HUMAN INTERACTION MANAGEMENT: LEARNING FROM COMPUTER SUPPORTED COOPERATIVE WORK

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Abstract

In this paper we research the common characteristics of the research area of Computer supported cooperative work (CSCW) and the upcoming area of Human interaction management (HIM). Since HIM promises to be the next level of business process management, we investigate whether this immature area of research can learn from the more mature area of CSCW. From an explorative literature research we identify the important lessons learned from CSCW systems, and create a framework for reference. With an example we illustrate to what extent the identified lessons learned from CSCW can be applied in the area of HIM. We conclude that a large part of the CSCW lessons can be extracted and applied in the HIM area, since CSCW and HIM have important common characteristics, such as the focus on supporting collaborative work through ICT. The lessons from CSCW that can be extracted and applied in the HIM area are lessons from the use of CSCW systems and routines supporting collaboration on a human-driven level. After applying these lessons, the HIM principles should be applied to get a base for an agile human-driven process.

Keywords: Computer supported cooperative work, Human interaction management, Business process management, Lessons learned, Critical success factors.

1 INTRODUCTION

Due to the increasing business globalization and commoditization, enterprises become more dependent on business process management (BPM) to keep their business processes in control (Smith & Fingar, 2003). BPM has been ranked as the third of the top 10 strategic technologies for 2008, after green IT and unified communication (Gartner, 2007). International Data Corporation predicts that the revenue for the BPM market will climb from $ 1 billion in 2005 to $ 3.8 billion by 2012 (Zhao, Liu & Li, 2008). Business processes are originally developed to help people conduct businesses in an efficient way. On the current day, the research area of BPM mainly attempts to improve efficiency by automating business processes from a computer-oriented perspective, i.e. the Business Process Management Systems (BPMSs) focus on the technical aspects of business processes (Zhao et al., 2008). But when it comes to the dynamic, collaborative, innovative processes driven by humans, such systems are not sufficient (Harrison-Broninski, 2005a). In order to understand and manage business processes, it is essential to also understand and manage the human-driven work processes (Han, Kauranen, Kristola & Merinen, 2006). The concept of Human Interaction Management (HIM) has been developed in recent years to address this challenge.

Companies can relatively easily automate their standard processes with BPMSs; this is not where the challenge and the competition lie anymore. The real competition between companies is now taking place on the level of knowledge intensive interaction between partners and inside companies (Harrison-Broninski, 2006). The current wave of BPMSs does support communication, but does not provide support for the innovative processes driven by humans (Harrison-Broninski, 2005a). People are flooded with infinite possibilities of communication, which causes an information overload. A good example is the current e-mail traffic amongst co-workers. Current e-mail clients only support unstructured e-mail conversations that cannot be related to tasks, teams, versions of documents, dependencies and progress in the business process (Louw, 2008; Harrison-Broninski, 2006). The purpose of a Human Interaction Management System (HIMS) is to solve this kind of issues and allow for better collaboration between people. Integrating human activities to BPM will definitely enhance the controllability of business processes, and improve the practical performance of business processes (Zhao et al., 2008).

Up until now, no scientific research supports the principles and vision of HIM. This makes the adoption of HIM problematic. Therefore this paper describes an explorative literature research to extract lessons learned from the area of Computer Supported Cooperative Work (CSCW, cf. Borghoff & Schlichter, 2000; Rodden, 1991) that can be applied in the area of HIM. Since CSCW systems are broadly used and related to HIM, this research can support the adoption of HIM, the new level of BPM. Throughout this research, we work with the following research question:

What lessons learned from the research field of Computer supported cooperative work can be extracted to support the upcoming area of Human interaction management?

This paper provides a contribution to the current limited scientific literature of HIM. Aside from contributing, it provides an insight in how lessons from current working methods can be extracted to support upcoming trends. In a practical sense, the findings from this research can support the adoption of HIMSs by presenting an overview of lessons learned from proven work methods from the area of CSCW, which can be applied in the area of HIM.

The structure of the remainder of this paper is as follows. First we give a literature overview of the important concepts of HIM and CSCW. Then the method and results of an explorative research follow, that has served to provide a framework of important lessons learned from the area of CSCW. The application of the framework on the area of HIM follows. We conclude by answer answering the research question, plus the implications and limitations of this research.

2 RELATED LITERATURE

In this section we discuss two important concepts for this research: Human interaction management and Computer supported cooperative work.

2.1 Human interaction management

Harrison-Broninski (2010) states that 80 percent of the work that gets automated with BPMSs, only accounts for 20 percent of the costs and effort, while 20 percent of the work that gets done manually (human-driven), accounts for 80 percent of the effort and costs. Current BPM techniques are geared toward activities that are transactional. But what about the activities that are collaborative in nature and account for most of the effort and costs? Several studies have been conducted to assess the importance of HIM and what impact it has on an organization that utilizes it appropriately. In his book "Human Interactions", Keith Harrison-Broninski (2005b) explains the importance of HIM and how this is the missing link in the current BPMSs. Harrison-Broninski is the founder of the concept of HIM, and emphasizes that the people are the important factor in work, not the processes automated by the information technology. People do the work, and they need help with their collaboration (Harrison-Broninski, 2005b). From the article of Zhao et al. (2008) it becomes clear that the current area of BPM is unsupportive for the people that have to work with the changing processes. Processes and information technology are well supported, but the people are mainly left out of the picture. The new generation of BPM systems - the HIMSs - should encompass a new understanding from the current work that is being done, to support human-driven processes (Harrison-Broninski, 2005a). The HIMS has proven its worth and has gone commercial. In his article "Playing in the orchestra on the Titanic (2010)", Harrison-Broninski outlines once more the importance of HIM by explaining the application of a new HIMS called HumanEdj, that supports structured e-mail traffic and visualizing e-mails in conversations, thereby showing project dependencies, teams, and progress.

2.2 Computer supported cooperative work

Computer supported cooperative work is collaboration through the use of computer systems over a network environment (Borghoff & Schlichter, 2000). The human being is not considered as an individual entity, but as being embedded into society, where he or she works and interacts. The term 'supported' refers to both very simple, uncoordinated access to shared data and to complex, synchronized modelling and provision of group-internal relationships and interactions, like group processes (Borghoff & Schlichter, 2000). CSCW applications can be broadly classified in message systems, group editors, electronic meeting rooms, conferencing systems, shared information spaces, intelligent agents and coordination systems (Borghoff & Schlichter, 2000). Other classifications are also present, for example the classification according to same place (of technology and people) and same time (of working).

HIM and CSCW share some common characteristics, regarding the support of collaborating human workers, possibly across organizational boundaries, through the use of information and communication technology. An important difference is that HIM focuses purely on human-centric work processes, where CSCW also supports the less human-driven processes and human-to-system processes. In this research we investigate the area of CSCW because we find it useful for extracting lessons that can be used in the upcoming area of HIM.

3 FRAMEWORK CONSTRUCTION

In this section a framework is described that we have constructed to depict the lessons we have identified from literature form the area of CSCW. It is depicted in Table 1: CSCW lessons framework.

. The lessons learned are written as critical success factors (CSFs). To categorize the framework, we have utilized the broadly accepted classification of CSCW systems, which categorizes cooperative systems in two dimensions: same/different place and same/different time (Johansen, 1988). This classification has been made concrete by Grudin (1994) and Rodden (1991). Rodden's classification can be seen in Figure 1: CSCW classification (Rodden, 1991).

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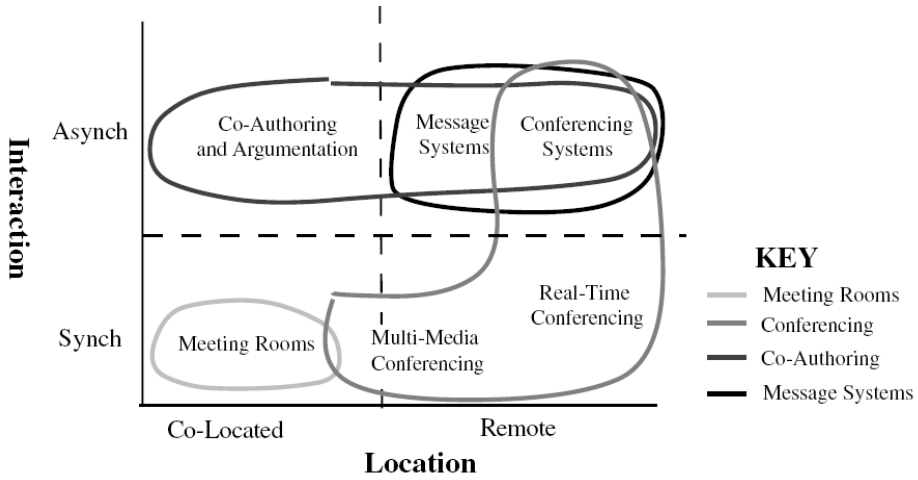

Figure 1: CSCW classification (Rodden, 1991).

In Table 1: CSCW lessons framework.

can be seen that another CSCW area has been added: coordination systems. This area has become more and more important in the last decade, which is acknowledged by Borghoff and Schlichter (2000). For each CSCW area in Table 1: CSCW lessons framework.

we have identified some types of systems with their CSFs and their risks. These have been derived from scientific sources, e.g. case study's or surveys. The amount of CSFs and risks are non-exhaustive to avoid duplicate information in the framework. As can be seen in Figure 1: CSCW classification (Rodden, 1991).

, the categories from the framework are non-exclusive: some systems can be categorized in more than one category. For clarity, the systems depicted in the framework in Table 1: CSCW lessons framework.

have each been categorized in only one category.

CSCW area	**System**	**CSF´s**	**Risks**	**Source**
Meeting	Collaborative	• Technology should make meetings	• Expensive equipment	Borghoff &

Rooms	decision making system	more productive: less time, airtime fragmentation, lack of memory, attention, conformance, information overload, domination, passivity.	may not be sufficiently exploited • Handling requires special training	Schlichter (2000)
Conferen-cing	Videoconferen-cing system	• Technology • Human resource policies • Training and Development • Standard Processes • Organizational Culture • Leadership • Leader and member competences	• Inability to work with technology • Alignment of technology • Technology not being available • Not having a proper aligned social network	Duarte & Snyder (1999) Sanderson (1992)
Co-Authoring	Wiki as organisational memory	• Content check • Critical User Mass • Reliable People • Early stakeholder involvement • Frequent use	• Unreliable data • Infrequent use leading to poor and outdated data • Only a handful using the Wiki	Wu, Yang & Boehm (2008) White et al. (2008)
	Computer Aided Design (CAD)	• Providing a checklist for CAD/CAM integration • Providing CAD guidelines • Identifying information needs • Providing the right information when needed • Evaluating the performance of the design • Furnishing a foundation for communication • Strengthening organization goals	• Coordination problems • Bad (or lack off) social interaction • Compatibility issues • Permeability issues	Soliman, Clegg & Tantoush (2001) Neuwirth, Kaufer, Chandhok, Morris (1990)
Message Systems	Instant messaging	• Change agents and championing (telephone just as easy) • Critical mass	• "Water cooler" conversations • Misunderstandings due to non face-to-face communication • Security	Herbsleb et al. (2002) Nardi, Withaker & Bradner (2000)
	e-Mail	• One standard • Ease of access • Easy web access • Easy interface	• Misunderstandings due to non face-to-face communication • Overload • Spam • Security	Volrey & Lord (2000) Duchenaut & Belotti (2001)
Coordina-tion systems	Workflow management system	• Efficient information flow to improve activity coordination • Detailed modelling and specification of concerned business processes • Scalability: possibility to grow along with the company • Organization process maturity • Management commitment, communication and participation by end users	• No honest and efficient usage due to fear for monitoring from management • Lack of exception handling • Fear for non-flexible business processes • Effort of introducing the system into the company	Borghoff & Schlichter (2000) Mutschler, Reichert & Bumiller (2008)
	Shared agenda	• Stimulation/rewarding of end-users by management • Clear conflict indication and notification	• No complete usage due to increase in workload	Borghoff & Schlichter (2000)

Table 1: CSCW lessons framework.

4 FRAMEWORK OPERATIONALIZATION

In this section we list the characteristics of HIM to decide which categories of the CSCW lessons framework are actually applicable on the area of HIM. The framework can then be adjusted accordingly.

4.1 Characteristics of HIM

Below the important characteristics of HIM are listed. They are extracted from a paper written by the founder of HIM: Harrison-Broninski (2008).

- Focus on human-driven processes; humans collaborating and innovating:
  - High-level work such as organizational control and change;
  - Knowledge work such as R&D, sales support, team management, and customer service;
  - Sectors in which human activity is critical, such as healthcare, law, policing, and disaster relief.
- A formalized approach that:
  - Helps human workers to achieve goals;
  - Structures the creation, maintenance, and re-use of knowledge;
  - Ensures the ongoing alignment of human activity with changing organizational strategy.
- Focus on the facilitation of management of teams, communication, knowledge, time, and plans.
- Aiming to provide software support for processes involving human collaboration, even those that cross organizational boundaries, via a new kind of software system, a HIMS.

4.2 CSCW lessons for HIM framework

Based on the listed characteristics of HIM, the CSCW lessons framework from Table 1: CSCW lessons framework.

has been adjusted to only include the CSCW areas that have common characteristics with HIM. The resulting 'CSCW lessons for HIM framework' is depicted in Table 2: CSCW lessons for HIM framework.

. The CSCW categories of Meeting Rooms and Conferencing are discarded. Also, the shared agenda system from the Coordination systems category has been discarded. These CSCW applications aim at small processes like video conferencing and sharing agendas. We think that these applications are too simplistic in terms of software support for the human-involvement, and therefore are not useful to extract lessons from for application in the area of HIM.

CSCW area	System	CSF´s	Risks	Source
Co-Authoring	Wiki as organisational memory	• Content check • Critical User Mass • Reliable People • Early stakeholder involvement • Frequent use	• Unreliable data • Infrequent use leading to poor and outdated data • Only a handful using the Wiki	Wu, Yang & Boehm (2008) White et al. (2008)
	Computer Aided Design (CAD)	• Providing a checklist for CAD/CAM integration • Providing CAD guidelines • Identifying information needs • Providing the right information when needed • Evaluating the performance of the design • Furnishing a foundation for communication • Strengthening organization goals	• Coordination problems • Bad (or lack off) social interaction • Compatibility issues • Permeability issues	Soliman, Clegg & Tantoush (2001) Neuwirth, Kaufer, Chandhok, Morris (1990)
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	e-Mail	• One standard • Ease of access • Easy web access • Easy interface	• Misunderstandings due to non face-to-face communication • Overload • Spam • Security	Volrey & Lord (2000) Duchenaut & Belotti (2001)
Coordina-tion systems	Workflow management system	• Efficient information flow to improve activity coordination • Detailed modelling and specification of concerned business processes • Scalability: possibility to grow along with the company • Organization process maturity • Management commitment, communication and participation by end users	• No honest and efficient usage due to fear for monitoring from management • Lack of exception handling • Fear for non-flexible business processes • Effort of introducing the system into the company	Borghoff & Schlichter (2000) Mutschler, Reichert & Bumiller (2008)

Table 2: CSCW lessons for HIM framework.

5 FRAMEWORK APPLICATION

We apply the framework on a purchasing process to illustrate its use: which CSCW principles can be utilized to stimulate the HIM application in the process. We use the classification of RosettaNet (2007) to get an overview of the purchasing processes 'request purchase order' and 'request purchase order change'. These processes are human centric, which means that the HIM principles can be applied to them. The processes are visualized in Figure 2 and Figure 3.

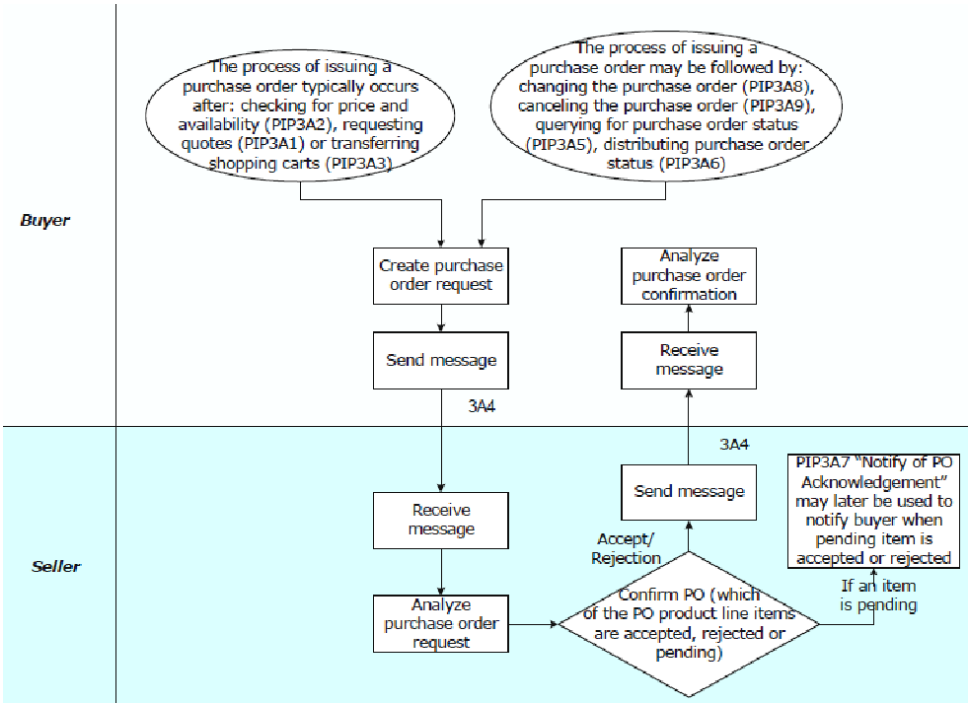

Figure 2: Request purchase order (RosettaNet, 2007).

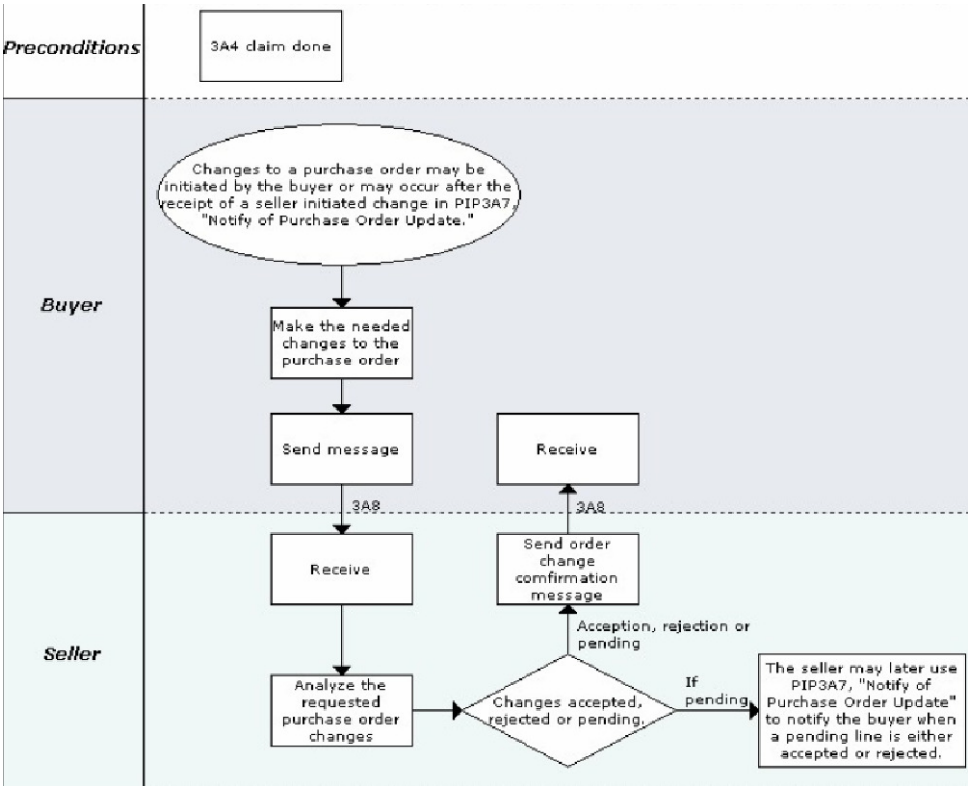

Figure 3: Request purchase order change (RosettaNet, 2007).

The purpose of the first process is to support a process between trading partners that involves issuing a purchase order and acknowledging that purchase order. This also supports the capability to cancel or change the purchase order based on the acknowledgement response and to acknowledge, at the line level, if the order is accepted, rejected or pending (RosettaNet, 2007). The purpose of the second process is to enable a buyer to change purchase order line items and obtain a quick response from the provider that acknowledges, at the line level, if the changes are accepted, rejected or pending. Changes to a purchase order may be initiated by the buyer or may occur after the receipt of a seller-initiated change (RosettaNet, 2007). These processes require a lot of communication: sending and receiving of messages. Aside from this, they require decision making and action taking at both the buyer and supplier side. The communication and decision making can be supported by CSCW/HIM systems to make it more agile and easy.

Several systems can be utilized to support the steps of these purchasing processes. We refer to the CSCW lessons for HIM framework in Table 2: CSCW lessons for HIM framework.

. On the buyer side, a workflow management system can be used to collaboratively work on defining specifications for preparing a list of approved suppliers, drawing up requests for quotations or selecting a supplier together with the internal customer. A supporting system can be a Wiki that serves as organisational memory for supplier experiences and approach strategies. The identified CSFs and risks should be taken in account while implementing such systems. On the supplier side, a workflow management system can be used to support the action taking, decision making and other processes that are related to the delivery, or potentially even creation of products or services for their buyers. However, the line separating the buyers and suppliers must not be ignored. CSCW systems can be applied, such as e-mail systems to allow for an agile and quick way of communicating with the correct people. The previous statements have been combined in a graphic display that is depicted in **Error! Reference source not found.**. We do not claim that this picture always has to be the case for an

organization, since situational factors should be taken in account, e.g. firm size, corporate culture and process maturity.

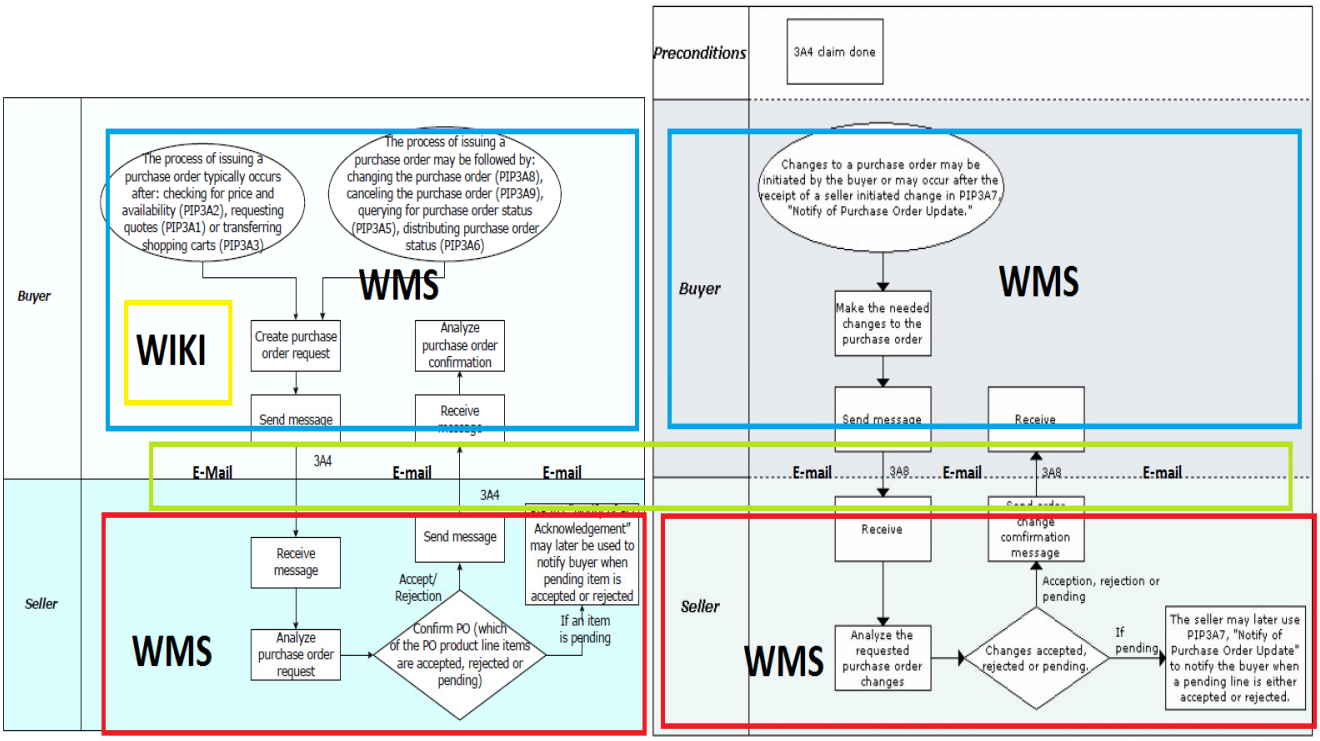

Figure 4: Application of CSCW in the business processes.

Most likely some of the CSCW systems above are already in place and in use when executing a purchasing process in a small or medium-sized enterprise. The most obvious in this case is the e-mail system. However, the HIM principles are often not applied (Harrison-Broninski, 2005a), since the CSCW systems also focus on the less human-driven processes and human-to-system processes. Applying HIM principles on the purchasing process can lead to the integration of existing coordination and organizational memory systems, or implementing a new HIMS. The changing role of the purchasing department means more human involvement in the first stages of the purchasing process (Van Weele, 2005). To ensure the ongoing alignment of human activity with this changing organizational strategy, a HIMS can be of great use (Harrison-Broninski, 2008). While implementing such a HIMS, the identified CSFs and risks from the CSCW lessons for HIM framework (Table 2: CSCW lessons for HIM framework.

) can be of help. Our RosettaNet example illustrates that - after identifying the proper CSCW systems for a human-centric process (subpart) - the process is not yet HIM valid. The HIM principles should be applied to get a solid base for an agile human-driven process, by implementing a HIMS or applying the HIM principles on current CSCW systems.

6 CONCLUSION

In this paper the research of the common characteristics of CSCW and HIM has been described. Concerning our research question, we can conclude that a large part of the CSCW lessons can be extracted and applied in the HIM area, since CSCW and HIM have important common characteristics, such as the focus on supporting collaborative work through ICT. The lessons from CSCW that can be extracted and applied in the HIM area are lessons from the use of CSCW systems and routines supporting collaboration on a human-driven level. We have identified these lessons in the CSCW lessons for HIM framework (Table 2: CSCW lessons for HIM framework.

). After applying these lessons, the HIM principles from Harrison-Broninski (2008) should be applied to get a base for an agile human-driven process. A HIMS - or a (CSCW) system where HIM principles are applied on - can be of great help here.

Limitations of this research include the limited scope while searching for CSCW CSFs and risks. The area of CSCW is large and should me more extensively investigated for lessons learned. Another limitation is that the CSCW lessons for HIM framework has not been validated in a business environment. In future research we aim to extend and validate the framework. If the validation is positive, future research could focus on integrating current CSCW systems to form the base for a HIMS. When applying the principles from HIM on the human-driven processes that these integrated systems support, this could lead to a HIMS that is more capable of supporting these processes than the current systems in use.

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