another ingredient of the collaboration process and has its own roots based on interdependence. The organizations in order to collaborate they need to experience mutually beneficial interdependencies and that is based either on differing interests (what Powell calls complementarities (Powell, 1990)) or on shared interests (Thomson & Perry, 2007). Complementarity describes a situation in which "parties to a network agree to forego the right to pursue their own interests at the expense of others" (Powell, 1990). While on the other hand, shared interests are based on homogeneity, i.e. commonalities among organizations such as similarity of mission or culture (Thomson & Perry, 2006).

Norms

The last entity of collaboration is the norms, which is divided to reciprocity and trust. The two words are closely related conceptually. Reciprocity is described as the tendency from one collaborator to interact only if the other participant demonstrates the same willingness (Thomson & Perry, 2006). This "I will-if-you-will" mentality is based on perceived degrees of the reciprocal obligations each will have toward the others (Thomson & Perry, 2007). Accepting the tit-for-tat reciprocity, the partners are willing to make

the first step because they expect the other participants eventually to equalize the distribution of costs and benefits, what Ring and Van de Ven called fair dealing (Ring & Van de Ven, 1994). While the collaboration evolves, mores can be created between the participants and that will form the basis of reciprocal exchange and social interaction (Thomson & Perry, 2006). Those mores can also be translated as a form of trust. Trust can be defined as a common belief among a group of individuals that all the members will perform in accordance with any commitments both explicit and implicit with good faith (Cummings & Bromiley, 1996). Although, trust is an important component of collaboration, it can take an excessive amount of time to create the close relationships and build trust (Tubin & Levin-Rozalis, 2008).

2.3.8 Summary

The Part three is focused on the collaboration theories and how we can apply models and rules to create a sustainable and profitable collaboration environment. On one hand, Value Net theory suggests a new business design that will bridge the gap between the organization and its environment; the clients and other organization. The value network aims to change the organization's mindset from the transactional supply chain practices to a more collaborative ones, creating bonds with stakeholders and serve the customer the best way possible. Creating value networks, the organizations are able to tackle non-linear and complex activities, combine resources, share information and build valuable relationships.

On the other hand, the antecedent-process-outcome framework reveals the collaboration secrets that the organizations can exploit to create a sustainable and valuable collaboration environment. Combining the concept of the Value net theory with the ingredients of five-pillar framework, we can create a sustainable collaboration environment to serve the business and customers' demands.

Chapter 3 - Results

3.1 Case Study at Exact

3.1.1 Introduction

The research is following an exploratory case study style, which is a form of a qualitative descriptive research. A case study is an empirical inquiry that investigates a contemporary problem within its real-life context. The exploratory study is aiming to analyze the case study data by building an explanation about the case in the company Exact and identifying a set of casual links with the proposed technology of Smart Process Applications. Afterwards, based on the results, we are revisiting the initial case, compare the findings and propose a solution, answering a “how” research question.

The research is conducted in Exact, where they are developing industry-specific on premises, hosted and cloud based software solutions in a wide variety of industries. The central idea was to examine how Exact can exploit the Smart Process Applications concept to approach their current challenges with a different perspective. Therefore, the first step was to identify in which department, Smart Process Apps will be the most of use. Three different departments were in the first focus; Accounting, Professional Services and Customer on boarding. After the first introduction interviews, it was decided to focus on the Professional Service Department in Exact Online.

In that department, a new collaboration platform is implemented. We are revising the solution, identifying potential challenges and understanding how SPA can propose a new perspective in the subject. Therefore, in the following chapter we are explaining the main research around the collaboration platform solution of Exact, depicting the processes and the actions that are taking place from the participants in the collaboration platform and highlighting the challenges the product is facing.

3.1.2 PSA collaboration Platform

PSA current process

Exact has different divisions based on the software solution they are offering, part of the solution is also the Exact Online department, responsible for the cloud solutions. The Professional Service Department of Exact Online launched recently a new software solution to introduce collaboration to the users. The collaboration platform approaches the basic functionalities (invoice, quotation, purchase orders) of Exact PSA product with a different way, trying to bridge the customers by offering collaboration features. Different requests can be created and executed through the system, but the part of the actual interaction of several parties through a specific process is still a challenge.

The PSA solution is based in the tangible connections among the parties involved in the process. The solution contains the creation of an artifact (like an invoice) and structures the process step by step for faster execution and collaboration. Following the solution; a stakeholder creates the artifact (pdf format), specifies the details for collaboration (rights) and sends it to possible different receivers via a URL functionality. When the document is received, the collaborator can open the URL directly in respect of better user experience and flexibility. The overview of the artifact, then, is displayed in the screen and several actions can be performed by the user.

The collaborator can reject or approve the document within the due date that is specified by the creator. He can also place a note in the note box, next to the artifact, visible to the parties when the artefact is approved or denied. If one of the collaborators reacts and for example approves the artifact, the other parties will be aware of the artifact status in the overview collaboration page of Exact Online (EOL), but they cannot interfere anymore in the document. The overview page hosts all the artifacts created so far and their status with the last note the collaborator placed. On the other hand, if the document is rejected, accompanied by a note with the specific reasons, a new pdf has to be created to meet the requirements of the stakeholders.

3.1.3 Interviews' Take Aways

Remco Kroes and Hermien Ratcliffe, from Professional Services department, participated in my first interview in order to identify a problem that Smart Process Applications concept can provide a different perspective. Exact online can execute transactional services like CRM, accounting and contract management but lacks the collaborative features that can boost the software to the leading product in the market. It is identified that all the transactional processes together raises the collaboration necessity for faster process execution and the reduction of potential challenges. One step further, the participants started to describe a current challenge of the organization; the electronic sign offs. The electronic sign off procedure demands accuracy and speed in order the organization can benefit the fruits.

Diving into the subject, the term domino effect popped up. Hermien and Remco exemplified several scenarios of how this problem works. The starting point is the several stakeholders. We defined for example the client, the company that is hired to provide the services to the client and also the subcontractors. All of the sides need to exchange information for different procedures, for instance, invoicing (for purchase, sales and bills), notifications, complaints and quoting all completed via email. To move forward in the next process step, every single side needs the approval of the other engaged in a process. Therefore, the delays can be time consuming and create an inefficient environment of working.

The **domino effect** can be defined as the added complexity in the communication among different parties when one transactional process triggers another and continues to create new sub processes. Therefore, the more the parties involved, the more the sub processes triggered, the more the time of execution of the transactional business processes. The need of collaboration interferes the main process, creating other essential processes that have to be executed beforehand. These mainly intangible triggers cannot be predicted, because of the complexity of the system of collaboration and the intuitive human nature to communicate and negotiate a process. The domino effect can express the unstructured activities that took place in a structure end-to-end process and are very important for the final tangible result of the process.

During the interviews the following challenges were identified:

- **PDF recreation:**

The EOL user articulates the artifact based on specific data that acquires beforehand. The collaborator that receives the URL can reject, approve or resend the document and potentially place a note in the note box. The margins of collaboration are tight. Therefore, in case of disagreement and misalignment of the collaborators' requirements, the pdf file has to be recreated and reformulated. It is understandable that if the document is sent to more than one stakeholder the complexity is risen. For example, if several parties need to read the document

and each of them have different suggestions, the PDF file either has to be recreated several times or in the worst case scenario to be outdated until the parties will conclude to a final decision. The reestablishment of the pdf several times could cause serious issues in respect of the time of the process execution.

- ***Visibility-Real Time Awareness***

Moving forward, another issue is very critical for the collaboration among the parties. In the note box only the last message is visible to the parties involved, therefore the bigger picture of collaboration is obscured. Missing a part of the actual collaboration can cause confusion among the parties that missed a step and create a non-virtuous circle of communication. The lack of visibility of the others current status or intentions may increase the delays and will lead the parties to collaborate in different ways (email, person to person communication), apart the solution that Exact Online is offering.

- ***Collaboration***

In the current solution, the collaborators are restricted to specific actions so far. Instant messaging is not an option as well as the collaboration upon the document, such as discussion of the requirements or specifications, desired modifications or potential solutions. The actual collaboration would take place in the middle of the process, when they have to decide all together if the context meets their expectations and requirements. Of course, it is inevitable to replace completely the person to person communication with a software solution but the emails can be avoided with a certain solution that amplifies the real-time collaboration. The human need for intuitive collaboration in order to clarify specific issues and problems should took into consideration. Therefore, a proposed solution needs to involve the real time collaboration in the place and time of generation.

- ***Document Enrichment***

Another essential element that is missing in the current solution is the document enrichment. The people involved need to propose solutions for some problematic statements in the artifact or even more to add other documents next to the original one to clarify some points. This functionality will enhance the collaboration of the stakeholders and create a transparent and clear process without misinterpretations and misleading information that can lead to confusions and wrong decisions.

- ***End-to-end process***

Last but not least, as we mentioned the parties need to intuitively collaborate when is necessary. The current solution does not provide collaboration before or after the artifact process. For example, collaboration among the stakeholders, before the artifact is created, might resolve critical issues, misinterpretations and confusions. Or even more, after the document is delivered and the status is known to everyone, the parties may still want to collaborate for the next steps of the process or how this artifact can be related to other issues that may be facing. A proposed solution should include the previous and next phase of the PDF creation. For example, the quotation and invoice matching can be tackled in the previous phase and better decision making might take place after the artifact is created. Therefore, an end-to-end approach that includes also other processes before and after the main workflow of the current solution may accelerate more the time of the process execution and everyone involved will have a holistic view of the situation in a very transparent way.

3.1.4 PSA solution's SWOT analysis



Picture 16: SWOT analysis of PSA collaboration Platform

3.1.5 Interpretations

Based on the Forrester, as it was explained in the literature study, there are two main categories in the business processes; the transactional and the collaborative ones. The PSA collaboration platform introduces collaborative features in their transactional software system in order to offer a more integrated solution. Comparing the two given pictures (picture one and picture seven) from the literature study, given also that the collaboration platform of Exact is mostly aiming to automate the invoicing process, the PSA solution can be classified in the first hemisphere of picture seven, which means that the solution tackles problems with little human involvement and process variability.

Although, the Invoicing process variability is relatively low, there are cases that it can become more complex. When the participants are raising some complaints and juxtapositions are created, the members need to collaborate to establish a common ground of understanding upon the subject. Therefore, the information exchange is a necessity in order everyone to be aligned and fully aware of the situation. These means that additional documents need to be attached, like timesheets, purchase orders or quotation all related to the given invoice.

Given the misunderstanding among the participants, the current solution of the PSA collaboration platform offers only the exchange of the artefact and the comment functionality of the reasons why they accepted or rejected. Therefore, there is not an actual collaboration among the members in the product solution with instant messages, or being present at the same (virtual) time to discuss the matter.

This particular case, where collaboration has to take place, introduces the domino effect, as Hermien mentioned in the conducted interviews. The domino effect definition is explained above, but the consequences of it are becoming visible when the stakeholders of an invoice are using the product. When the invoice is created, it can be sent to a stakeholder to approve it or deny it and in his turn he can send it to other people that are interested in this particular document. The first person that received the artefact is waiting the following persons to revise it and accept or deny it. Therefore, a linear chain of processes is created, waiting each step to be confirmed in order to get to the final result.

There are three main interpretations around the PSA solution. At first, even that PSA introduced some collaborative features to their product, the solution remains to tackle only the straight forward business processes. The second one is that following this solution, they cannot avoid the domino effect and as a result the process time of execution to be relatively high. The last one is the collaboration itself and how the PSA is approaching the term. Analytically:

1. Straight-Forward Business processes

Taking the definition of the Systems of Record as the main axis, we can identify the commonalities of the collaboration platform with this definition. The product is aiming to the performance standards of accuracy and completeness, finding the right person for the artefact to accept it or deny it. The primary record type is a document, like an invoice, purchase order or quotation. Each of the areas of the systems of Record definition can be mirrored to the PSA collaboration platform. Therefore, we can categorize the solution of the Professional Service Department to the transactional software applications, operating as a module of the basic product and not to the collaborative software applications.

2. Time of Execution

One of the most important reasons for the companies to create networks and get networked business partners is time saving. Following the PSA solution, it is confirmed that if more people are involved in the process, the process time of execution will be increased, because some steps need to be executed in order. Picture 15 explains that if the steps are linearly executed, the time will be increased, while on the other hand it is more efficient if the steps will be executed in parallel or in group activities. Therefore, for the PSA solution reducing the time of execution is still a challenge.

3. Collaboration

The PSA collaboration platform introduces some collaborative features in their product. Their approach is not about the actual collaboration, but about simplicity. They wanted to simplify document oriented procedures, by building functionality in the existed product where with some simple steps the

document can be approved or denied. It is identified that the actual collaboration was eventually out of the scope. As a result, the participants in this document oriented process cannot actually collaborate, exchange information be aware of the process state, as part of the limited visibility. The stakeholders are forced to exchange information with other ways like emailing or calling, giving space to the domino effect to be appeared.

In the following sections we will describe through a use case how the participants communicate in an end-to-end process about a specific case.

3.1.7 Analysis of the current practices

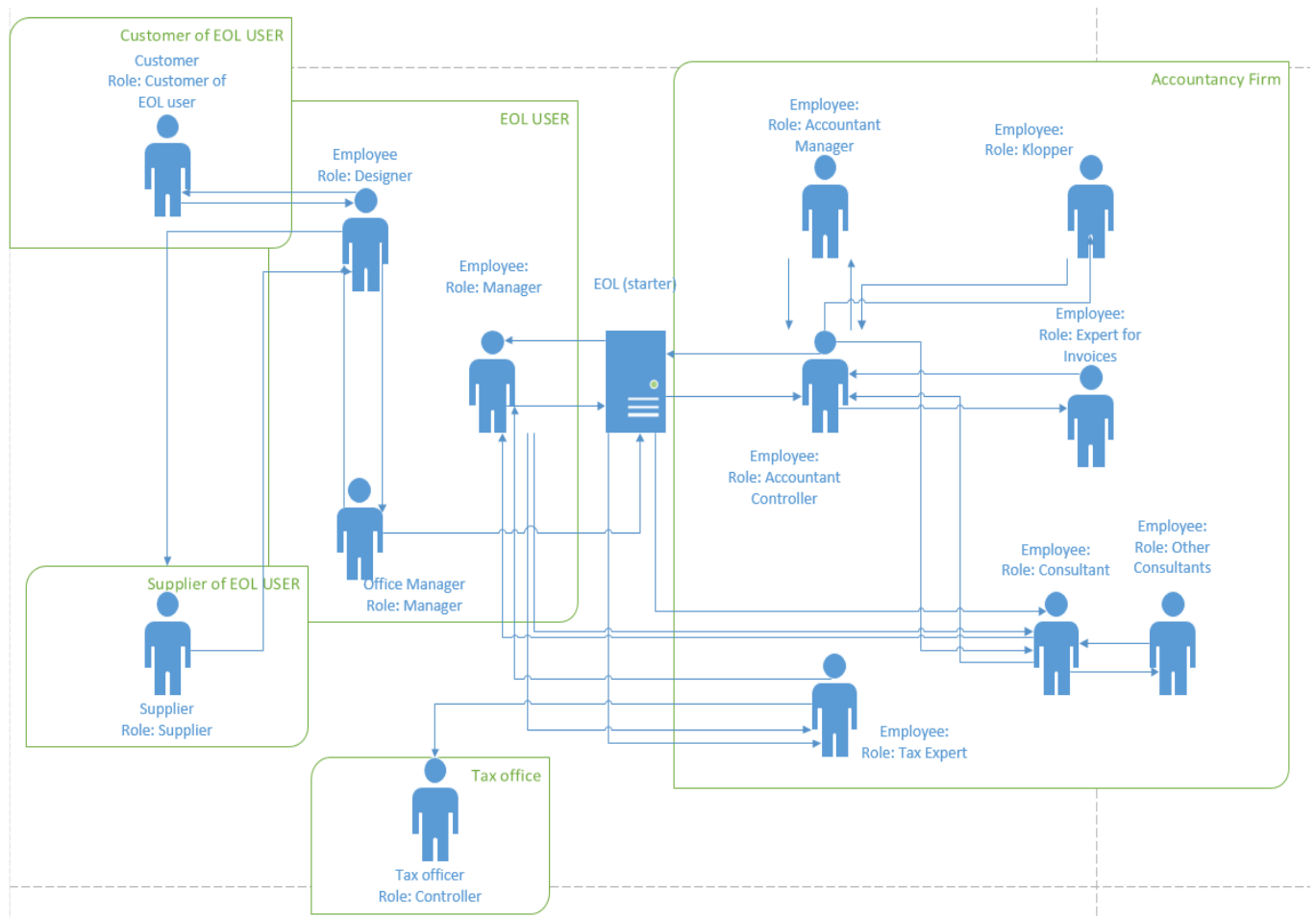
Introduction

In this sector an end-to-end financial process will be described. The process includes three different areas. The first phase includes the EOL user, business X, and its interactions with their own customers and suppliers. In the second phase, the communication between the business X and an Accountancy firm is established. At last, in the third phase the internal processes in the Accountancy firm are included. The end-to-end to approach is chosen to highlight the need of collaboration before and after an invoice is created.

Especially, this use case is created in order to identify the missing connections, the bottlenecks and the iterations in the process. Understanding the gaps in the end-to-end process, we will be able to make moderations and conceptualize solutions that could offer better collaboration and efficiency in the connections among the different stakeholders as a result to reduce the time of execution and enhance the customer satisfaction.

Description of the current process

The first picture depicts the connections of different parties and classifies the areas of interaction.



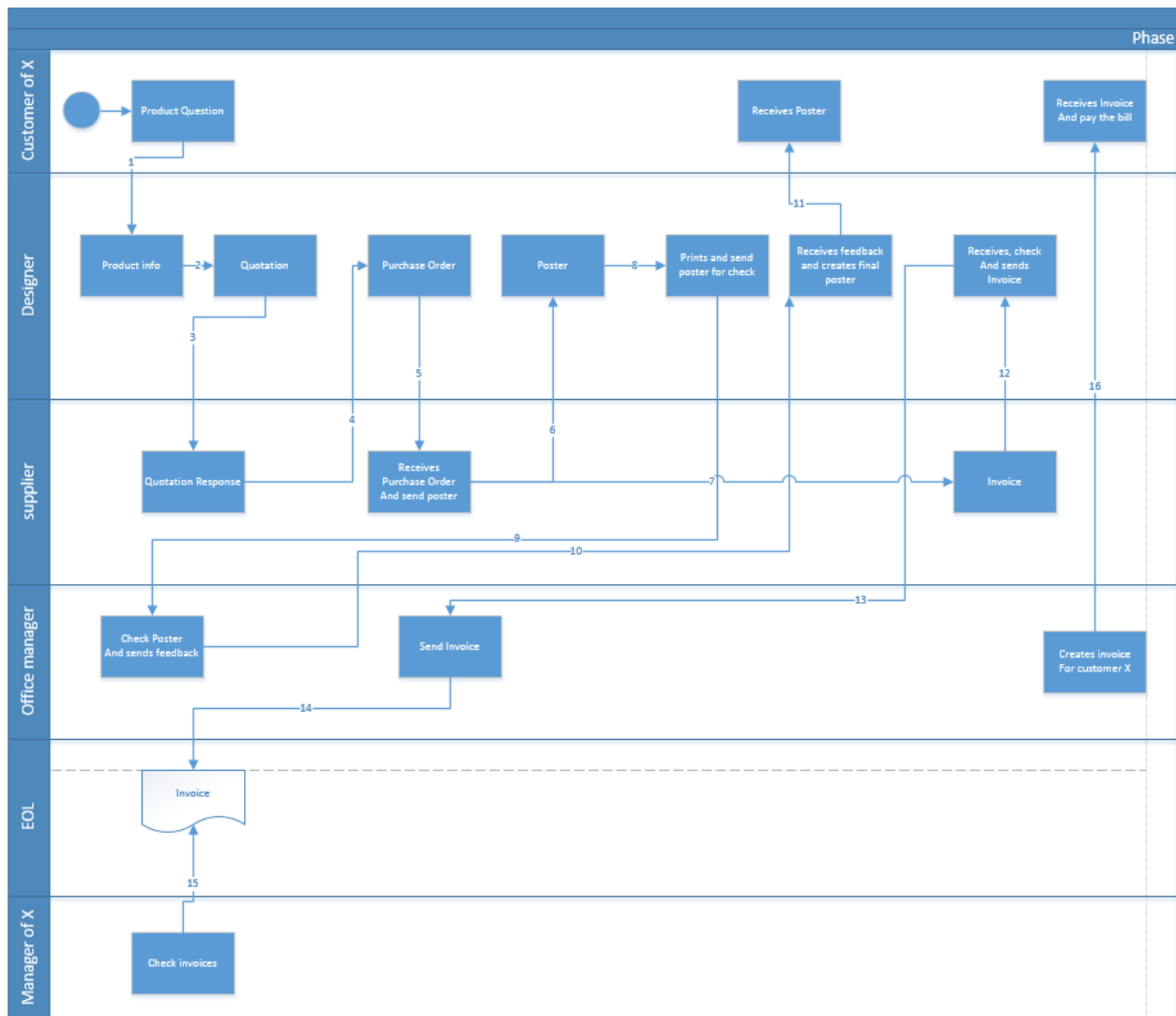
Picture 17: Network overview of the Use Case

This overview highlights the different actors that are involved in a specific case, from the customer of the EOL user until the accountancy and the tax office. This example illustrates the invoice life cycle from the point of origination until its final destination, the collaboration that is important among the parties, as well as the connections before and after the invoice is created. We can identify five different areas or three high level ones. The first one is the EOL user and the interaction of its customer and supplier; the second one is the interaction of the EOL user with the accountancy firm, and at last the internal interactions of the accountancy firm and the tax office.

In a more detailed environment (Picture 2), several processes took place between the EOL user (business X) its customer and the supplier, but also internally among the employees. A customer of the business X makes a request and the responsible employee responds, executing the right actions. He contacts the supplier, places a quotation and the purchase order is created. The supplier provides the goods and formats an invoice in return of its services. The poster and the invoice are following the same direction for approval by the person in charge, the office manager. Then, the invoice is placed in EOL along with the purchase order and the sales invoice for their customer. Meanwhile, the poster is delivered to the customer and the process is completed in its first phase. Different stages of approval took place then. The employee, along with the office manager and the manager, needs to run some checks for these specific documents. After the completion of the checks, the second phase of the

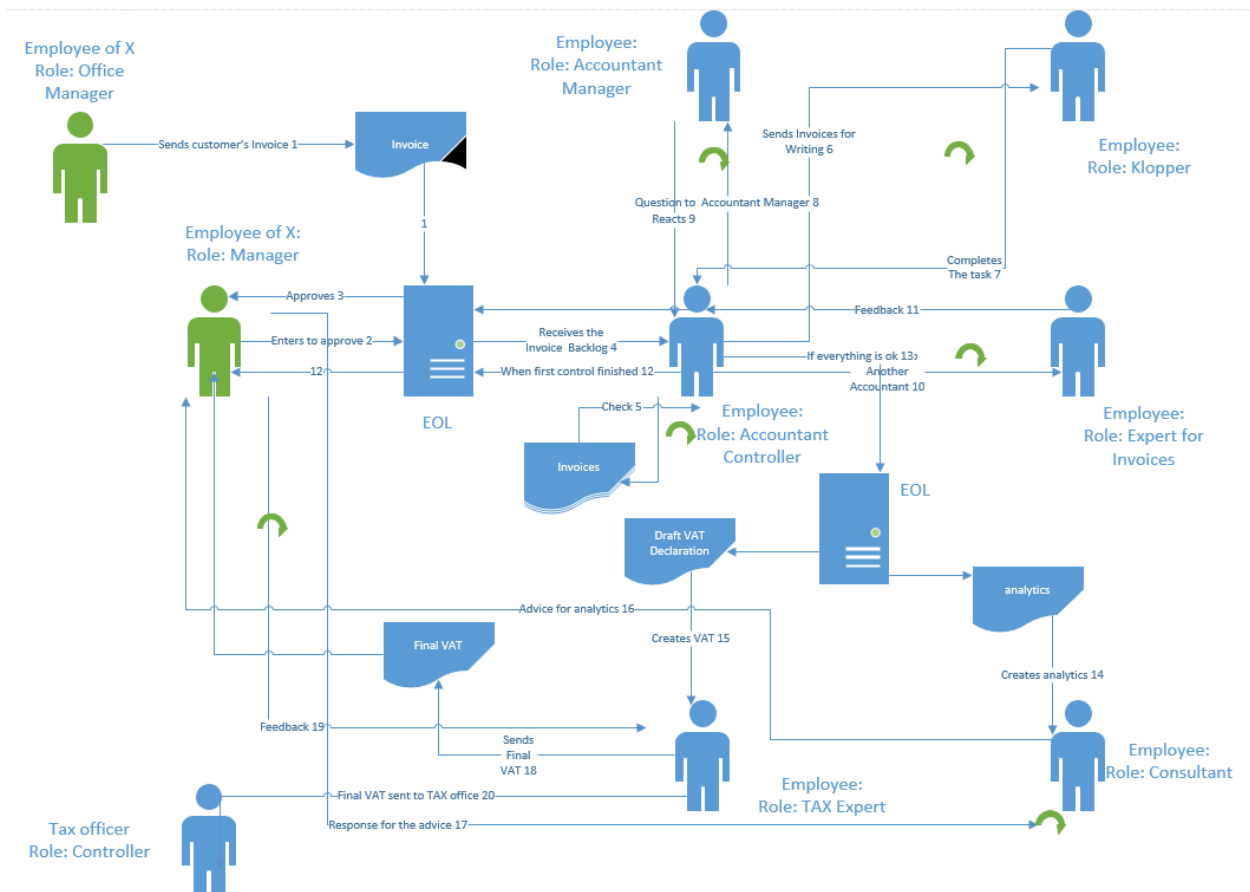
[illegible]

Here is a linear representation of the executed process within the network of different stakeholders. Although, the sequential approach is sketched, in a real-life example the processes can be executed in a parallel way.



Picture 19: The different stakeholders, their roles and a roadmap of the connections among them.

In the second phase, the accountancy firm is involved. The Accountant controller is delegated to handle the financial affairs of the Business X. He can be considered as the broker of information between the Business X and the Accountancy firm. Over and over each month in relation of Business X financial activities, a backlog of invoices is created in the EOL system. The Accountant is in charge to carry out a series of activities for his customer. He personally runs several checks for the backlog and restores potential problems. If some invoice need to be rewritten, the Accountant forwards them to an employee of the Accountancy firm, the Klopper. The Klopper rewrites and types the invoices, formulates them in a specific official form and resends them back to the Accountant controller.



Picture 20: The network of connections in the Accountancy firm.

After the Klopper delivers the documents back to the Accountant Controller, several actions and discussions about the context of the documents might take place. The Accountant Controller communicates with his Manager and other experts, like the TAX or Invoice Experts and Consultants, for significant issues that the documents entail. For example, as the specific case describes, the Accountant Controller asks permissions from his Manager, or advises from other experts, before he finalizes all the necessary checks and insert all the documents back to EOL system. In the EOL system, a draft VAT declaration is created. The Tax expert or the Accountant controller revisits the document and conducts the final check before delivering it to the owner of the business X, the manager. Thereafter, the Business X manager either approves the document or states some remarks for the declaration, proposing or providing some insights. When the final VAT is formulated, the TAX expert delivers it to the Tax officer and the process is completed.

EOL besides the TAX declaration produces analytics for the financial activities of the Business X. The consultant analyzes the results of the business activities status and provide financial or business related advises to business owner.

Analysis

The previous case describes the basic actions that occur in the Business X. The network is consisted of different actors, different stages and actions (tangible and intangible). The following analysis highlights the challenges in communication focusing on the lack of collaboration and time of execution of the business processes.

The basic axis of the case is Business X and its network of connections. Comparing to the Value Net theory model, the customer of Business X should be the epicenter of the network, that will be surrounded by the Business X company and the other parties like the supplier or the Accountancy Firm. The network can also be divided in three main parts: The Business X with their Customer and Supplier, the Business X with the Accountancy Firm and the interactions within Accountancy Firm.

Value Actors

- Business X: Employee, Manager and Office Manager
- Client and Supplier
- Accountancy Firm: Accountant Controller, Manager, Invoice Expert, Consultant

Value Objects:

- Product like the Poster
- Artefacts like Invoicing, Purchase Order and Quotation

Value Ports:

- Exact Online for the Artefacts
- Decentralized communication like email, telephone, website

Value Exchange:

- Product
- Constructive collaboration to accelerate the time of execution and add value to the parties involved

Since the research is based on the collaboration activities, the analysis will focus on the intangible connections among the actors. The miscommunication may increase the time of execution of the business process and turn the working environment to become less efficient. The value network analysis will explore three main aspects:

- *Exchange Analysis:* What is the overall pattern of exchanges in the system?
- *Impact analysis:* What impact does each value input have on the participants?
- *Value Creation Analysis:* What is the best way to create, extend and leverage value either through adding value, extending value to other participants or converting one type of value to another? (Allee, 2004).

Exchange Analysis

An Exchange Analysis assesses the overall patterns and system dynamics of value exchange to determine if the value system is healthy, sustainable and expanding (Allee, 2004). The analysis will follow the next questions:

Is there a coherent logic and flow to the way value moves through the system?

We will take into consideration the three different parts of the network that was previously defined:

Business X-Customer and Supplier

Observations in the first Part:

- It is identified that the manger is remote from the whole procedure. Its contribution is essential by singing and evaluating the invoices.
- The communication between the employee and the office manager involves only tangible connections, there is no information exchange.
- From the interviews was not clear if the invoices headed to the right person as a result confusion and mistakes can be occurred.
- The quotation is not included in the process to verify the invoice if there was any complaints.
- The office manager needs to approve the invoices and the product (poster) for the customer and he is not close related to the case. Therefore, the information can be circulated and that could affect the visibility of the stakeholders (office manager, employee) because of the reason that some documents may be missing and that would lead to the increase of the time of execution and eventually to customer dissatisfaction.
- Creation of information silos

Business X-Accountancy

Observations:

- No close Collaboration among the different parties, only through the Exact Online product
- Lack of Collaborative work like in the triangle of Manager-Account controller-Consultant

Within Accountancy

- There are iterations in respect of the documents. The accountant, who is handling the case, needs to contact different persons that are not fully synchronized with the case status as a result the time of correspondence to be increased.
- Different people have to be informed for the status of the invoice
- The Business X manager is not aligned with the accountancy firm and aware of the process.

Impact analysis:

An Impact Analysis determines the tangible and intangible costs (or risks) and gains of inputs for the participant (Allee, 2004). Every input triggers some type of response. There are costs for handling the input and for leveraging the value received. The main question is:

What are the tangible and intangible costs and benefits for each input for a particular participant?

With the following table we will evaluate the intangible and tangible benefits and costs in the current process.

In/tangible Costs	In/tangible Benefits
Missing Information and real time awareness	In respect of collaboration no benefits were identified. Although the process is not optimal, the actions will be performed and the product will finally be delivered to the customer.
Circulated and overlapped Information	
Increased time of execution because of the lack of collaboration and document consolidation	
Visibility at the end-to-end process	

Faster decision making	
Consolidation of the related documents to the specific case	
Delays may affect the customer satisfaction	

Table 4: Tangible and Intangible Cost and Benefits: Impact Analysis

Value Creation Analysis

The Value Creation Analysis will be addressed in the following chapter where the solution of the Workspace will be examined and analyzed.

3.2 Solution: The Workspace

3.2.1 Introduction

In the previous chapter the main challenges of Exact were revealed. We focused on the collaboration platform of Exact and how they approach the subject of collaboration. We have identified that their solution still stands to the transactional business processes side. Exact followed this road because of their main strategy of growth by focus, innovation and simplicity. Their products are serving the customer's needs with innovation and simple ways to execute the tasks. However, there are opportunities to approach the subject of collaboration with different ways. We have introduced Smart Process Applications as one possible road to follow. In the following chapter, we are going to explain how the Workspace solution was conceptualized in order to meet three different requirements; Smart Process Apps fundamentals, Exact challenges and theoretical frameworks that support collaboration.

It is essential to stay in line with the SPA concept, cover Exact's challenges and add a theoretical background that will support the solution as a sustainable one. The idea of the Workspace was firstly generated by exploring the transactional software applications of Exact, realizing which business processes of Exact is on target and how these procedures could be improved. The Workspace journey started by understanding the difference between the linear execution and collaborative concept of dealing the business processes. From that point, we revisited the SPA concept and the Dynamic Case Management practices of how they are handling the collaboration. Then, we researched about the Value Net Theory and their ideas of creating networks to create value for the customer and all the participants. The Workspace solution is based on the Value Net theory concepts of creating digital networks to offer value to all of the stakeholders. Though, the Value Net theory explains how the business model should be approached and how the connections of the parties involved should be, there was a gap of how exactly to perform the collaboration process.

Diving back to the literature pool, we have found the Antecedent-Process –Outcome Framework of Wood and Grey that explains the collaboration process and which are the basic elements in order the collaboration process to be sustainable. This important finding became the roadmap of which principles should the Workspace follow. Therefore, the following chapter will explain how these concepts are all combined, but also will describe how the Workspace operates and which are its main functionalities. Last but not least, a Use Case was chosen to describe how the Workspace would fit in the real world situations.

3.2.2 Objectives

This research introduces the concept of the Workspace in order to facilitate the collaboration among different parties involved in an end-to-end data oriented process. Not only does the Workspace aim to tackle the current challenges that Exact is facing but also to meet the requirements of the Smart Process Applications concept, introduced by Forrester. Furthermore, the requirements of the collaboration theories must also be included in the solution in order to serve the collaboration criteria and standards and become effective, efficient and sustainable for its users.

The workspace focuses on simplicity and flexibility to provide a harmonious transition from the current state to the future one. The specific functionalities that will be introduced in the following paragraphs will tackle the current obstacles and replace the common transactional way of working with the collaboration one. The parties will be able to work in parallel in specific tasks and accelerate the time of process execution, overcoming the delays and information silos over the complete process. The main objectives are:

1. **Improve Collaboration:** Introduce actual collaboration with instant messaging, video conferences and interaction tools in a specific virtual working environment.
2. **Streamline collaboration process:** Offer a friendly environment to streamline the collaboration process for a specific document with the workflow and milestones functionality
3. **Real-time information awareness:** All the users will have access based on their assigned roles in the document related information
4. **Reducing the time of the process execution.** Consolidating the processes and introducing also a governance structure, the participants will be able to execute the tasks faster and more efficient.
5. **Enhance customer satisfaction:** With the data consolidation, the process structure, the ability to collaborate with the other stakeholders, the process transparency and the flexibility of calling several workspaces, the users will experience a new customer-friendly, flexible and fun way of working.

The proposed system will be adaptable to future development iterations as the requirements grow over time and the process is evolving. The future states should include more complex transactional processes with intensive human involvement and process variability.

3.2.3 PSA collaboration platform - Current Situation

The PSA solution is based in the tangible connections among the parties involved in the process. The solution contains the creation of an artifact (like an invoice) and structures the process step by step for faster execution and collaboration. Following the solution; a stakeholder creates the artifact (pdf format), specifies the details for collaboration (rights) and sends it to possible different receivers via a URL functionality. When the document is received, the collaborator can open the URL directly in respect of better user experience and flexibility. The overview of the artifact, then, is displayed in the screen and several actions can be performed.

The collaborator can reject, approve/sign off the document within the due date that is specified by the creator. He can also place a note in the note box, next to the artifact, visible to the parties when an

action is performed. If one of the collaborators reacts and for example approves the artifact, the other parties will be aware of the artifact status in the overview collaboration page of EOL, but they cannot interfere anymore in the document. The overview page hosts all the artifacts created so far and their status with the last placed note of the collaborator. On the other hand, if the document is rejected, accompanied by a note with the specific reasons, a new pdf has to be created to meet the requirements of the stakeholders and follows the same procedure.

3.2.4 New Situation

The workspace introduces digital collaboration. The target is to overcome the obstacle of decentralized activities and host all the functionalities that could provide a holistic solution to the users in a data-oriented process. A user can call the workspace functionality and invite the stakeholders of a specific artifact in order to collaborate. The underlying concept of the workspace is that when you are calling the workspace automatically a virtuous case file (VCF) is created. The importance of the VCF lies on the consolidated data that it contains. Taking into consideration that for a file in order to be complete several stages should be executed, the VCF functionality provides the flexibility to maneuver from one stage to another. Using the activity diagram timeline, the users who have the specific rights can jump from one workspace to another and experience a fully transparent way of working.

The Workspace solution is trying to tackle the identified challenges of the PSA collaboration platform. To begin with, one important issue is the actual collaboration upon the document. The stakeholders will be able to perform several actions in the dynamic interface that provides the possibility to share their ideas, complaints and questions, have a conversation around the artefact and come to final conclusion collectively. Secondly, transparency across the process is an essential requirement. The stakeholders are driven by the need to be aligned with the others, to have a common understanding of what everybody considers about the document and then they can decide what actions should take. The activity diagram timeline offers the needed transparency, by connecting all the actions, milestones to be reached and all process steps to be followed.

3.2.5 Within Scope

The functional analysis is purely a high level description of the workspace functionalities and is not meant to include technology specifications, details and implementation techniques. Additionally, the proposed solution of the workspace is based on three research areas; the transactional software applications, the systems of engagement and mostly its representative the Smart Process Applications and the collaboration theories of the five pillar framework and Value Net theory.

Under this scope, we examine the workspace as a solution of the transactional way of working, introducing the collaboration among the parties and trying to reach the standards of SPA in the given situation. Furthermore, the workspace is conceptualized to be applicable in the IT and software maturity of the company as well as to serve its current challenges. Therefore, we mainly explain the basic idea of the Workspace and how a user can operate it. We are introducing a new business process, as an extended version of the current business process in the PSA collaboration platform and we include the user roles and responsibilities. Last but not least, we include a user interface example to depict and explain the basic functionalities of the Workspace solution, as a roadmap for the actual development of the User Interface.

3.2.6 Out of Scope

As it is described before, this document doesn't include any software or hardware requirements. Therefore, the question "How Exact is going to implement it" is out of the scope and the only input of this research is that the Smart Process Applications should be deployed in a dynamic platform, preferably in a dynamic case management suite/platform, that allows changes and customizations in the Workspace solution. Moreover, security requirements are not included as all these specifications will follow the existence requirements of Exact.

3.2.7 User Roles and Responsibilities

In order the Workspace to stand as a sustainable solution, it has to follow the principles of the selected theories. Therefore as Dynamic Case Management and Antecedent-Process-Outcome framework suggest there should be a clear governance and administrative structure into the Workspace solution. Dynamic Case Management introduces the role of the knowledge worker as the dominant role in the whole procedure, who controls all the actions and he is in charge of the procedure. The same mindset is applied to the Workspace, where the virtual case creator takes the responsibility to organize and monitor the process. There are two main roles: the knowledge worker and the collaborator, which can be divided in other roles like the viewer and the coordinator.

Knowledge Worker

The Knowledge worker is the person that initiates the case, form the process steps, choose the right participants and assign them the roles. In all the cases, like Invoicing and contract management, there will be predefined roles, accompanied with the freedom of action upon the document, the case owner can choose and assign them.

Collaborators

The collaborator can perform all the actions upon the document. He can also call the "create new workspace" functionality to initiate another process, but first the case owner must accept the request.

Viewer

The viewer will have limited freedom to perform actions upon the document. For example, he might not be able to reject or deny the document but he can comment or instant message the collaborators.

Coordinator

This role will have the same access rights as the knowledge worker. For example, if the case owner will be on vacations, he can delegate his role on his supervisor or another appropriate person. Then the coordinator will be in charge of the process and should be able to organize the case file.

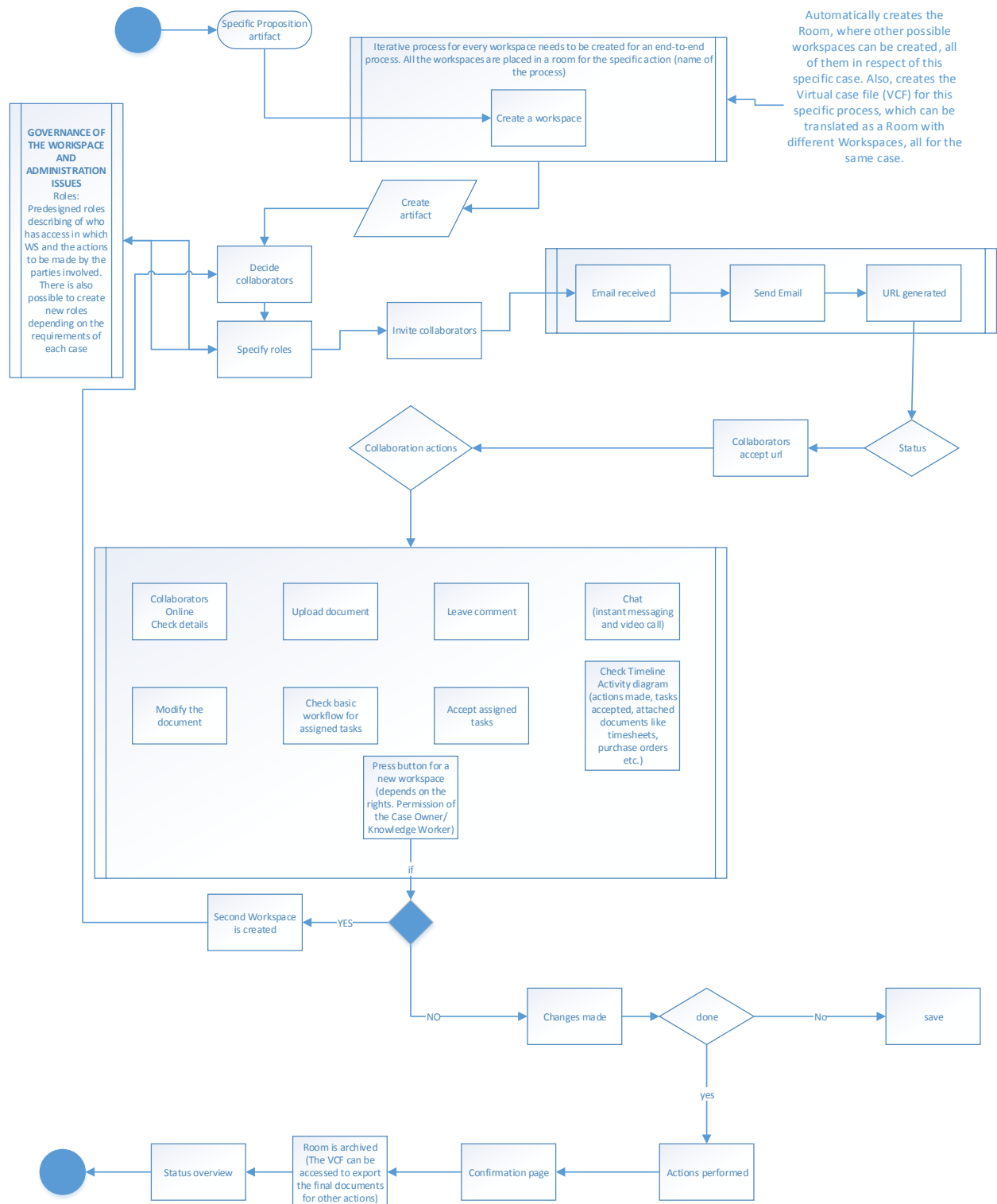
Every role has different access rights. For example, if the knowledge worker creates a second workspace then the participants if he decides so, they will not be able to access the first workspace. Therefore, it is the case owner's responsibility to assign the roles who is going to have access in which document and workspace in order to have a strict governance structure and not a spaghetti solution.

3.2.8 Workspace Process Flow diagram

The Workspace process flow diagram is following Exact's existing diagram. New steps are introduced to explain the Workspace functionalities. The person that is in charge of the artefact and wants to share it with the other stakeholders initiates the process. Therefore, he calls the Workspace functionality for grouping people in a document oriented case, creating at the same time a virtual case file (VCF) that it will contain all the information about this specific case. When he creates the Workspace, then he can specify the details of the artifact and decide who the stakeholders in respect of this document are. It is important to be stated that he is the only one in charge of the case file, turning to be the knowledge worker of the process, but he can also delegate his role to a supervisor or someone more knowledgeable for the case.

The next important step is to specify the roles of the participants in order everyone to be under control, introducing a governance structure for this specific case file. The roles can be predefined, accompanied with the specific rights. For example, someone can be only a viewer and so is allowed to make only comments and no other important actions, like approve, deny or modify the document. Continuing, the collaborators then are invited and can access the workspace by the URL functionality, as in the Exact's collaboration process. When all the participants are online then they can perform different actions that will be explained in the functionality paragraph later on.

Then, there is the choice for the participants to create a second workspace related to this specific case, inviting collaborators that should not be for some reasons in the first Workspace (this will be explored in the Use Case). If the second Workspace is created then the process starts by deciding the collaborators and forward. Therefore there is the opportunity for several workspaces to be created, always related to this specific case and with the permission of the knowledge case worker. If all the changes are made the VCF will be closed and be shown in the overview page, otherwise the participants can reopen the case file and make new changes until the process is over.



Picture 21: Workspace collaboration process

3.2.9 Workspace Functionalities

The orchestration of the interface components will be dynamically handled. The interface will be composed of different web parts (plug-ins) that will represent different functionalities. Depending on the given situation the creator of the workspace can decide which parts should activate or which are not. Although, the creator can activate the parts any time he decides to do so.

The Workspace should include the following functionalities:

1. Document Input

The creator of the workspace will import the desired document that the stakeholders need to collaborate. The artefact will be visible for different actions, specified from the delegated rights that the creator has authorized. If the actors are authorized with the editing functionalities, they will be able to use functionalities like in the Microsoft Word software. This functionality serves the flexible recreation of the artefact and eliminates the decentralized actions for the document.

2. Action tools for the document

Next to the artefact section, the main actions upon the document are displayed. The main actions are:

- Approve the artefact
- Deny the artifact
- Edit the artefact
- Attach Documents
- Print
- Display (the final document after editing)
- Import Analytics
- Report incidents
- Audit trail

3. Activity timeline diagram

The activity timeline diagram demonstrates the activities in a time order. The actors can click in the displayed pictures and be aware of the details of this specific action. For example, if one actor approves the document, the other parties involved will be informed real-time. There will also be an optional notification email if the actors request it, even for specific actions like approval or deny. One of the basic characteristics using a timeline is that everybody will be informed of what actions took while they were away as a result in short time to be aligned with the others. Clicking on the items on the activity diagram the participant can jump from one action to the other, reading all the information included. For example, if a user A creates a new workspace and user B of the Workspace One is included also in the new Workspace Two, then the user B can click the item and jump to the second Workspace without taking any other actions, like searching or emailing. The activity diagram represents the transparency that is an essential requirement for collaboration. Disclosing all the information silos, the actors are able to take decision faster and avoid confusion and misinterpretations.

4. Chat rooms/Instant Messaging and Video calls

Social integration will boost the collaboration to the maximum. The actors can private talk via the instant messaging functionality but also can post messages in the chat room for the whole group. Digital meetings for the people are also available for faster communication.

5. Workflow diagram

The workflow diagram will represent the structure of the process that the actors need to follow. The process will be dynamic and with regard to the delegated rights the actors can change the step in dynamic way. The governance of the workflow resides with the creator, although it is possible the creator to proxy his rights to other actors. The workflow's steps will also be depicted in the timeline diagram in order all the actions to have a specific timeframe to be executed. It also provides the flexibility and serves the user interface principles by combining all the parts together.

6. Assigned Tasks

Based on the workflow diagram different tasks are possible to be assigned in the stakeholders. Defining the roles for the participants will serve the administration and governance purposes.

7. Comments

Collaborators can post comments in this web part that will be visible to all the participants.

8. Collaborators Overview

This functionality will demonstrate the entire customer's information dynamically, communicating also with the CRM system of each participant's company.

9. Create the workspace button

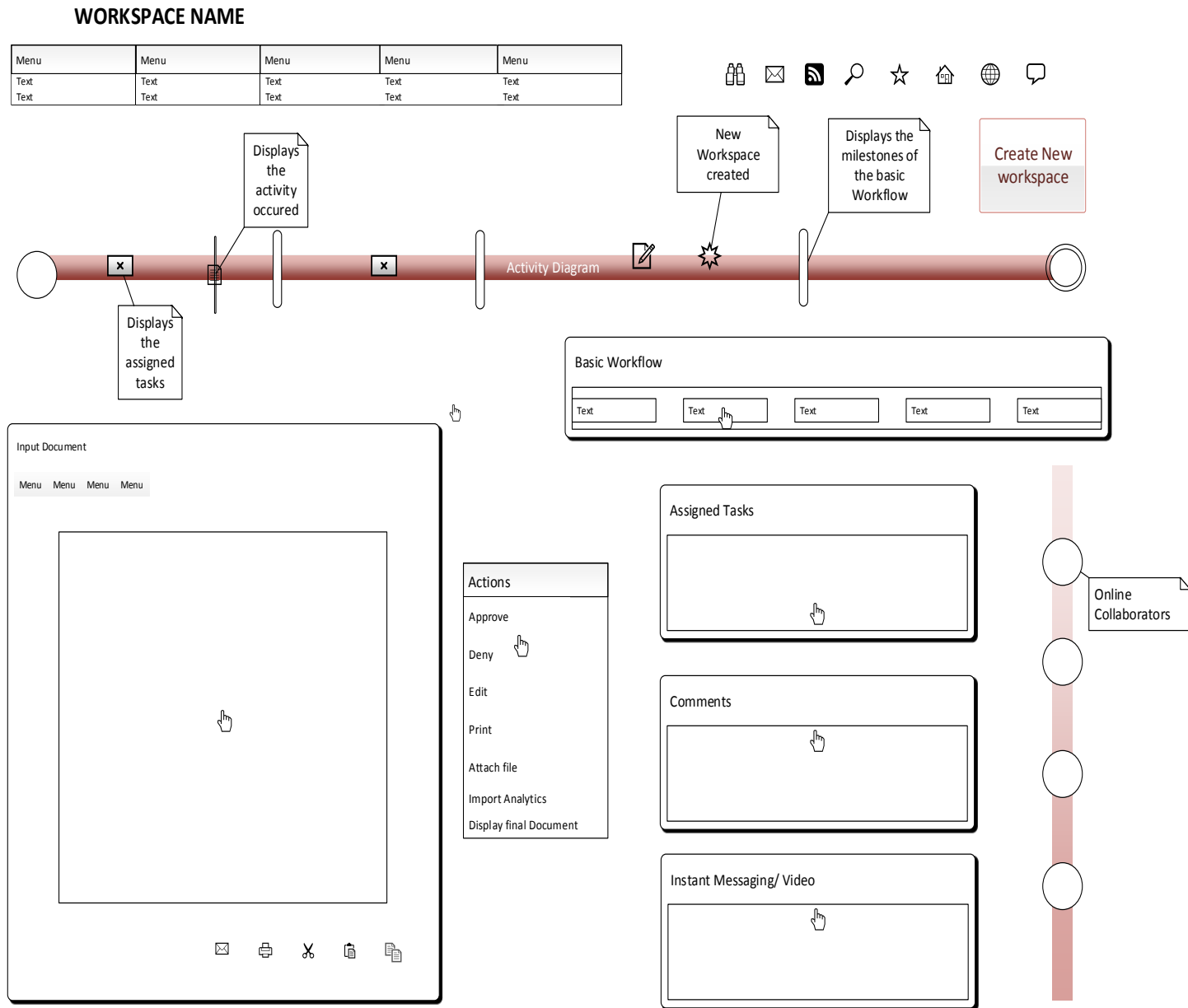
One of the main functionalities of the workspace is the button "create new workspace". In an end to end process of an artifact, different participants can be involved. For example, a customer cannot participate in the invoice review of the employees within one enterprise. It provides the flexibility for the actors to participate in different stages of the artefact process. The creation of the new workspace depends on the rights that the actors acquire. The creation of the workspace will be visible in the activity diagram and pressing this activity the actor can "jump" from one workspace to another. The activity diagram provides the transparency of the process and introduces the governance structure that is essential for actors not to create workspace spaghetti and lose track of it.

10. Social Interaction buttons

The social interaction provides the opportunity to contact with the outside digital work. Sharing the workspace to other participants or involve them in social interfaces accelerates the communication and bonds their relationship in the social level.

3.2.10 User interface Example

Here is a potential user interface to host the proposed functionalities of the workspace. It should be fully customizable to serve each user's requirements and provide the flexibility that the user requires. This is the reason why the structure of the interface is based on web parts that can be added or took off. The creator of the workspace will govern and structure the interface with regard to the different situation needs.



Picture 22: User Interface example of the Workspace

3.2.11 Use Case for the Workspace

Description

Exact wants to provide data-oriented collaboration functionality in its software product in order to enable the users to create a network of connections that will be able to collaborate upon specific documents. With this system, a user can upload an artefact, for example an invoice, and invite the stakeholders in order to solve a specific issue (discount) with regard to the artefact.

The Business X that is using the software has a request of one of its client for a specific order. The client receives the invoice from Business X financial department, but raises a complaint about its content. The office manager, who created the invoice in the first place, calls the workspace functionality and invite the actors to collaborate upon the document. When all the parties are identified and assigned the right roles that are accompanied with the specific rights, the actors will exchange information about the invoice. In addition, the office manager by creating a workspace, he also creates a virtual case file where all the documents, conversations and possible different workspaces for a specific process will be stored.

The customer comments on the invoice that the amount that is charged is not align with the agreed terms and attaches the purchase order and the discount that was arranged. The manager, who entered the conversation because of the importance of the customer, places a new offer with another discount. While, the customer considers the new offer, the office manager is skeptical about the new offer and calls the employee, the sales person and the manager in another workspace to discuss the matter and create another invoice that meets the customer demands. They exchange opinions and instant messages (or video conference call) and create the new invoice for the customer. The office manager, then, closes the Workspace2 and pastes the new invoice in the main Workspace. The timeline activity diagram facilitates the transition from one workspace to another in order the parties who have the specific rights to access the end-to-end process easier. The customer then can decide if the new offer can meet his requirements and either approve or deny. In this specific use case, the customer accepts the invoice and the virtual case file is saved, closed and stored as an evidence and fact that can be used from other parties.

Identify classes and objects.

Here is the class categorization that we will derive our classes based on the previous description:

- Tangibles (e.g. classroom, playground)
- Conceptual (e.g. course, module)
- Events (e.g. test, examination, seminar)
- External Organizations (e.g. publisher, supplier)
- Roles Played (student, teacher)
- Other System (admission system)
- Attributes

Client (role played)	Button Accept/Deny (attribute)
Business X (concept)	Create new workspace button (attribute)
Purchase Order (event)	Comment/Instant Messaging/Conference call (attribute)
Invoice (event)	Attach document button (attribute)
Amount charged (attribute)	Timeline activity diagram (attribute)
Workspace (system)	Virtual Case File (system)
Office manager, employee and manager (role played)	

Table 5: Classes and object for the Use Case Analysis

The next step is to analyze further the classes that were created and remove the inappropriate ones based on the following criteria:

Categories	Description
Redundant Classes	Classes that mean the same thing like invoice and purchase order can be translated as an Artefact
Irrelevant Classes	Classes that are not directly related to the problem. For example, the purchase order can be an attached document in the collaboration framework.
Vague Classes	Classes that are loosely defined
Attributes	Attributes of classes are also represented as nouns or noun phrases Therefore, the list of nouns may contain attributes of classes like the button accept/deny is an attribute of the workspace
Operations	The performance of actions is sometimes expressed as nouns or noun phrases

Table 6: Criteria to identify classes

Here is the final classes after excluding the inappropriate classes:

Creator (role played)	Workspace (system)
Firm (concept)	Virtual Case File (system)
User (role played)	Actions (event)
Artefact (event)	

Table 7: Final Table of appropriate classes

Use Case One: Sales Invoice

Use Case Number	01
Use case name	Sales invoice

Use case diagram	<pre> graph LR Actor[Office Manager of Business X] --> UC1(Opens the invoice form) Actor --> UC2(Fills the form of the invoice) Actor --> UC3(Saves the file) subgraph Create an Invoice UC1 UC2 UC3 end </pre>
Description	The office manager creates a sales invoice for his customer. He specifies the details, filling all the necessary information (Company, Amount, Address, etc.) saves the file.
Actors	Office manager of Business X (user or EOL)
Basic flow	<p>Create Invoice</p> <ol style="list-style-type: none"> 1. Login to EOL 2. System shows the menu 3. Clicks the button 'create an invoice' 4. Fills the sales invoice details 5. Saves the sales invoice 6. Processes the sales invoice 7. Return to main menu
Alternative Path	If the invoice does not require collaboration between the customer and the Business X, then the invoice can be processed with the collaboration button without the need to create a workspace
Pre-conditions	A sales order is placed
Post-Conditions	After the invoice processed, the customer realizes that he is over-billed because the discount number is less than it was agreed in the first place. The customer raises the complaint and the employee of office manager creates the workspace in order for the customer, the manager, the employee and himself to collaborate upon the content of the invoice.

Use Case Two: Complaints about the discount

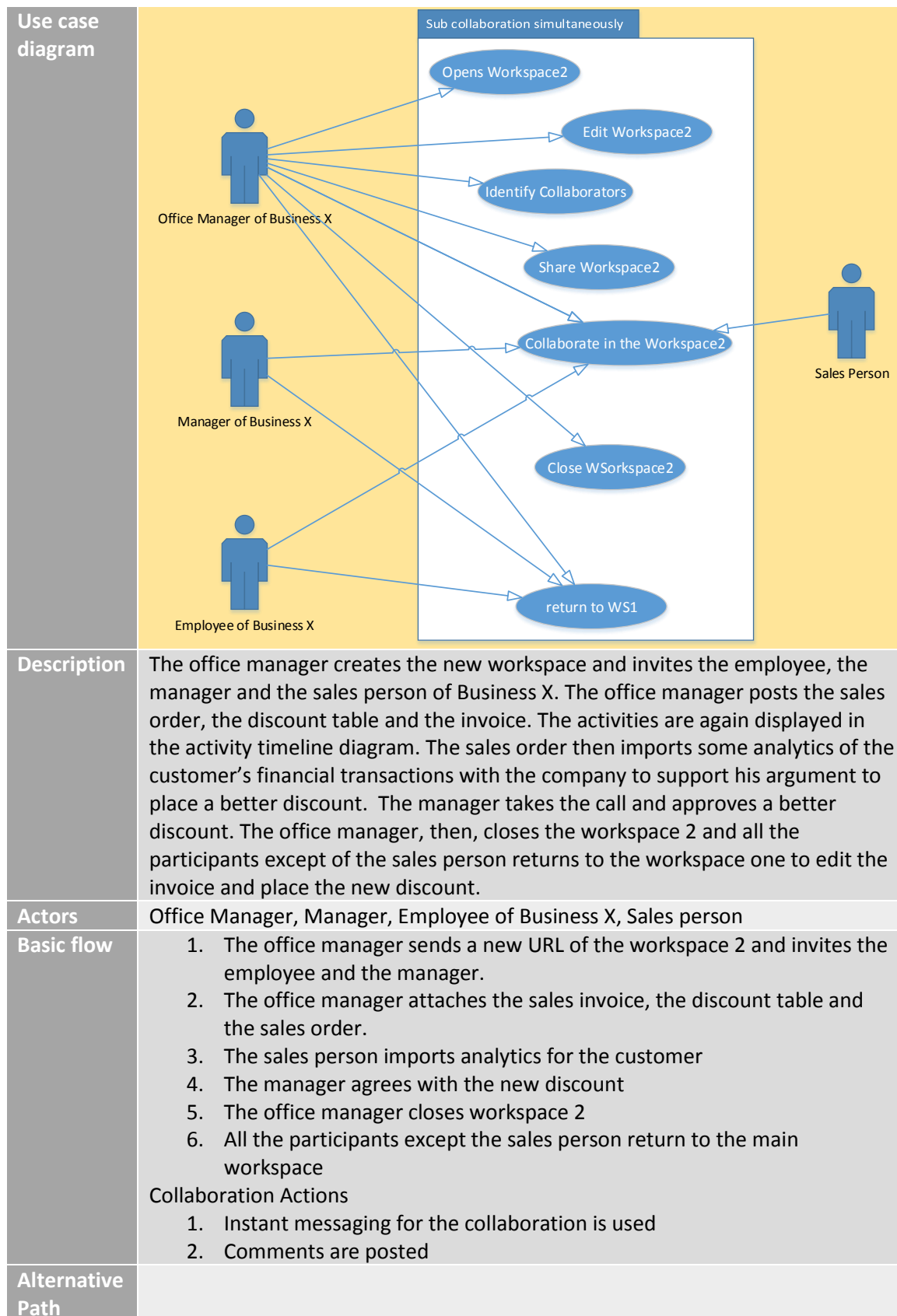
Use Case Number	02
Use case name	Complaint about the discount

Use case diagram	<pre> graph LR subgraph "Collaborate in the Invoice" UC1(Create a Workspace) UC2(Edit Workspace) UC3(Identify Collaborators) UC4(Specify Roles) UC5(Share Workspace) UC6(Collaborate in the Workspace) UC7(Creates the Workspace2) end EM[Employee of Business X] --- UC1 EM --- UC2 EM --- UC3 EM --- UC4 EM --- UC5 EM --- UC6 OM[Office Manager of Business X] --- UC1 OM --- UC2 OM --- UC3 OM --- UC4 OM --- UC5 OM --- UC6 OM --- UC7 M[Manager of Business X] --- UC6 C[Customer of Business X] --- UC5 C --- UC6 </pre>
Description	<p>After the customer’s complaint is placed, the office manager invites the employee, the manager and the customer to a workspace in order to discuss the situation. According to the roles that the office manager defined for each actor, the participants have the specific action rights upon the invoice. Neither the customer nor the employee has the rights to edit the invoice but only the manager and the office manager. Then, the customer places his complaint in the comment box and attaches also the document that describes the agreed discount. The employee also attaches the sales order to clarify the situation. In the activity diagram all of the actions are displayed in a chronological order, making easier for the actors to keep track of the actions. The manager, who is invited because the customer is important, attaches the discount table that explains in which discount level the customer’s sales order belongs. The employee realizes that he made a mistake and had shared to the customer the wrong amount. The “new workspace” button is not disabled only to the office manager and the manager, based on the specified rights. The office manager, then, takes the initiative to create a new workspace, inviting the manager, the employee and their sales person to specify the terms of the discount. The instant messaging functionality provides the flexibility to inform the customer for their intentions. The customer waits for the other participants’ reaction.</p>
Actors	<p>Employee, Office Manager, Manager and Customer of Business X</p>
Basic Course of events	<ol style="list-style-type: none"> 1. The office manager receives the complaint from the customer 2. The office manager presses the button ‘create workspace’ 3. The office manager chooses the participants (employee, customer, and manager of Business X) 4. The office manager specifies the roles and the rights (predefined list of roles with specific rights) 5. He also sets the basic workflow for the specific workspace (two steps in this case: Accept Invoice, Invoice sent to the financial department)

	<ol style="list-style-type: none"> 6. The office manager sends the URL to the employee, manager and customer 7. He also places the sales invoice of the customer 8. The participants accept the URL and enters the workspace 9. The customer comments in the comment box 10. The customer attached the discount document 11. The employee attached the sales order 12. The office manager press the button create a new workspace <p>Collaboration actions</p> <ol style="list-style-type: none"> 1. The activity diagram depicts the actions in chronological order 2. The instant messaging functionality is used
Alternative Path	The office manager could call the sales person to the same workspace
Pre-conditions	Complaint for the discount
Post-Conditions	The sales person reacts to the office manager's manager invitation.

Use Case 3: Sales Person-Discount

Use Case Number	03
Use case name	Sales Person - Discount



Pre-conditions	The workspace 1 is created and the subject of discussion in workspace 2 was already set.
Post-Conditions	The participants return to the main workspace (one)

Use Case 4: Sales Invoice approval

Use Case Number	04
Use case name	Sales Invoice approval
Use case diagram	<pre> graph LR subgraph "Collaborate in the Invoice" direction TB U1([Edits the sales invoice]) U2([Approves invoice]) U3([Closes and saves the Virtual case file]) U4([Sends the VCF to the financial department]) U1 --> U2 end EM[Employee of Business X] --> U1 OM[Office Manager of Business X] --> U1 OM --> U3 OM --> U4 CU[Customer of Business X] --> U2 </pre>
Description	<p>The participants return to the workspace one. Only the manager and the office manager can edit the invoice and insert the right discount. The customer can see the changes real-time and reacts using the instant messaging function. The office manager finishes the document and presses the button display. The final document is created, saved and ready to be approved. The customer agrees with new terms and press the button approve.</p> <p>The virtual case files that contain all the recorded files and activities is saved and closed. Office manager then sends the virtual case file to the financial department to make the necessary changes. The case is closed.</p>
Actors	Office Manager, Manager, Employee of Business X, Customer
Basic flow	<ol style="list-style-type: none"> 1. Participants return to the main workspace 2. The office manager edits the invoice 3. He saves the invoice and push the button display to create the final format 4. The customer, who agrees with the terms, press the button accept 5. The virtual case file is closed by the office manager

	6. The office manager sends the file to the financial department Collaboration Actions <ol style="list-style-type: none"> 1. Instant messaging for the collaboration is used 2. Comments are posted
Alternative Path	
Pre-conditions	The discount is agreed and confirmed from the manager.
Post-Conditions	The customer agreed and approved the invoice.

3.3 Validation

3.3.1 Introduction

In the previous chapter, we have conceptualized the Workspace solution and its main functionalities. It is considered that this solution could meet the challenges that Exact's PSA collaboration platform is facing and provide another perspective to this matter. There are many ways that the problem could be approached but based on the given requirements, the workspace fits the description. In the following chapter, two ways are explored to validate the Workspace model based on the Solution Design scientific approach. The first one is based on the literature study and the underpinnings that the theory sets for the solution.

The second one is the interviews within the organization and mostly with the people that presented the subject of the PSA collaboration platform but also within the research department. We will demonstrate the connections of the Workspace with the explored theories: Value Net theory and the Antecedent-Process-Outcome framework. But also we will explain why this solution stands as a Smart Process application and which the connections with the Dynamic Case Management are. Last but not least, we will present a final empirical framework with the theories that the Workspace solution consolidates.

3.3.2 Value Net theory and the Workspace

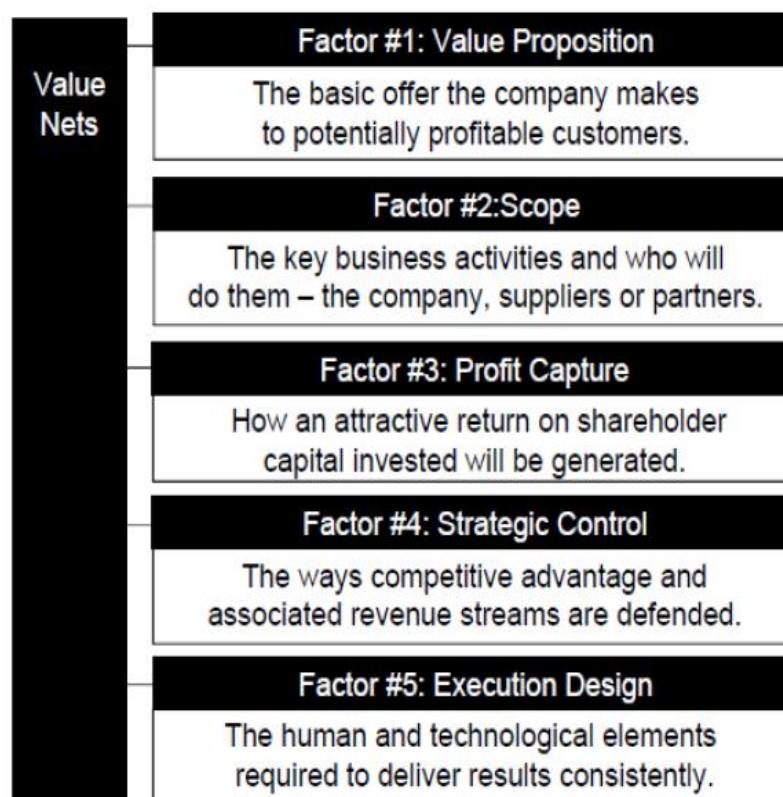
The linear business process execution was the starting point of this research, extended to the transactional software applications. Then, the interest move forward to explore a more collective way of executing the processes. ***The idea of grouping the sub processes of a process step in a process chain, rather than performing the actions linearly, gave birth to the Workspace solution.*** The research then focused on the collaborative theories that support this idea of grouping the activities, providing value to the parties involved in the process. The Value Net theory was a perfect match to explain the concept of the workspace and why grouping organizations, people and activities with the right structure can be proved beneficial to all the stakeholders.

During the research, other theories or practices were explored like the System Dynamics, as a tool to understand the complexity of the network and depict the dynamic relationships among the actors. It was considered as a non-added value option, because the main focus is to create the network in a digital way in order to be integrated in the current Exact's practices. The dynamic analysis, based on System Dynamic concept, would be useful if we approached the relationships as an ecosystem of organizations

and actors but instead we focused on the document oriented approach of creating a software product for the organizations.

Peppard et al mentioned that adopting a contrasting network approach, the perspective is changed. The organizations no longer focus on their business but the value creating system itself in which different participant work together to co-produce value. The relationships among the actors are interdependent; therefore it creates a collective mindset of creating an individual value through the value that the network is gaining and as Peppard states: “It is this network of relationships that provides the key to understanding the competitive environment in the network economy” (Peppard & Rylander, 2006).

The Value Net theory set the underpinnings of a new mindset, the collaborative one and defined a new business model (picture 23) that the organizations need to follow.



Picture 23: Value Net Theory's business design (Bovet & Martha, 2000).

Revisiting the definition of Value Net theory and consulting several researches, Value Net theory's core value is not about the business redesign but the new perspective to exploit the benefits of network connections. Technology is now the heart of the competition. The more the organizations are technologically advanced, the more the competitive advantage they gain nowadays. Therefore, digitalized networks are in the front line. Forrester's rationale was that "since we have gained most of the value out of automating the structured activities, the unstructured activities should be our new target in order to serve the customer's requirements". Bovet and Martha stressed that the value networks bring supply chain management and performance into the digital business by sharing circulated updated real-time information electronically on an ongoing basis (Bovet & Martha, 2000).

The Workspace solution proposes a new virtual network that under the right structure can become profitable for all the parties involved. From the management perspective, there are five factors that need to be addressed for a concrete value net solution. Based on the proposed business design of the Mercer Management Consulting group, the five factors for a company to capture the network value are: the Value proposition, Scope, Profit capture, Strategic Control and execution design. The workspace business analysis follows:

Value Proposition: The Workspace

The workspace is created for the purpose to tackle the given challenges at Exact and add another perspective of how they can be managed. Therefore:

1. *Integration-Collaboration*

The Workspace will connect all the stakeholders of a process to a single location. Creating a Virtual Case File for every case, the participants will be able to have real-time information awareness and access to the same master data. The information flow will be enhanced and critical activities will be accelerated.

2. *Flexibility-Transparency*

The Workspace supports flexibility and transparency. The timeline activity diagram will help the participants to jump from one action to the other but also it will serve the transparency of the process. What's more, the ability to create several workspaces related to the initial case tackles the transactional process complexity and makes the user able to perform faster and more efficiently.

3. *Governance*

The proposed governance structure of one person in charge, but with the ability to delegate its roles, enhances the workspace performance, clarifies the roles and creates norms of trust among the members. The end-to-end propose will be monitored and follow flexible business rules adaptable in the given case.

Value Creation Analysis

The above value proposition was examined and confirmed from the conducted interviews. The workspace will create the following values:

Awareness

- Insight into business processes
- The parties can be present in the ongoing process without participating
- Access in history of conversations and documentation

Agility

- Real-time and parallel execution
- Reduce the time of execution
- Process can get SMARTER (learning curve)

Collaboration

- Customer-oriented
- Shared workspace
- Participation in different workspaces
- Intimate customer relationship -> "Quality Time"

Transparency and Visibility

- Face paper intensive processes (Reporting, Invoicing, Quotation)
- Metrics-based performance management for the complete end-to-end process.
- Avoid as much as possible the decentralized communication (emails, fax, etc.)

Scope

Given the requirements gathered through this research, the Workspace solution will be document oriented in the beginning. Invoicing, contract management and timesheet approval will be the first challenges that will be tackled. The Workspace aims to help the customer of Exact and in their turn to elevate their own customers' satisfaction, by enhancing the collaboration among all the stakeholders.

Profit Capture

The Workspace is a win-win situation for Exact, its customers and the customers of the customers. For Exact will enhance its product line, boost its reputation and brand name as an innovative company expanding its portfolio from the transactional software also to the collaborative ones. Exact's customers will bear the fruits of the product and serve their practices and their customer's expectations. The customer will be the epicenter of interest, involved in the business processes as an important player.

Strategic control

Exact will update and advance the first versions of the product, eliminating the deficiencies and offering a more integrated solution for its customer. They will strengthen their position in the market, gain competitive advantage over others and follow their strategy of growth by focus, innovation and simplicity.

Execution Design

The new product will follow Exact's practices and the current execution designs.

3.3.3 Antecedent-Process-Outcome Framework and the Workspace

In the previous section, the Value Net Theory is used as the base business design to support the idea of the Workspace and explain the benefits of creating value networks. The organizations, networking on a specific nutshell, can derive value out of their relationships with other organizations. Based on the specific working environment, digital value networks were the prime focus during this research. Though, the Value Net theory describes the business design and promotes collaboration, the actual collaboration process is missing. The Antecedent-Process-Outcome framework comes to complement the Value Net theory and add the five basic elements for a sustainable collaboration process.

Governance:

In the literature pool, there are several definitions of the process governance. For example, Spanyi & Dwyer (2008) define the governance as: "the structure, metrics, roles and responsibilities necessary to measure and improve performance and to manage an organization's processes, and regard it as fundamental to optimal, workable process improvement in the organization" (Paim & Flexa, 2011).

In the Workspace solution the governance structure is executed by the initiator/knowledge worker of the workspace. He is responsible to delegate the roles and the responsibilities to the different participants in order to manage the execution of the processes and create a workable virtual environment. The Workspace introduces a dynamic governance structure with an authoritative figure

that will divide the labor but flexible enough to adjust the roles based on the participants feedback and based on the case requirements. It will enhance the participative decision making, stabilizing the relationships and making clear that all the participants are equally responsible to execute their tasks and reflect a group consensus rather than an individualistic one.

This governance structure with one stable variable, the knowledge worker, and equally distributed roles to the other participants is called, as Bardach (1998) named it, “jointness”. The collective responsibility of the parties involved will allow them to focus directly on addressing the problem rather than on assigning individual responsibilities and making them more likely to collaborate (Thomson & Perry, 2006).

Administration:

Thomson et al (2006) stated that the administration structure is the mechanism for the organization to move from governance to action. The administration control is essential for the viability of the Workspace as well. The clarity of roles and responsibilities among the participants foster the credibility and sustainability of the Workspace solution and enhance the collaboration and the norms of trust.

In the Workspace, the knowledge worker is responsible for the administration and the maintenance of the roles and responsibilities. Therefore, he assigns the roles based on a predefined list, as they have been described in the chapter five, which are also attached with the specific responsibilities. He can also create new roles with mixed responsibilities in order the governance to be dynamically responding to the case requirements. Moreover, the roles and the responsibilities can be also discussed when the Workspace is created in order the roles to be reorganized based on the participants feedback, setting the customer to the middle of interest.

The initiator is also the key keeper for the series of workspaces that could be created. If a participant desires to create a second workspace related to the first one, he must take the approval from the initiator in order the last one to keep control of the process and avoid a spaghetti structure. Therefore, the only stable variable is the knowledge worker who will be responsible for the ad hoc connections and will maintain a rigor but also dynamic governance and administration structure.

Organization autonomy

The basic idea of the third pillar of the Collaboration framework is that the organizations should maintain their own distinct identities and organizational authority separate from the collaborative identity [32]. The conceptualization of the Workspace is also based on the organization autonomy by introducing a case driven solution. The Workspace as an entity is translated to a specific case folder that consolidates all the information related to this specific case. As a result, the participants, and their organization in extend, are not obligated to share any other information that is irrelevant with this case. In this way, the organization autonomy is served, trust and accountability is fostered.

Mutuality

Thomson et al (2006) stated that information sharing does not explicitly lead to collaboration if the mutual benefits are excluded. Mutuality has its root to interdependencies, or as Powell (1990) defined to complementarities. Creating a mutual interest for a specific case forges the collaboration and establishes a common target. In the Workspace solution, mutuality is a pre-requisite. In the case driven solution all the parties have mutual interest because it is part of their responsibility. Therefore, all the stakeholders have a common interest to solve any issue related and succeed a common target. On the other hand, there is always the possibility for the individuals to pursue a different target for a specific

document, but with the instant collaboration, a constructive conversation can take place and finally reach to a common understanding and in extend to a common goal.

Norms of Trust and reciprocity:

During collaboration, there is very often the phenomenon of the “I will if you will” mentality, which means that a participant is willing to collaborate only if the other participant demonstrates the same willingness (Thomson & Perry, 2006). Reciprocity is rooted in a sociological understanding of obligation (Ostrom, 1990 and Huxman 1996). Next to the described factor of reciprocity comes the trust, which is also a very essential component of collaboration. Trust facilitates the good faith and honesty among the members involved.

In the Workspace solution, trust is an important issue. Though it is a short-term solution, when the steps are executed the case is closed, it is long term functionality. From the first stage, when the participants are selected, the people can interact, create relationships, provide their feedback and evaluate the performance of the Workspace. The separate Workspaces that can be created to discuss private but related information to the case, forges the trust among the participants and drives them to collaborate in a flexible way. This privacy is protected by the different access rights that the participants have. For example, when a second workspace is created, which will be shown also in the timeline diagram, only the people who have the access rights can click on the image and go to the workspace two to see the shared information. This ad hoc solution promotes trust and sets boundaries of the exposed information among the stakeholders.

3.3.4 Dynamic Case Management and Workspace

Based on the Forrester research (Clair & Miers, 2011), the traditional information systems are fell short to support the human centric business processes that are most applicable these days. The Dynamic Case Management (DCM) concept is suitable for case and knowledge driven business processes that are mostly unstructured and collaborative. Having explored the main idea of DCM, in this section will explain how the DCM concept is applied in the Workspace solution.

The Workspace solution follows the following DCM characteristics:

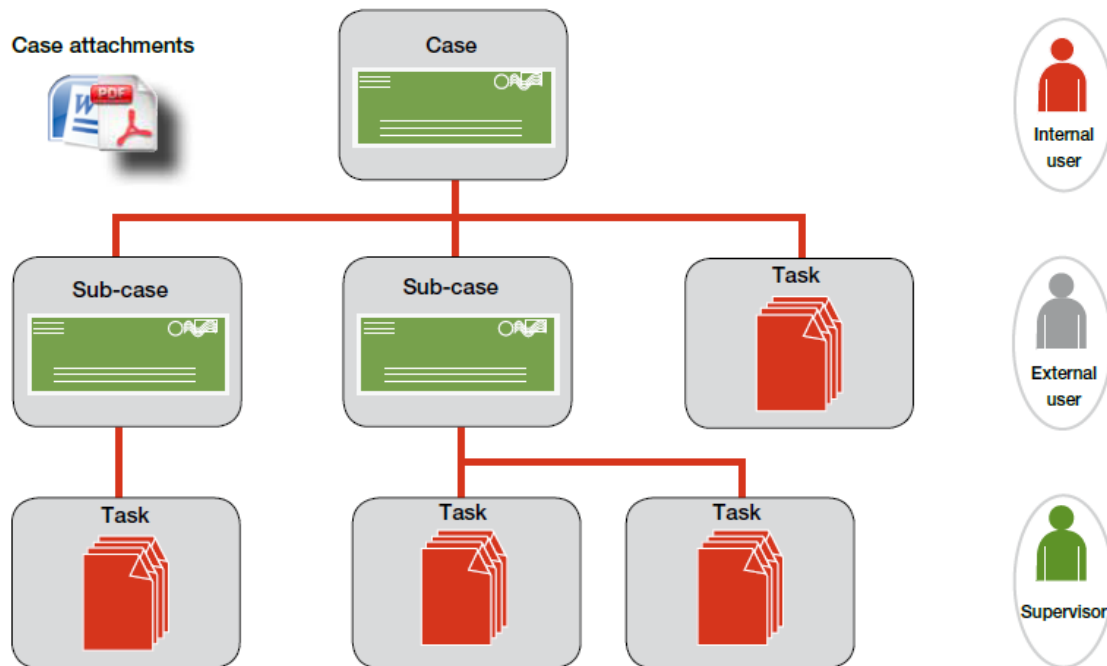
- Case driven
- The existence of a knowledge worker
- Support the untamed activities with its collaborative nature

Case Driven

The Workspace follows the DCM structure of initiating a case, include the related information, involve the stakeholders to actual collaboration and handle the case requirements based on predefined steps. It also creates ad-hoc connections and indexes the case file after the case is closed.

Therefore, when the Workspace is called in order the parties involved to participate in a collaborative process, a case file is created to consolidate all the information. At extend, the series of the workspaces that can be created can be translated as subcases of the same case with different tasks that the participants have to execute to complete the procedure, which is the same as in the following picture. For example, creating the initial case specific stakeholders are invited, but if some other stakeholders need to be involved and share information that is private to the first workspace stakeholders, the knowledge worker calls another workspace same as the sub-case file of the following picture. This

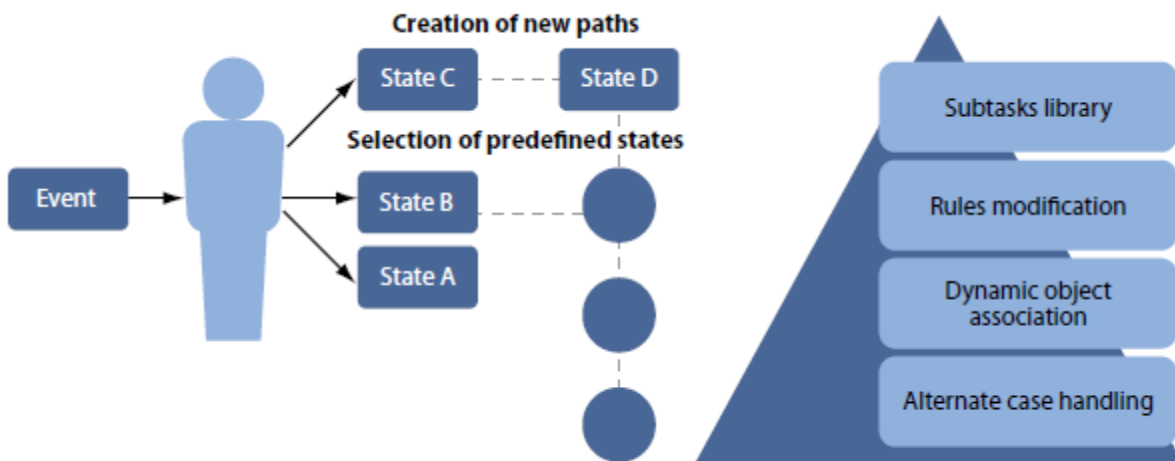
provides the agility and norms of trust among the participants and provides them to handle the case with greater flexibility introducing also the gamification trait of the workspace.



Picture 24: Dynamic Case Management (Kitson, Ravisanskar, Soudamini, 2012)

Knowledge Worker

The second principle of the DCM that the Workspace solution is built upon is the Knowledge worker figure. The knowledge worker is the key player of the workspace, assigning the rules, controlling the administration process and monitoring the whole procedure. He is responsible to organize the participants around the case based on business rules but also with the participants' feedback, creating a very dynamic environment. Based on the DCM concept the knowledge worker can choose between different roads of executing a case, based on the given requirements. As the following picture reveals, he can maneuver from one state to the other, selecting the most appropriate one with a jointly decision making process with the other participants.



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Source: Forrester Research, Inc.

Picture 25: Forrester review, Dynamic Case Management (Clair & Miers, 2011).

Collaboration and Agility

The workspace functionality promotes the structured collaboration exploiting the five principles of the antecedent-process-outcome framework of Wood and Grey. The timeline activity diagram provides the flexibility for the participants to change the environment moving from one workspace to another if they have the access rights to do so. This functionality links all the necessary components of the workspace; people, data and processes.

Clair et al in the Forrester report about the Dynamic Case Management have found that the ERP providers have significant opportunities to enrich their initial product with Dynamic Case Management features (Clair & Miers, 2011).

3.3.5 Smart Process Applications and the Workspace

Smart Process Applications are the new software concept for collaborative processes. They combine five different elements in their solutions as a consolidation of best practices; awareness of data, analytics, collaboration and content and business process management. Besides business process management, which is a fundamental pillar for the SPA solution, it is identified that Dynamic Case Management practices are also used to support specific case activities. Fingar, in his article Smart Process Apps, refers that the essence of SPA existed before Forrester who firstly coined the term. In the book of Broninski, Human Interactions it is clear that the organizations need to move forward from their strict structure, expand their boundaries and set the human interaction as one of the most important components of business process management.

Workspace as a SPA solution - examples

HumanEdj

The book was based on the first Smart Process Application that was built from Broninski's team, the Humamedj. The Humanedj, as a virtual worrkspace solution, fulfils all the basic characteristics of the smart Process apps concept that Forrester defined. The basic functionality is the creation of virtual

teams that can collaborate in a variety of activities, using the basic rule of stages-roles-activities. They introduce a governance and administration structure, analytics and real-time data awareness in order to support the collaborative activities.

ISIS Papyrus

The ISIS Papyrus is a very powerful dynamic case management solution that supports the collaborative activities [50]. The solution is a virtual workspace which introduces as a key driver the creation of virtual case teams that can collaborate real-time, sharing and capturing information and applying business rules. The basic concept of this virtual dynamic network is to support the informal communication, by linking content with data processes and content with people as well as connecting people with people and history of content with experts and topics.

The above examples stress the importance of the Workspace as a powerful solution for the unstructured activities. The workspaces, like the proposed solution of this research, that include the SPA characteristics can be considered also as a horizontal smart process application.

3.3.7 Experts' Validation

Having completed the basic research around the Smart Process Applications topic, five questions have been set to serve the validation purpose. Given the fact that the actual testing of the Workspace is not possible within six months in a large company like Exact, the validation part is only based on theory (described above) and interviews with the knowledgeable people in Exact. It has been selected a specific group of people; the Professional Services employees that participated in the first interview of collecting the requirements and the research department. The questions are composed in order to clarify if the participants can identify all the concepts examined during the research and if the product adds value to the existing application landscape.

The people that participated in the validation review were:

1. Hermien Ratcliffe, Principal Product Manager	6. Paul Kaesler, Senior Research Engineer
2. Mark van Dijk, Research Engineering Manager	7. Umit Turan, Senior Research Engineer
3. Bart Platzbeecker, Principal Software Architect	8. Gerard Klapwijk, Research Engineer
4. Simon Brookfield, Senior Software Engineer	9. James Lo, Research Engineer
5. Jeroen Klarenbeek, Senior Research Engineer	10. Robbert Holtkamp, Software Engineer
	11. Erik van Uffelen, Functional Designer
	12. Joline Boschman, User Experience Designer

Table 8: Validation Participants

Questions for the Validation:

- 1. Do you believe that the WS serves the Five Pillars of the Collaboration Framework?**

The solution design is based on the Antecedent-Process-Outcome framework that introduces five elements in order to support the collaboration process and turn it to a sustainable one. If they stakeholders of the process have a clear administration and governance structure, keep their organization autonomy outside of the collaboration process, have a mutual interest for this and manage to create bonds among them, then the collaboration process will be more efficient, effective and sustainable. Therefore, the target group was asked if they could identify in the Workspace solution the five elements in a very clear and elaborated way. The responses were positive and all of the parties believed that the five elements were well analyzed to support the collaboration process in the WS. Their focus turned mainly to the governance structure and possible problems.

For Governance:

From the Professional Services Department:

Hermien mentioned: *"Yeah. Definitely is there, following the governance structure of the dynamic case management"* and **Joline** and **Simon** agreed. **Simon** also commented that the governance structure is controllable and sustainable. *"The creation of different workspaces, under the control of one person, seems to be concrete, dynamic and contained"*. **Simon** also explored different scenarios to examine the governance structure, sketching different cases. He commented that seems doable and there is no serious problem because also the initiator/knowledge worker can delegate his role to someone else in order to sustain the process.

From the Research team:

Jeroen said that probably is a challenge if one initiator has to handle one hundred invoices and **Erik** mentioned that you always need to find the right person to initiate the process, the difficult task is to identify the knowledge worker. On the other hand, **Bart** mentioned that the person could be the project owner, as here in Exact. Therefore the knowledge worker can be translated to the project owner. **Mark**: With this solution you are able to capture all the content and information about the case and by having that, you create more governance. You are also able to track the untamed processes and therefore it enhances the governance structure.

For Administration:

The PSA participants agreed on the predefined list of roles and different access rights like the ones they are using now in their system. On the other hand, **Bart** from the different team, asked how is going to have access where and that will be quite complicated sometimes. It was explained that the predefined roles will be used but also new roles can be created based on the different case.

For Organization Autonomy

The participants agreed that the stakeholders of the workspace can share only the information they desire without the others to have access in their organization information pools. **Bart** mentioned that it is fully functional itself, the element does exist.

For Mutuality

There weren't too many comments in this part as this concept is different from the others.

For Norms of Trust:

Hermien mentioned that: *“They are coming back. The other collaborators can’t see the other WS information”* and also **Joline** said that could boost the trust if the all the participants can have access to the different workspaces that could be created during the process.

On the other hand, **Erik** commented that the idea of not having access in all the workspaces could cause some trust issues because some people could be interested to know in which state the process is. Although, then it was explained that if all the participants had access to all the workspaces, the idea of the different workspaces would have no meaning anymore because all of the participants could be in one workspace but also it would break the organization autonomy that the solution wants to promote.

2. Do you believe that solution adds value in your application landscape?

The purpose of this question is to trigger the participants to elaborate upon the solution and comment if the solution can be characterized as a valuable one. If the interviewees agreed that the solution adds value then the digital workspace follows the concept of the value net theory.

Hermien mentioned that: *“The higher you up in the market, the more complex the business processes get, because people need different level of visibility into what they are doing. There is where the flexibility comes in. The bigger the company the more they split the business processes into small parts but also require more flexibility in order to maneuver. So this is definitely a case for PSA that I can see, this is where the whole visibility becomes because it captures everything and because you are able to change it on the fly. Especially when I am looking the contract management”* and also *“I can definitely see the value on it, If you want to have this, from customer perspective based on my experience. It is a more structure way to communicate to enhance data and to collaborate with externals, so I definitely see the value there. And by opening these workspaces, there is the flexibility, the value on that”*

What’s more she stressed the matter of the User Interface: *“The UX is going to make a break. If there is not a clear structure and display of all the things you want to put together, then it is going to fail. From UX perspective, the user should see that and go. Understand. This is what I need to do, this is where I am. Because in this, I see a lot of gamification. You open up a new workspace you have achieved this you have done that. This is outstanding. It should be so intuitive to know where you are what to need to follow up. If the user interface is not good, the whole concept becomes too complex for people to understand that.”*

Joline: *“Great design, great usability, save time, added value. For example, the whole problem of bookkeeping is that they don’t like it, to entry hours etc. The solution has to add value also to the customer in order to use it. Very interesting”*

Simon commented: *“Eventually you start with A and want to go to B, but what happens in between it gives you a lot more flexibility. It is all little steps from A to B everywhere that’s why I think it is controllable. Linear collaboration but they are linked together. So a step has to finish to move to the other. It is doable, I want to implement it!”*

Mark added that *“I see this as the next generation of our product. Capture more of what is happening. What we are missing is the external communication to capture that and give the possibility to the external people to collaborate in that process.”* **Erik** said *“Like in synergy, we do have the information but*

we exclude the customers. If you have a workspace perhaps then the external person can be more involved to the process” and **Bart**: “you can reuse that knowledge, share information and download it. Definitely I see the value on it. ERP systems are quite rigid and we are missing the additional support for collaboration. Share your knowledge, you can build a history and do analysis on that, analyze your processes, step away from the predefined processes. Involving the stakeholders, suppliers and customers and communicate”

3. Do you believe that it can reduce the time of execution?

The time of execution is one of the major issues in the transactional software applications as well as in Exact. This will validate that the network approach actually adds value to Exact but also to the customers, being able to execute the business processes faster.

Joline said that “The time of the process execution might be increased, but the lead time towards the desired outcome can be more efficient in short term than previously because the participants can collaborate into the Workspace, for example the approval of a document. Before that they didn’t have the possibility to invite people to create comments to talk about the invoice therefore they just rejected. In the workspace may be faster because you will not need to pick up the phone and call someone or email, so you put them all together. So I think if you measure the total time from the previous system and the workspace, the workspace may be faster but also more efficient”

Hermien mentioned also: “that visibility and that tracking and monitoring is valuable. On the other hand, if you get to the phone, follow-up emails but with this instant access to your information you can say: “hey you haven’t done your stuff” There is much more information available at your fingertips. So I definitely see it will be a time saver for our customers”. She also said that: “It provides the visibility to see where you are, what is your next step to do and gives you the confidence to go on.”

What’s more **Jeroen** complemented that “If they are going to collaborate then yes it saves time. If you are in room with four people at the same time then easily will collaborate to solve the issue, if the collaboration works, because you don’t have to wait for someone else”. **Bart** also mentioned that “I believe It will reduce the interactions like calling, emailing” as well as **Erik** stated that “I believe that all the stakeholders can see what is happening or what has to be done and I cannot delay because the people in the workspace are waiting for me”

4. Do you believe that the WS tackles the identified PSA challenges?

The target group answered if the gathered requirements in the first of the research were met by the Workspace solution.

From the Professional Services department, **Hermien** said that: “Of course, there are not there all the PSA challenges but those that were detected; yeah you provide a very solid solution”. And continued: “From the collaboration perspective, I definitely see the areas which are problematic today, not necessary on customer feedback, but this solution definitely addresses some of the issues we would love to do but we didn’t have enough time. It puts every smart way dealing with them in order to provide agility, flexibility. I think it is really nice”.

On the other hand, the research team asked if the people from the professional department agreed upon that. I explained the challenges and mostly they agreed that they can identify the things that they were missing from the previous solution at the Workspace solution.

5. Can you identify potential problems in the Workspace solution?

This open question is targeting to initiate a discussion upon the potential problems, aiming to get information for the future work.

During the interviews several problems were identified and considered to be examined for future work. **Hermien** found that: *“The only thing that I don’t like this. You are now saying that these guy needs to get an approval so he needs to start a second workspace. Now the collaborator needs to request from the initiator: Can I please start a second WS? No! The initiator doesn’t care for the rest of the organization and the process there because he wants his stuff done. Why can’t this person request an additional WS? All this guy sees is the dependency on another workspace. The question that is risen is” if one collaborator wants to open a second workspace, what happens to the visibility and access to the second workspace?” You are now assuming a mother-child relationship that the mother looks out for the children.”*

Although, it is very good argument, it was explained that the governance of the workspace couldn’t be structured differently. The only reason is that if the collaborators would open any workspace they wanted then there will be spaghetti of workspaces, difficult to track and monitor the information and the processes that were attached and executed. Therefore, following the dynamic case management governance structure we manage to keep the gamification trait under control. Then, she seemed to agree but she was concerned about the issue and suggested a more thorough analysis. Hermien also mentioned that the User interface would be a challenge and she stated that: *“if you make it so simply, even if the underlying entities can be so complex, it becomes easy to use, understand and follow”*

Jeroen mentioned that: *“This solution is very advanced and it probably tackles a very small present of the current processes, because we can cover with the current solution the 95% of the cases”*. He continued saying that this advance solution may not be applicable here in Exact and would not offer a return of investment after all.

Simon mentioned that: *“Technologically the timeline diagram that puts everything together may be very challenging but I think it is doable”*

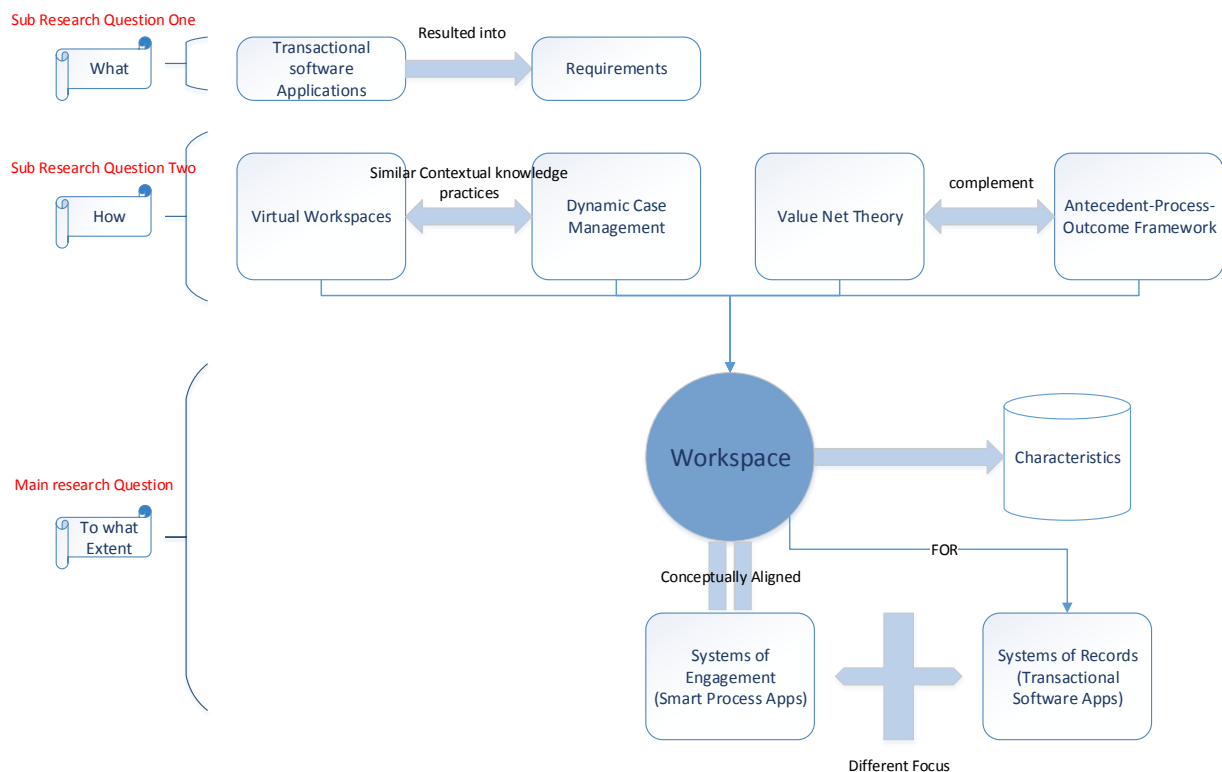
The research team expressed the argument, from the technical perspective, that the implementation of the workspace could be a challenge, especially the flexibility the workspace demands for the business processes. Therefore, the configuration of the business processes in the workspaces could cause some issues. It was also stated the solution of the outsourcing but there wasn’t a depth analysis upon this matter.

Concluding, the participants were very positive, interested in the solution and willing to be engaged in the discussion. From the second question about the value of the workspace as a concept, we derive the result that the workspace could be a valuable solution. The main outcome was that the customer is in the middle of the concern and is involved in the decision making process and that is very positive aspect that the workspace offers.

Chapter 4 – Conclusion

Research Results

In this chapter the main research question “*To what extent, collaboration can be enabled in transactional software applications?*” will be answered along with the sub-research questions. The main result of this research is the Workspace solution and how it is conceptualized. The main connections of theory and practice will be highlighted. The connections that found during the research are depicted in the following picture.



Picture: 26: Research results

4.1 Sub-Research Question 1

The first sub research question examines the similarities of the transactional software applications challenges found in theory with the challenges that were identified in the systems of Exact.

What are the main challenges of transactional software applications regarding collaboration in theory and practice and what are their similarities?

The first approach was to examine the transactional software applications theory and their main challenges. The outcome was that these systems, as the ERP, CRM and others, fell short to deal with the collaborative processes and ultimately offer a holistic solution to the increased customers' demands. Then, in the case study that was conducted at Exact, the research focused on their Professional Services

Department and mainly in the collaboration platform they have developed, as a module in their ERP product. Interviews took place to identify their main challenges. In following table, the findings of the research in theory and case study are depicted:

Theory	Case Study about Exact's collaboration platform
Integration challenges	PDF recreation
Lack of Flexibility	Visibility among the users
Customization problems	Real-time awareness
Inability to follow organization challenges	Actual collaboration
Information silos	Document enrichment
Complexity	Frame solution in an end-to-end process
Over budget and late projects	Document oriented
Misalignment with business strategy	
Lack of collaborative features, information intensive systems	

Table 9: Theory and Case study outcomes

The main difference of those two categories is that theory refers to challenges of the ERP systems in an organization perspective. On the other hand, the collaboration platform that was developed from the Professional Services Department in Exact refers to product challenges and not organizational ones. However, some similarities have been detected.

Point One:

Starting from the Case Study, two main points discovered; the visibility and the real-time awareness among the users of the product. These two main points fall into the lack of flexibility and customization problems category from the theory. Using the collaboration platform the users cannot actually collaborate and comprehend the other collaborators' motives and intentions.

Point two:

The collaboration platform deals with problems like Invoicing, Sales orders and generally document oriented processes. They only offer a frame of the end-to-end process, excluding important information that would be useful for the participants to take decisions, increasing the time of the process execution. Moreover, there is a lack of consolidation of the related documents to the specific case, creating as a result information silos. These results match the same outcomes found in the theory.

Point three

During the literature study and the case study one more similarity was found between the theory and Exact practices. Based on Forrester's categorization of Business Process as a Service (BPaaS) and Smart Process Applications (SPA) depicted at [picture 5](#) of the document, Exact is placed on the BPaaS side. It is found that Exact's collaboration platform is developed for document oriented processes like Invoicing and handles low human involvement and process variability. This was also confirmed by the interviews. It confirms the research result that their product belongs to the transactional software side, though they

tried to integrate collaborative features. The workspace solution is aligned with the SPA concept, but it is also structured for document oriented processes in order to meet the identified requirements from the Professional Services Department.

Point Four

The final and most crucial point is that no actual collaboration occurs among the users in the collaboration platform. This has been identified and stressed by Forrester research, but also found in the case study.

Concluding, the collaboration platform product from the Professional Services Department fell into the category of the transactional software applications or Systems of Record as Geoffrey Moore defined (Moore, 2011). Taking as a prerequisite that Exact wants to introduce collaborative features in their product and that this research is based on the collaborative technologies, as the Smart Process Applications, this research is then focused on following sub-research questions.

4.2 Sub-Research Question 2

The second research concerns about how the identified theories will establish the theoretical background of the Workspace solution and how the identified practices will structure the solution. The “How” question is answered with the Workspace solution.

How can the combination of Systems of Engagement and collaborative theories provide a sustainable solution for the identified challenges in the Systems of Record?

During the research, the following connections were discovered:

1. Value Net Theory – Workspace solution

The Value Net Theory gave birth to the Workspace solution. Based on this theory, the workspace was conceptualized. Therefore, the solution is following the Value Net theory fundamentals; Customer-Aligned, Collaborative and Systematic, Agile and Scalable, Fast Flow and Digital. The research introduces the Workspace as a miniature of a value network as the theory states.

2. Value Net theory – Antecedent-Process-Outcome Framework

Although the Value Net theory is the parental theory it lacks the explanation of the collaboration process. The Antecedent-Process-Outcome Framework facilitates the collaboration process with five pillars. The Workspace solution followed the fundamentals of the Framework to support the collaboration process and become a sustainable solution.

3. Dynamic Case Management – Workspace solution

The research continues with the introduction of the Workspace solution. The structure of the Workspace is based on the Dynamic Case management (DCM) practices. The solution introduces the virtual case file (Room) that contains all the information around the project and it is structured by different sub-cases (several Workspaces) if it is necessary.

4. Virtual Workspaces – Dynamic Case Management

During the literature research was identified the connection between the Dynamic Case management and the theory of Virtual Workspaces. Both of them can be considered Knowledge Management

systems because they structure information contextually. The two concepts structure the information in a specific entity; Activity (Virtual Workspaces) and Case (Dynamic Case Management). The Workspace solution of the research is based on those two concepts, contextualizing the information around the project entity.

The above theories were the pillars of the Workspace foundation. The Workspace characteristics are developed and based on those concepts in order to meet the identified requirements from the transactional software applications' research and offer a sustainable solution to Exact.

4.3 Main Research Question

In this section, the main research question will be answered.

To what extent, collaboration can be enabled in transactional software applications?

The main research question explores collaborative techniques that can enhance the by definition non-collaborative concept of transactional software applications. The customer demands and the increasing competitiveness in the market drove the organizations to strengthen their systems with collaborative features.

As it is depicted in [picture 26](#), the main challenges of the transactional systems turned to requirements for this research. The four concepts that were explored (*Virtual Workspaces, Dynamic Case Management, Value Net Theory and the Antecedent-Process-Outcome Framework*), provided the foundation of the workspace solution. Their combination led to the basic characteristics of the workspace that can enable collaborative features in the transactional software systems. Since the solution is created for Systems of Record, it introduces a data-oriented approach with collaborative traits. The virtual network enables the participants to become active in the business process rather than the isolated position they hold so far with the other systems. They can collaborate and solve their problems in a centralized customer-focused solution.

Therefore, the main research question is answered by the solution design of the Workspace. Based on the experts' statements, the Workspace is considered to be a System of Engagement and in extend a Smart Process Application. The Workspace structure met the identified requirements from the case study that was conducted at Exact and was validated also from the interviews. Specifically, Hermien Rachliffe mentioned: *"From the collaboration perspective, I definitely see the areas which are problematic today, not necessary on customer feedback, but this solution definitely addresses some of the issues we would love to do but we didn't have enough time. It puts every smart way dealing with them in order to provide agility, flexibility. I think it is really nice".*

As well the Product Owner Mark van Dijk of the Research Department said: *"I see this as the next generation of our product. Capture more of what is happening. What we are missing is the external communication to capture that and give the possibility to the external people to collaborate in that process."*

Concluding, the Workspace can enable collaborative features in the transactional software systems and become their extra missing module.

Chapter 5-Discussion

5.1 Challenges-Findings-Solution

The research raises the question of how Systems of Records can be enhanced with collaborative features. Taking into consideration that these systems are data process oriented, the research explores the concept of Systems of Engagement. The systems of Engagement are defined as a collaborative concept that can extend the functionalities of Systems of Record and support more complex human oriented processes.

In order to tackle the Systems of Record's challenges, four different theories were studied. The Value Net Theory was the inspiration theory that set the foundations of the Workspace solution and the research finally resulted in. The approach was to create a network in data oriented processes that would add value to the participants. While this theory sets the underpinnings for the Workspace solution, it lacks the description of the collaboration process within the network. Therefore, in order the Workspace solution to be a sustainable one, the pillars of the Antecedent-Process-Outcome framework were explored and became the essential ingredients of the Workspace solution. Moving forward, the Virtual Workspace theories were the roadmap of the Research Solution.

The study managed to extend and enhance the theories with a new approach. The new approach was the creation of a Workspace based on the Dynamic Case Management principles. The study introduced the virtual case file solution to consolidate the data of the Workspace and suggested also the Room functionality. The Room consists of different workspaces, related to the initial project/case, and serves the flexibility, privacy and real-time awareness requirements. These connections offer a spherical approach of the subject and contribute to the existing literature of each and one of these concepts.

The Workspace solution considers to be a System of Engagement, as it was stated from the experts. Therefore, the main goal of creating a system that the participants can collaborate was reached. Furthermore, the study managed to create a theoretical background behind the Systems of Engagement concept with the Value Net theory, the Antecedent-Process-Outcome framework and the Virtual Workspaces' theories. The Workspace solution as a System of Engagement represents a spherical study around the topic, combining best technologies practices with well-established and explored collaborative theories. Furthermore, the study provided a different perspective of the Workspace solutions that already exists and encourages further investigation upon the subject.

The Workspace solution was conceptualized during the case study that was conducted at Exact. The solution managed to tackle the identified challenges in that specific environment and met the requirements that were defined. It is argued that the solution is not restricted to Exact practices. It can be used from other companies in the same field, by keeping the same Workspace concept but modifying the solution to meet their own requirements. The Workspace solution was validated from several experts within Exact through the interview and presentation process. The comments were positive and it is agreed that the solution could offer value on their application landscape.

5.2 Weaknesses

The Workspace solution design is not flaws free. It is important to be mentioned that the solution is technologically high level. No technological background was added or how it could be implemented. The lack of the technology exploration may lead to potential challenges and the solution to be considered problematic. On the other hand, software engineers claimed that technologically the Workspace solution is possible. However, there was no initiation of implementing the Solution in order to test its value. Of course, at the size of the company that the case study was conducted, it was not possible the solution would be implemented.

Moreover, the research approached the Workspace solution as the most applicable one but no other solutions were visited or examined. Since the research based on a Solution Design, the time to explore alternative directions were limited. A case study was conducted to explore the Invoice process, but the research wasn't extended into other areas, as Contract Management. However, the research states that the Workspace solution can be applied also to other areas and Hermien Ratchliffe, the Principal Director, agreed on this claim. Therefore, it is only one approach and one case study around the collaboration subject rather than several ones.

5.3 Suggestions for Further Research

The main recommendation derives from the weaknesses. It can be explored the opportunity of implementing the Workspace Solution in order its value to be specified. An implementation project could offer valuable insights and demonstrate potential challenges either technological or conceptual oriented. Moreover, considering that the time of execution of the linear processes is estimated and is relatively high, a Workspace implementation could also offer some insights of the collaborative time execution. Then, a comparison of the two estimated times could either verify or disprove the Workspace's advantages that this research argued.

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