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## **Horizontal Collaborative e-Purchasing for Hospitals: IT for Addressing Collaborative Purchasing Impediments**

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### **ABSTRACT**

*Horizontal collaborative purchasing (HCP) has often been cited as a way for hospitals to address the challenges of the rising healthcare costs. However, hospitals do not seem to utilize horizontal collaborative purchasing on any large scale, and recent initiatives have had mixed results. Focusing on Dutch hospitals, in this paper we present major impediments for collaborative purchasing, resulting in a first component of our proposed electronic horizontal collaborative purchasing model for hospitals; as a second component it contains a collaborative purchasing typology. A first validation round with hospital purchasing professionals, described separately in Kusters and Versendaal (2011), confirmed four applicable purchasing types and fourteen salient collaborative purchasing impediments. The model is operationalized by including possible information technology (IT) solutions that address the specific fourteen impediments. This model is validated through methodological triangulation of four different validation techniques. We conclude that IT has the potential to support, or overcome, the impediments of HCP. The validation also reveals the need to distinguish between more process-related, as opposed to social-related, obstacles; the immediate potential for IT solutions is greater for the process-related impediments. Ultimately, we conclude that the collaborative e-purchasing model (e-HCP) and implementation roadmap can be used by healthcare consortia, branche organizations, partnering healthcare institutes and multi-site healthcare institutes as a means to help identifying strategies to initiate, manage and evaluate collaborative purchasing practices.*

### **INTRODUCTION**

Dutch hospitals are currently confronted with rising healthcare costs, an aging population, and increased pressure to cut expenses. These looming challenges are a popular topic of discussion, which is reflected in the considerable media and academic attention given to the phenomenon of mounting healthcare expenditures and the associated ongoing professionalization of the procurement function (Llewellyn, Eden & Lay, 1999; Puschmann & Alt, 2005). To illustrate, healthcare costs per capita in the Netherlands, have already increased 21.7 percent just over the last four years; the Dutch Ministry of Health, Welfare and Sport (VWS) has calculated that the costs will continue to grow in the years leading up to the aging peak of the 'baby boomer' generation in 2040 (VWS, 2008). Anticipated cost increases combined with the knowledge that a hospital's strategy should be based on maximizing the quality of care against cost efficiency (Porter & Olmsted, 2006) puts more and more pressure on the procurement function of a

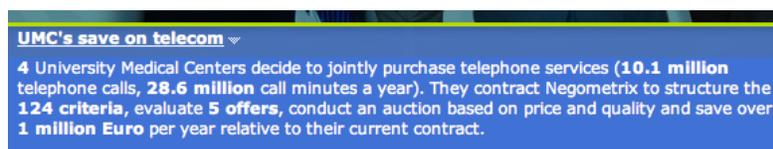
hospital. Horizontal collaborative purchasing, with its many purported benefits, has often been cited as a way for hospitals to address these challenges. However, Dutch hospitals seem not to utilize horizontal collaborative purchasing on any large scale, and recent initiatives have had mixed results.

Within the scientific literature procurement has received increasing attention in the last decades. Various authors (Beall, Carter, Carter, Germer, Hendrick, Jap & Kaufmann, 2003; Ellram and Carr, 1994; Morlacchi & Harland, 2000; Chadwick & Rajagopal, (1995); Spekman, Kamauff, & Salmund, 1994) have contributed to the field of electronic procurement and auctions, with a special emphasis on benefits and structure. A relatively new area of study examines the potential for group buying (collaborative purchasing) to contribute to the purchasing function. Collaborative purchasing refers to the act of multiple firms cooperatively procuring products and services from a supplier, often as a consortium.

Cooperation in itself within the procurement domain is not a new phenomenon; on the contrary researchers were already investigating collaborative purchasing decades ago. However, until recently the focus was mainly on the field of vertical relationships between buyer and supplier (Patterson, Forker, & Hanna, 1999) and on price reductions and improvement of the activities executed within the purchasing department (Ribbers, 1980). Beginning in the 1980's the research agenda has shifted to a more strategic, long-term view with a focus on the purchasing function as a cross-functional chain of purchasing activities (Hahn, & Kaufmann, 1999). Since then many researchers have studied the increased strategic importance of the purchasing function and the corresponding shift from the department purchasing view towards a more integrated and strategic function view (Rozemeijer, 2000).

While vertical buyer-seller cooperation has long been researched, horizontal buyer-buyer cooperation is a more recent development (Ellram, 1991; Essig, 2000; Nollet, & Beaulieu, 2005). This mirrors a shift in practice, with collaborative purchasing increasingly being examined and adopted. At the beginning of the twenty first century, several large automotive and aerospace companies initiated collaborative purchasing platforms like Covisint ([www.covisint.com](http://www.covisint.com)) and Exostar ([www.exostar.com](http://www.exostar.com)), and these platforms continue to extend their services. Here in the Netherlands, one notable case of a successful collaborative purchasing initiative involved four Dutch University Medical Centers (UMC's) that made the decision to buy all their telecommunication costs collaboratively (10,1 million phone calls, 28,6 million minutes per year). They hired the consultancy firm Negometrix to advise their purchasing departments on how to select, structure and execute the project, relying on their expertise in reverse auctioning and procurement solutions. The end result was an overall savings of €1 million euro per year based on existing agreements. See the snapshot retrieved from the Negometrix website on February 15<sup>th</sup>, 2011, in Figure 1.

**Figure 1: Example of savings through collaborative purchasing.**



While cases such as these and the literature demonstrate how collaborative purchasing can provide major advantages such as economies of scale, stronger negotiation position, lower transaction costs, lower supplier risks, and more overall efficiency, in our opinion collaborative purchasing has not been leveraged to its full potential in the healthcare sector in general, and by hospitals in particular. Returning back to the Dutch situation, only a fraction of all hospital purchases are made as part of collaboration (NVZ, 2005; RVZ, 2008). The Netherlands has 89 hospitals, some of them with multiple offices, but only a few are really active in collaborative purchasing initiatives (NVZ, 2005). It is for this reason that our research focuses on the healthcare sector.

Additionally, from an information technology (IT) perspective, the latest developments and principles such as ‘software as a service’ (SaaS) and Web 2.0 (O’Reilly, 2007) provide new opportunities for cooperation between business partners and the associated communication (e.g. Emaus, Versendaal, Kloos, & Helms, 2010). Together, these developments and observations lead us to our research question, namely: *What are the main impediments to collaborative purchasing among Dutch hospitals and how can IT help in addressing them?*

While there has been some research conducted on impediments within the procurement domain (Schotanus & Telgen, 2007), it was not tailored to the healthcare sector and did not include an IT perspective. Similarly, Ball and Pye (2000) and Pye, and Ball, (1999) performed research to identify success and adoption factors of collaborative purchasing but without the IT component. Also, their research examined the public sector as a whole. Meanwhile, researchers have recognized the potential for academic work connecting the fields of collaborative purchasing and IT (Tella & Virolainen, 2005) and Huber, Sweeney and Smyth (2004) both called for further on the use of IT applications and principles to enable and support collaborative purchasing. Essig (2000) also recognized the dearth of research looking at success factors of purchasing collaborations with the aim to develop practical sourcing tools to support them.

In section 2 we will identify two dimensions contained in the conceptual model that we develop to address our research question; 1) the collaborative purchasing impediments and 2) the collaborative purchasing types. In section 3 the results of an explanatory survey conducted in the Dutch healthcare sector of both public and academic hospitals are presented as well as the framing of the final model. In section 4 we operationalize the model by filling out the cells of the conceptual model with IT principles and applications that are identified by another group of experts for addressing the impediments. An extended version of our current section 2 to 4 has already been presented at the Bled eConference (Kusters & Versendaal, 2011). In section 5 we validate the operationalized model using methodological triangulation of four different techniques during in-depth interviews with another set of validation experts. Based on insights gained in the interviews, a roadmap for implementing the IT solutions is presented in section 6. Finally, in section 7 final conclusions are drawn and a few recommendations for future research made.

## LITERATURE STUDY

In a first observation of literature, we found that potential impediments of collaborative purchasing are often situational; they depend on various specific characteristics of the consortium performing the actual buying. Schotanus and Telgen (2007) defined particular collaborative purchasing situations into purchasing types. They explicitly combined and

validated identified variables (a- costs and gains for the consortium members, b- influence by all members on the activities of the consortium, c- number of different activities in the consortium, d- organizational structure of the consortium, e- member characteristics, f- size of the consortium, g- lifespan of the consortium) into a typology for purchasing types. They subsequently defined the following purchasing types, with associated characteristics:

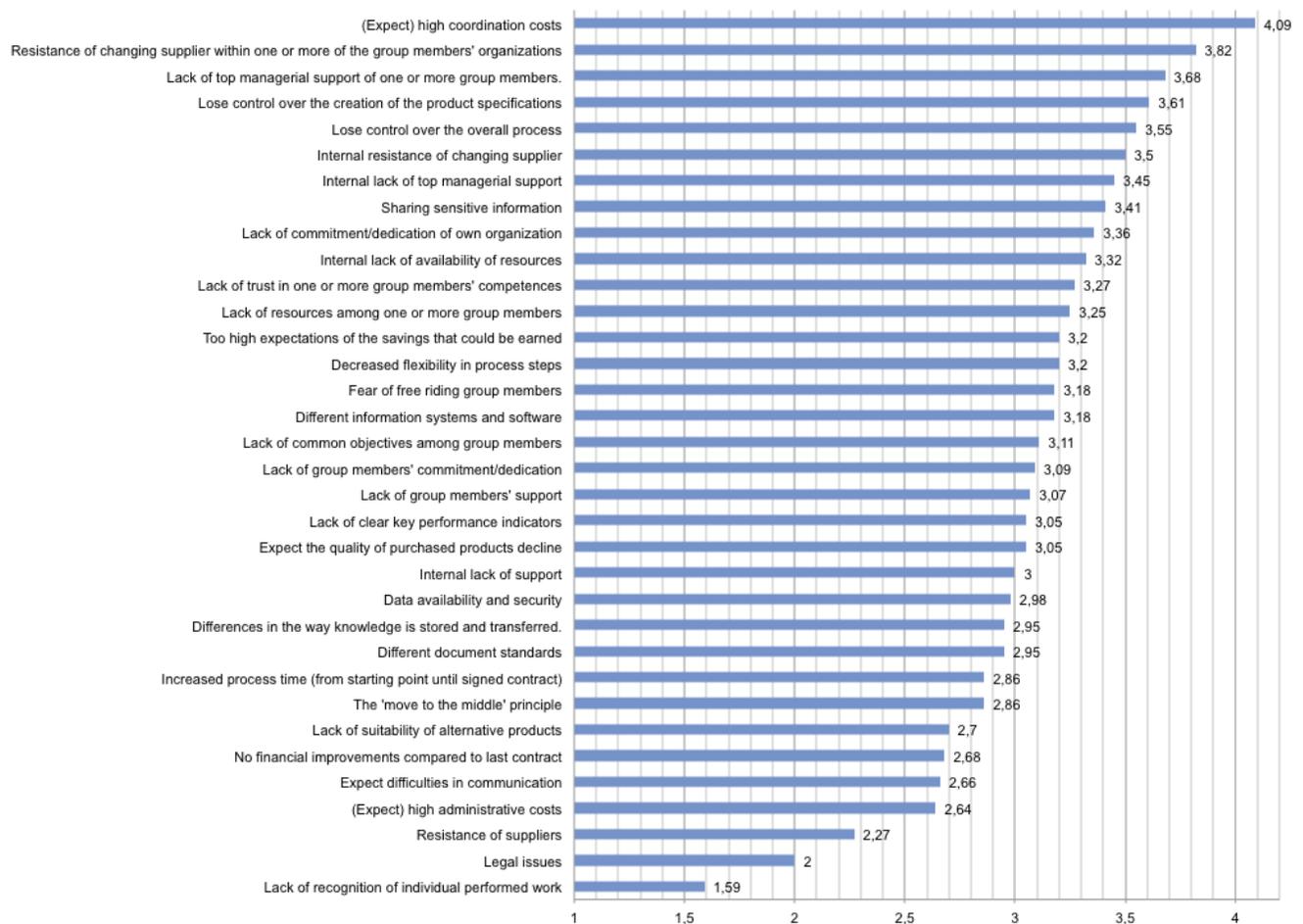
1. Piggy-backing: focus on simplicity
2. Third party: focus on scale; third party with specific resources; fair allocation of gains and costs; there is a membership fee
3. Project: one-time event; focus on learning and reducing transaction costs
4. Program: focus on learning, transaction costs and standardization
5. Lead buying: activities for a project are carried out by one party; skill specialization in the consortium; members depend on each other's skills and efforts

As for the individual purchasing impediments of collaborative purchasing we conducted an extensive literature study. We conducted a literature search for relevant papers using keywords (among others: collaboration, consortium buying, collaborative purchasing). A first selection based on abstract reading produced 98 papers, including dissertations. Various scholars were found to have investigated impediments from different perspectives on collaborative purchasing, such as the life span of the group (D'Aunno, & Zuckerman, 1987; Johnson, 2008), extent of the costs and size of the group (Nollet, & Beaulieu, 2005). We then read through each of these 98 papers and systematically recorded all impediments to collaborative purchasing mentioned, noting the frequency with which impediments were found in the literature, and merging similar concepts together into one impediment. This yielded 34 impediments that were mentioned in anywhere from 14 to 36 papers, and ranged in their perspectives from financial related to social related. For example, "expect high coordination costs" was identified in 29 papers, including Schotanus and Telgen (2007), Huber, Sweeney and Smyth (2004), Nollet and Beaulieu (2005), Essig (2000), Bakker, Walker, Schotanus, & Harland, (2008), and Puschmann and Alt (2005). For a full list of the 34 impediments see Figure 2; note that this figure also contains 44 experts identified ranking of importance, which is further explained later.

## **RESULTS AND FRAMING OF THE MODEL**

To validate our initial literature findings on the impediments we conducted a survey between February and mid-March 2010. The set-up of this has been described in detail in (Kusters & Versendaal, 2011). Here, we only provide the findings in order to illustrate the foundation for the further operationalization.

A main outcome of the survey was that there was much variation in the purchasing types used when purchasing collaboratively. The full breakdown can be seen in table 1. We noted that the results show differences between the University Medical Centers (UMCs) and general hospitals; yet these will not be elaborated in this paper. For now we decide to leave out program groups as a purchasing type, as no hospital could confirm a single practice of this type.

**Figure 2: The 34 impediments (with average result of each impediment) (N = 44).****Table 1: Absolute numbers of performed collaborative purchasing procedures per type in 2009 (N = 44).**

	General Hospitals	Relative percentage	UM C	Relative percentage	Total	Percentage
Piggy-backing groups	291	38,70%	192	44,44%	483	40,79%
Third party groups	225	29,92%	60	13,89%	285	24,07%
Lead buying groups	224	29,79%	159	36,81%	383	32,35%
Project groups	12	1,60%	21	4,86%	33	2,79%
Program groups	0	0,00%	0	0,00%	0	0,00%
Total	752	100,00%	432	100,00%	1184	100,00%

Based on the validation we were also able to narrow the 34 impediments down to fourteen. The details of the narrowing process are presented by Kusters and Versendaal (2011). The vertical axis of Figure 3 shows the fourteen impediments; the horizontal axis shows the typology, suggesting situational per impediment. As such figure 3 illustrates the frame of our hospital collaborative e-purchasing (e-HCP) model.

**Figure 3: The frame of the resulting conceptual hospital collaborative purchasing model (e-HCP-model).**

Conceptual model		Collaborative purchasing group structures			
		Piggy backing	Third party	Lead buying	Project group
Collaborative purchasing impediments	(Expect) high coordination costs				
	Resistance of changing supplier within one or more of the group members' organizations				
	Lack of top managerial support of one or more group members.				
	Lose control over the creation of the product specifications				
	Lose control over the overall process				
	Internal resistance of changing supplier				
	Internal lack of top managerial support				
	Trust related obstacles - Sharing sensitive information				
	Lack of commitment/dedication of own organization				
	Internal lack of availability of resources				
	Lack of trust in one or more group members' competences				
	Lack of resources among one or more group members				
	Decreased flexibility in process steps (e.g. planning/deadlines)				
	Different information systems and software				

**Operationalization of the model**

To operationalize our model we determined IT systems, principles and features that could overcome or address the specific impediments listed in the outlined conceptual model. The data used to operationalize (i.e. fill the cells) was attained through semi-structured explorative interviews with five experts (two heads of purchasing of two major Dutch universities, one head of purchasing of an e-procurement consultancy firm, one head of purchasing of a large Dutch hospital, and the program manager of a major health care research institute) in the field of purchasing with profound knowledge on (developments in) IT.

We used an open-ended format for our expert interviews as it ensured that respondents were not forced to provide their views and experiences through pre-established response categories but could rather provide their input in their own words and terminology, which we found appropriate for our purposes (Myers, 1997). We analyzed the interview findings with an open coding data technique, which entailed labeling the interview results to the corresponding IT principles and applications (Kaplan, & Maxwell, 2005).

In the interviews respondents were asked, where possible and applicable, to assign potential IT items to purchasing impediment/types combinations of collaborative purchasing. IT solutions were discussed in detail and identified for all fourteen impediments. In the flow of this paper, and for spatial reasons, we only highlight the results of the four impediments related to costs, control and flexibility. The full list of impediments can be downloaded separately.

The first impediment concerned coordination costs. All the experts identified that IT can help to lower the actual coordination costs by optimizing the collaborative process and communication streams. Physical meetings can be replaced with virtual videoconferencing and wiki's, which can reduce the need for physical meetings, thereby reducing costs. The experts mentioned web based platforms that can be used off-the-shelf, 24/7 data availability and automatic status updates that will save the members time. Additionally, coupling techniques like web services, EDI/XML and translation middleware can tie the e-procurement system to other e-business applications saving time, people, and correspondingly money.

Moreover, the experts mentioned that the concerns about losing control of the process could be addressed with IT programs that show real time progress. Furthermore, if the e-procurement system is able to embed some user management structure, it will contribute to the (perceived) level of control, since one can allocate user rights (e.g. read only, write) based on the specific group type one uses. As a demonstration of such a software program, one expert noted that "If the partners are all equally involved in the creation of important documents, groupware, real time monitoring and version control principles like they can be found in Google Docs or some collaborative package can help structure and guide the process, ultimately helping in gaining a greater degree of overall control". At any time, any of the group members can get the status quo. If all partners are not equally involved (third party or lead buying group structure) it is essential to make the progress visible. Transparency can help the ones that are not the (lead) buyer to still feel involved and somewhat in control. Additionally, it is useful to incorporate business intelligence, decision support systems and monitoring systems to track key performance indicators in order to gain a higher perceived feeling of authority.

In response to the question of what IT can do for the 'flexibility in process steps' - impediment, one expert respondent indicated MS Project like applications. "Those applications can merge all planning of the group members together and can automate and recalculate the planning in cases where some milestones are not met on time". With such tools you make the consequences and the corresponding effect on the milestones of other members visible. Two respondents pointed out during the interview that a tool that shows the critical path based on the deadlines and current status of the project would really help the group in managing the planning.

Below, in Table 2, you can find the overview of the operationalization of a number of rows of the electronic Horizontal Collaborative Purchasing (e-HCP) model, that focus on impediments dealing with costs, control and flexibility.

**Table 2: Costs, control and flexibility operationalized impediments of the e-HCP model.**

Impediments	Collaborative purchasing types			
	Piggy backing	Third party	Lead buyer	Project group
<b>Coordination costs</b>	<ul style="list-style-type: none"> <li>•Web based</li> <li>•Digital files</li> <li>•Knowledge repository</li> </ul>	<ul style="list-style-type: none"> <li>•Social Referrals</li> <li>•Videoconference, wiki's, social media</li> </ul>	<ul style="list-style-type: none"> <li>•Social Referrals</li> <li>•Web based</li> <li>•Videoconference, wiki's, social media</li> </ul>	<ul style="list-style-type: none"> <li>•Social Referrals</li> <li>•Videoconference, wiki's, social media</li> </ul>
<b>Lose control over creation of product specifications</b>	<ul style="list-style-type: none"> <li>•Digital files with version control</li> <li>•Knowledge repository</li> <li>•Track &amp; trace</li> <li>•Wiki's</li> </ul>	<ul style="list-style-type: none"> <li>•Real time monitoring of planning</li> <li>•Groupware</li> </ul>	<ul style="list-style-type: none"> <li>•Process anchor and efficiency</li> <li>•Real time monitoring - traceability</li> <li>•User management structure</li> <li>•Groupware</li> <li>•Version control</li> <li>•Google Docs</li> <li>•Software as a Service</li> <li>•Knowledge gathering tool</li> <li>•Web portal 24/7 data availability</li> </ul>	<ul style="list-style-type: none"> <li>•Decision support tools</li> <li>•Process anchor and efficiency</li> <li>•Real time monitoring - traceability</li> <li>•User management structure</li> <li>•Groupware</li> <li>•Version control</li> <li>•Google Docs</li> <li>•Software as a Service</li> <li>•Knowledge gathering tool</li> <li>•Web portal 24/7 data availability</li> <li>•Decision support tools</li> </ul>

Impediments	Collaborative purchasing types			
	Piggy backing	Third party	Lead buyer	Project group
<b>Lose control over the overall process</b>	<ul style="list-style-type: none"> <li>•Digital files</li> <li>•Knowledge repository</li> <li>•Track &amp; trace</li> </ul>	<ul style="list-style-type: none"> <li>•Real time monitoring of planning</li> <li>•Groupware</li> <li>•Forum</li> </ul>	<ul style="list-style-type: none"> <li>•Process anchoring</li> <li>•Web services</li> <li>•Real time monitoring - traceability</li> <li>•User management structure</li> <li>•Groupware</li> <li>•Google Docs</li> <li>•Social planning networks</li> <li>•Web portal</li> <li>•Countdown of tasks</li> <li>•EDI</li> <li>•Interoperability with other business processes.</li> <li>•Decision support tools</li> <li>•KPI monitoring</li> </ul>	<ul style="list-style-type: none"> <li>•Process anchoring</li> <li>•Web services</li> <li>•Real time monitoring - traceability</li> <li>•User management structure</li> <li>•Groupware</li> <li>•Google Docs</li> <li>•Social planning networks</li> <li>•Web portal</li> <li>•Countdown of tasks</li> <li>•EDI</li> <li>•Interoperability with other business processes.</li> </ul>
<b>Decreased flexibility in process steps</b>	<ul style="list-style-type: none"> <li>•The experts deemed cell as not applicable.</li> </ul>	<ul style="list-style-type: none"> <li>•The experts deemed cell as not applicable.</li> </ul>	<ul style="list-style-type: none"> <li>•MS Project</li> <li>•Critical path</li> <li>•Monitoring and guarding</li> <li>•Social planning networks</li> <li>•Meta search engines- to increase pool of alternative</li> </ul>	<ul style="list-style-type: none"> <li>•MS Project</li> <li>•Critical path</li> <li>•Monitoring and guarding</li> <li>•Social planning networks</li> <li>•Meta search engines- to increase pool of alternative</li> </ul>

## VALIDATION

Thus far this research has resulted in (1) the identification of impediments and group forms from literature, (2) the validation and situationalization of those impediments and group forms to the Dutch healthcare sector by experienced hospital buyers, (3) the creation of a conceptual model incorporating the validated and situationalized impediments and group forms, and (4) the operationalization of this conceptual model with IT solutions by experts. The final stage of this research involved the validation of the identified IT solutions in the model. This was accomplished through validation interview sessions involving experienced hospital buyers. The validation experts' participation was solicited through contacts gained from the Nederlandse Vereniging voor Ziekenhuizen (Dutch Association for Hospitals, NVZ) public database as well as through the business network of Negometrix. Fifteen (not previously involved) experts were

contacted to participate in the validation phase. In total, six were willing to participate and selected for an audio-recorded face-to-face semi-structured interview of one to two and a half hours. To better ensure validity, a total of four different validation methods were used to methodologically triangulate the outcomes. Methodological triangulation is useful because it can help eliminate the weaknesses associated with relying on one validation method (Jack, & Raturi, 2006) and can ensure the overall completeness and correctness of the validation process (Yin, 2003). The four methods chosen were: (1) General and situationalized questions regarding the operationalized model, (2) pluralistic walkthrough scenarios, (3) the cross matching of the impediments, and (4) the usefulness rating of different solutions.

### ***Validation procedure***

The first of these validation techniques involved presenting the experts with the operationalized e-HCP impediments model and asking them to examine the model cell by cell, thereby validating the overall e-HCP impediments model and the existence of the impediments and the potential of IT solutions according to group type. All written and verbal comments were recorded and incorporated into the final e-HCP model using open coding techniques.

The second, and most interesting, validation method was that of pluralistic walkthroughs, or so-called participatory design review. Frequently, the pluralistic walkthrough method is used to evaluate the usability of user interfaces (Nielsen, & Mack, 1994; Bias, 1991), but other scholars have also utilized it to test the applicability and visualization of IT features in a process, such as testing Web 2.0 features within the purchasing process (Emaus et al., 2010). Since we pursue the same goal of determining the potential of IT features and components within a process (i.e. collaborative purchasing process) the pluralistic walkthrough was assumed applicable for our research. By using pluralistic walkthroughs we not only helped to validate our own research, but also substantiated the applicability and usefulness of the technique as a validation method. Another motivation for our use of pluralistic walkthroughs stems from the fact that the technique enables the concretization of abstract principles into real world solutions. This was not only employed to give the experts a better understanding of the solutions, but also to effectively observe the potential and impact of several different concretizations of the same solution.

While it would have been interesting to conduct pluralistic walkthroughs for every IT solution, it was simply impossible in light of time constraints. In the end, two pluralistic walkthrough scenarios were created and presented to the experts. To acknowledge the IT features' potential, or conversely to disprove it, experienced hospital buyers were guided through these scenarios each consisting of several mockup screens where the IT features were embedded and related to the current situation within collaborative purchasing. The mockup screens used were shaped around the existing SaaS e-procurement solution of Negometrix BV. The screens were presented in a logical predetermined order corresponding to the scenario. The mockup screens were printed and shared with each hospital buyer, thereby enabling them to edit/write/comment in their own language. Participants were specifically asked to note any (dis)advantage of the created solutions.

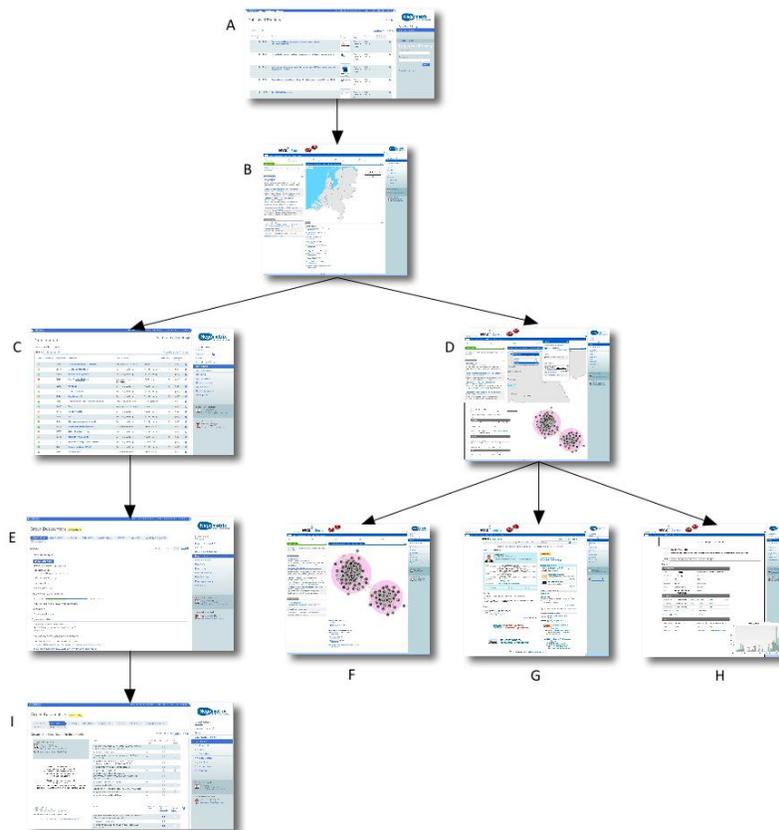
The first scenario aimed to concretize and validate one whole impediment (lack of trust in one or more group members' competencies) and the associated IT solutions for all group types, in other words one complete row in the e-HCP model. This particular impediment was chosen for two

reasons. First, because it was one of the more frequently cited obstacles, and secondly, because the IT solutions mentioned by the operationalization experts, such as new and increasingly popular technologies like social networks, are interesting to include in the mock ups. In this scenario experts acted as a buyer participating in a collaborative purchasing initiative involving new people and organizations. The goal was to determine which proposed solutions were perceived as the most useful for gaining insights into the members' competences, an area for which experts have indicated that IT has the potential to support. A number of different solutions were incorporated within the mockup screens to determine IT's potential; namely: social networks, buyers' and organizations' passports, social ranking, and Personal Performance Indicators (PPI) tracking. Two different representations of social networks and passport profiles were tested, not only to determine the concept's potential, but also which representation was deemed the most useful. Ranking according to an individual's network was also included, and PPI plus statuses were used to provide buyers with a sense of having a control panel. A full screen example of screen I is provided below in figure 4, and figure 5 shows all the screens in the order in which they were presented.

Figure 4: Screen I - Performance indicators.

The screenshot shows the Negometrix web application interface. At the top, there is a navigation bar with 'Home' and a location indicator '(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna'. Below this, the page title is 'Green Datacenters' with a sub-tab 'Voorbereiding'. A secondary navigation bar contains 'Tender opties', 'Deelnemers', 'Planning', 'Prijslijsten', 'Vragenlijsten', 'Offertes', 'Evalueren', and 'Vergelijk & Selecteer'. The main content area is titled 'Organisatie en collega's in deze tender' and features a table of actions and their status. The table has columns for 'Actie', 'Organisatie niveau', 'Toestaan', and 'Niet toestaan'. Two users are listed: 'Hoofcontactpersoon: Robbert Kusters' and 'Pieter Post'. The table shows various actions like 'Publiceer tender', 'Mag planning wijzigen', and 'Mag aanbieders koppelen aan tender' with checkboxes for 'Toestaan' and 'Niet toestaan'. The 'Toestaan' column for the first user shows 'Alles toestaan' and for the second user, 'Alles toestaan' is checked. A sidebar on the right contains the user profile for Robbert Kusters and a menu with items like 'Mijn Tenders', 'Mijn Organisatie', 'Mijn Profiel', 'Mijn Contacten', 'Mijn Documenten', 'Mijn Berichten', 'Mijn Herinneringen', and 'Mijn Agenda'. Below the menu, there is a 'Beheerder organisatie' section for Robbert Kusters and a 'Technische helpdesk' section for the Negometrix service desk.

Figure 5: Flowchart scenario one.



In the second scenario we did not concretize a single impediment and all associated solutions, but rather created a scenario focused on one task within the larger purchasing process, concretizing solutions that were suggested for multiple impediments. We specifically chose the planning and deadline management task because its importance was repeatedly mentioned by the experts. Moreover, the IT solutions associated with this task fulfill the criteria that they can be incorporated into a single scenario and the same concretization could be used to represent the solution for several different obstacles. In this way at least part of a number of different impediments could be validated with a single scenario; namely: the entire row (so for all group types) of the decreased flexibility obstacle in terms of deadline management and planning, parts of the losing control impediment in terms of planning and deadline management, the lack of dedication and commitment impediment in terms of planning and deadline management, and the lack of resources impediment.

In addition to the pluralistic walkthroughs, experts were asked to cross validate the findings. They were individually presented with both the identified IT solutions and impediments to collaborative purchasing as part of the in-depth interviews, all of which were explained. The experts were then asked to match them, and in doing so identify where they saw potential for IT. To provide a greater depth of understanding and to allow for original input, informants were again not be limited to a predetermined set of answer choices, but rather encouraged to discuss ideas and comment freely.

Finally, as a further means of clarification and validation, informants were asked to rate the different solutions according to their usefulness and potential on a scale of one to seven, with an eighth option to opt-out. This “usefulness rating” served as the fourth and final validation method.

### ***Validation results***

First and foremost, it is important to note that all the experts interviewed substantiated that there are indeed impediments to HCP in the healthcare sector, and that information systems, principles and technology have the potential to support, or even overcome, the impediments to HCP. Results also revealed the complexity of the purchasing sector and showed the need to distinguish between more process-related, as opposed to social-related obstacles. In regards to this it was shown that the immediate potential for IT solutions is greater for the process-related impediments. For the more socially and politically related obstacles, IT alone is at present insufficient to overcome them, but it can play a supportive role, and there is great potential in the future for these solutions. Despite the generally positive conclusion for the application of IT solutions, a number of caveats and qualifiers were mentioned:

1. Currently the effectiveness of these IT solutions is highly dependent on the institutional culture and history of the hospitals and purchasing departments within them as well as the type of product.
2. The likelihood of adoption of these IT tools is dependent on the type of service or good being purchased. Highly specialized medical goods are more problematic in terms of rational, transparent buying.
3. Experts identified different types of obstacles, and noted that especially those impediments related to organizational politics, trust, and stakeholder management can only be supported by IT, not solved. Although several experts felt these solutions would significantly reduce the severity of these impediments, they noted that IT could not entirely eliminate them. A human component remains necessary.
4. The political problems are more prevalent in relation to medical goods than facility goods.

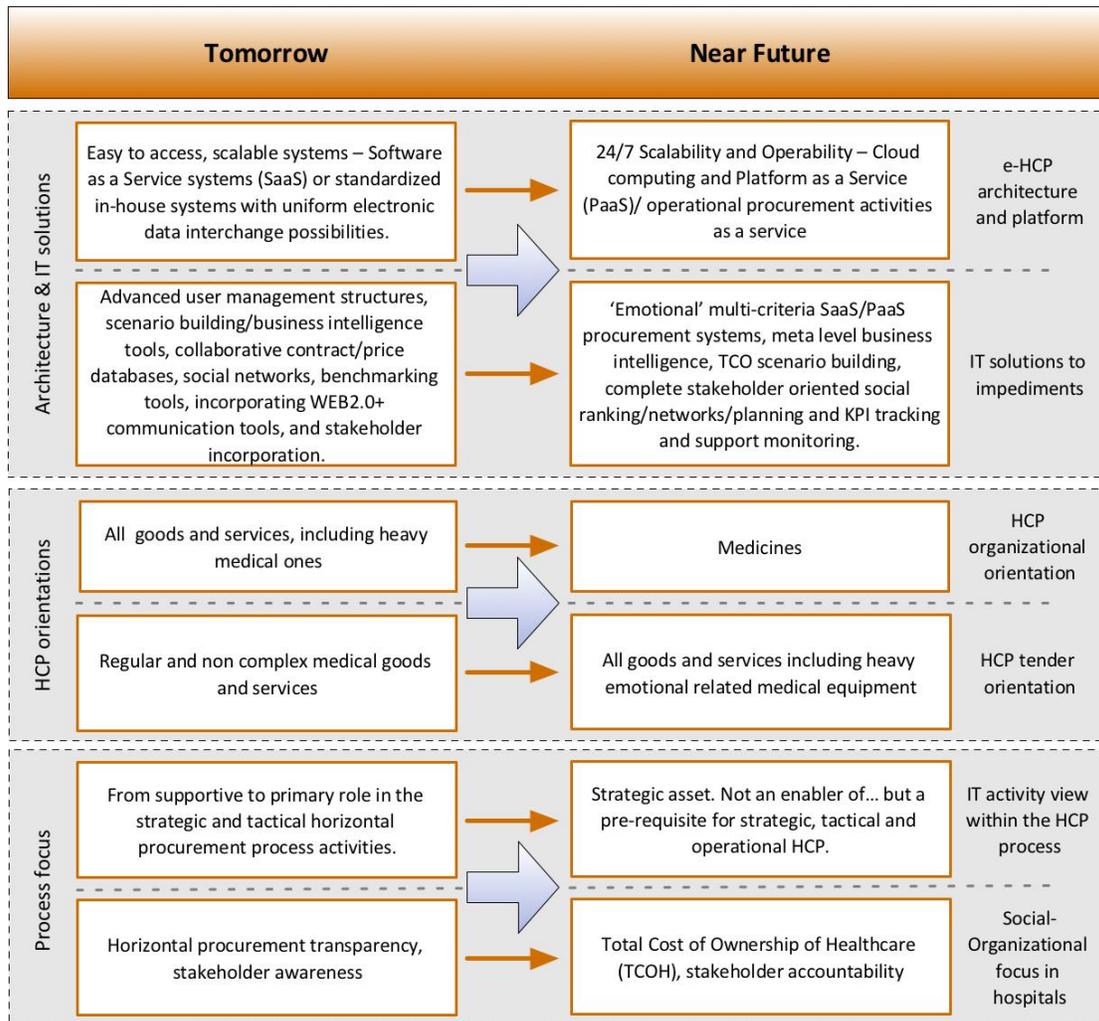
The validation phase also substantiated the relevance of the group structures identified in the model, however one expert was of opinion that the piggy backing group might be too generic of a term and that a differentiation between solely information sharing and actual hitchhiking during a tender might be needed. However, within the research of Schotanus and Telgen (2007), this difference was not made and in order to meet the external validity guideline of generalizability (Yin, 2003), it was decided to keep the definitions of the group types strictly in line with the typology of Schotanus and Telgen (2007).

### ***Validation implication: the e-HCP solution implementation roadmap***

As already noted, during the interviews some of the experts suggested that some solutions currently have great potential, while others are likely to play a greater role in the future. Based

on these suggestions, a roadmap was created from the interview data to depict which steps are mentioned as more immediately feasible, or correct for ‘tomorrow’, and which should be introduced at a later stage. The two phases, ‘tomorrow’ and ‘the near future’ are categorized in: the e-procurement focus of the platform and architecture, the possible solutions, the HCP organizational focus, the HCP tender orientation, and the social-organizational perspective. The model is created from literature, statements made by the operationalization and validation experts and the analysis of the various validation results. The e-HCP implementation roadmap can be found in figure 6. The roadmap consists of only two phases because the experts suggested that at this stage it is merely important to extract what could and should be done immediately and what should be introduced more gradually in the following years.

**Figure 6: The e-HCP implementation roadmap.**



The first category, the e-HCP architecture and platform, defines the necessary primary architectural focus of a horizontal collaborative purchasing system. For ‘tomorrow’ it is necessary that partner hospitals have the opportunity to quickly incorporate their process into that of another member hospital. A SaaS, or standardized in house solution, is preferred as well as an open (thus non proprietary) standard for procurement data exchange. In order to handle a

greater number of, and larger, collaborations, the architectural focus of a HCP system should focus in the near future on architectures like cloud computing that can adapt to demand, are highly scalable and can handle burst traffic without service delays. Moreover, moving to outsourced IT infrastructures makes it possible for hospitals to save room and focus more on their core competences.

The roadmap shows the following IT solutions to be ready for immediate implementation: advanced user management structures, scenario building and business intelligence tools, collaborative contract/price databases, social networks, benchmarking tools, incorporating Web 2.0+ communication tools, and stakeholder incorporation. The need for emotional multi-criteria SaaS/PaaS procurement systems is demonstrated, but organizational preparation for such a system is needed. Moreover, IT specialists should investigate a sufficient way of capturing emotion in such systems and it is for this reason that implementation at this moment would be doomed to fail. Secondly, the roadmap shows that various solutions of 'tomorrow' could be enhanced and improved, such as: business intelligence based on meta information, scenario building based on Total Cost of Ownership (TCO), social ranking/planning and network (not only including buyers but all stakeholders like specialists, board members and suppliers).

The roadmap also separates the necessary organizational focus for current and future tenders. A hospital should currently start performing collaborative horizontal tenders with a focus on regular and non-complex medical goods and services since these are less complex and include fewer stakeholders (i.e. medical specialists). However, since the main goal is to ultimately be able to perform successful tenders focusing on complex medical goods, it is important to prepare all the stakeholders within a hospital and begin to change and improve the frequently tense relationship between buyers and medical specialists. It is for this reason that the roadmap also contains a suggested HCP organizational orientation. Additionally, the roadmap provides the social-organizational focus that is required in order to make the HCP tenders a success. At first the focus of a hospital should primarily lie in increasing the transparency for horizontal initiatives and creating more awareness among all the involved stakeholders. In the near future hospitals can then benefit from the increased transparency and thereby introduce the concept of accountability for all stakeholders within its procurement process (e.g. medical specialist are co-responsible for the quality/price components of the requirements and the final price during medical related tenders).

## CONCLUSION

This paper has explored the current status and main impediments of horizontal buyer-buyer collaborative purchasing initiatives in the Dutch healthcare sector as well as the potential of various IT solutions to overcome them. Based on extensive literature study and the results of a cross-sectional survey, we constructed a conceptual model to explain the lack of collaborative purchasing despite many perceived benefits. One part of the model consisted of the typology of collaborative purchasing types. We confirmed the applicability of this typology to Dutch hospitals, with the exceptional finding that one type, program group, was not used by hospitals and therefore was excluded from our final e-HCP-model.

Also the fourteen most important impediments were presented for inclusion in the model as described in detail by Kusters and Versendaal (2011). Having established the perceived barriers

to collaborating, we then sought to find IT solutions for them by operationalizing our model through expert interviews. The operationalized model was then validated through the methodological triangulation of four different techniques. Of these, pluralistic walkthroughs was found to be particularly useful, not only for validating the IT solutions, but also for concretizing these more abstract concepts.

Generally, the research revealed the complexity of the purchasing sector; more specifically demonstrating the need to distinguish between more process-related, as opposed to social-related obstacles. Findings suggest that the immediate potential for IT solutions is greater for the former. For the more socially and politically related obstacles, IT can probably only play a supportive role at present, but has great potential for the future. This distinction between current and future solutions has been translated into the e-HCP implementation roadmap.

In terms of future studies, it would be interesting to examine collaborative purchasing and our identified impediments from other domains. Moreover, although we found the pluralistic walkthroughs to be invaluable in terms of translating the more abstract IT solutions into concrete mockups, we were only able to create them for a limited number of the impediments. It would therefore be a useful exercise to build mockups for all of the identified IT solutions.

Finally, with the findings in this paper, we are positive that the collaborative e-purchasing (e-HCP) model and implementation roadmap can be used by healthcare consortia, branch organizations, partnering healthcare institutes and multi-site healthcare institutes as a means to identify strategies to initiate, manage and evaluate collaborative purchasing practices.

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