Critical Success Factors for Inter-Organizational Process Collaboration in eHealth

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Abstract – **In most Western countries, there is substantial growth in inter-organizational cooperation in design and delivery of health services based on Internet technology. However, there is a gap in the literature describing these efforts, and future research as well as practice can benefit from more elaborate theoretical models to understand this phenomenon. In order to close this gap, this study reviews the literature on Business Process Management in an inter-organizational context with a special focus on factors that can explain the success of process development in inter-organizational contexts. The review identifies several critical success factors that may be important as a starting point for future research in eHealth.**

Keywords – Inter-Organizational Collaboration. Business Process Management. eHealth. Information Systems Research. eHealth Literature Review.

I. INTRODUCTION

Integrated processes using eHealth technology in inter-organizational collaborations are needed to accommodate future increasing demands and provide better utilization of scarce specialized-care resources and preventive medicine and care. Such collaboration is not without challenges.

For example, in Norway a new legislation has been passed to ensure close collaboration between hospitals and municipalities, with a strong incentive for more inter-municipal and public-private collaboration (the Norwegian Collaboration reform 'Samhandlingsreformen', passed as law no. 30, June 24, 2011).

Such calls for action often entail a need for process collaboration and integration at an inter-organizational level. What factors determine success or failure of such collaborations?

The purpose of this paper is to study whether literature on Collaborative Business Process Management (CBPM) in an inter-organizational context may inform researchers and practitioners on existing gaps in our knowledge of the sociotechnical factors critically impacting inter-organizational CBPM success, with consequences for eHealth process integration.

We looked at Business Process Management (BPM) as a management strategy [11], supported by more or less integrated tools, ranging from Business Process Modelling Notation as an illustration of 'AS-IS' and 'TO-BE' scenarios, to BPM systems with full workflow integration using service-oriented architecture. BPM has evolved as a synthesis of business process reengineering involving an all-or-nothing redesign of business processes, and total quality management [13] with emphasis on continuous improvement, customer orientation, employee involvement, and other benefits [7, 17]. The BPM subfield of CBPM is defined here as coordinated initiatives that involve actors from inside or outside of an organization, as opposed to non-collaborative BPM, where individuals conduct non-coordinated efforts to alter business processes [14].

Despite growing interest in the subject, there is a gap in the literature as to the importance of context for successful CBPM (Niehaves et al. 2012; ref. Appendix; J15), including inter-organizational contexts where BPM is coordinated between two or more corporations as separate legal entities. EHealth can be defined as the application of the Internet and other related technologies to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients, and consumers [9]. This definition is not exhaustive, as eHealth also entails IT-supported measures to promote good health in the general population.

Understanding and succeeding with CBPM in inter-organizational contexts, such as the health sector, represents an increasing relational challenge for many organizations and is thus particularly difficult [15]. Issues may arise due to politics [6], culture [19], or factors related to 'people' [8] and the 'soft side' of organizations [12], which are even more elusive or blurry concepts in an inter-organizational context.

The paper is organized as follows: In the next section, we describe the methods chosen for the literature review in addressing our research questions. Then, we present the results for each research question before we end with a discussion and conclusion regarding the status of the research on CBPM and implications for further research in eHealth.

II. METHOD

First, we looked for existing literature reviews on BPM research; specifically, we looked for overviews of critical success factors for CBPM. We found literature reviews summing up *intra-organizational* factors, collaboration using external consulting resources, culture factors, and general feasibility studies. We did not find any literature

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reviews summing up *inter-organizational* CBPM critical success factors. We addressed this gap by performing our own review of the information system (IS) literature.

This research addressed the following questions:

RQ1: Is successful inter-organizational CBPM perceived differently in eHealth than in current research? Here we want to know how current research has assessed success in terms of the value that is generated from CBPM.

RQ2: Is the success rate of inter-organizational CBPM reported differently in eHealth than in current research?

RQ3: Are the factors that influence successful inter-organizational CBPM in general also identified in the eHealth context?

We adopted the guidelines of a systematic literature review suggested by Webster and Watson [20], von Brocke et al. [18], and Okoli and Schabram [16]. In screening and collecting data from the articles, we adopted the guidelines suggested by Kitchenham et al. [10].

The process of identifying the literature was organized in three steps. The first step involved ten database searches in several databases (Scopus, IEEE, Emerald, ISI Web of knowledge, and others) using the search words 'collaborative business process management', 'BPM', and 'inter-organizational'. We used different truncations of these terms and in different combinations: for example, 'business process', 'management', 'collabo*' OR 'coop*', or 'inter org'. We also did special searches on IS sources with a special focus on BPM, including journals like *Business Process Management Journal* and *Journal of Enterprise Information Management*. We also did a special search for 'BPM' in the proceedings of the Hawaii International Conference on System Sciences (HICSS).

We only included articles in English and that were published after 2004. Our last search was performed on 30 June 2013. This step returned 5.361 titles. However, a screening of the found articles showed that the majority of the articles were irrelevant to our research questions. We excluded articles that did not describe inter-organizational process collaboration or success perspectives or factors, e.g., articles focusing solely on technical feasibility. This screening of articles thus resulted in 47 relevant articles. This led to the third and final step in our search process. We combined forward and backward searches for articles either cited by or citing the previously identified articles, as recommended by Webster and Watson [20]. In this last step, we also included articles from before 2005. This step led us to three additional articles, for a total of 50 (see Appendix). Eleven of these 50 articles reported studies from an eHealth context (Appendix; J1, J3, J5, J7, J11, J12, J15, J28, C8, C9, and C16).

Our search criteria may have omitted articles that focused on inter-organizational CBPM but used other terms. In screening the articles, we may also have omitted articles that should have been included.

III. RESULTS

In this section, we present the findings from our review of the literature according to the three research questions outlined above.

A. How is success assessed in CBPM research?

CBPM is often believed to add substantial value to organizations [15]. Still, the concept of value or successful CBPM is multi-faceted and often implicit in most studies. As a result, we wanted to identify the perspectives used to describe CBPM success in the identified literature. Table 1 shows that CBPM success involves many dimensions, from efficiency of project teams and processes, to effectiveness in goal achievement and quality of work practices involving production of design, products, and services. Success is also understood in some articles as the satisfaction of stakeholders involved in the collaborative processes. For example, in a healthcare context, doctors, patients, and their relatives are examples of important stakeholders in interpreting success.

TABLE 1. PERSPECTIVES ON SUCCESS MEASURES
(with no. of reports)

Perspectives on success	eHealth	other
Efficiency		
Team performance (knowledge and information sharing, service quality)	1	4
Process performance (time, costs, product and process quality)	4	7
Value creation	1	
Satisfaction		
Stakeholder satisfaction (process owner, client, relatives)	1	2
Job effectiveness		1
Information system quality		2
Interoperability, information handoff quality	3	
Achieving legitimacy through standardization		1
Effectiveness		
Goal achievement	1	1
Improved work practices		1
Improved user interface		1
Quality of design and service	1	6
IT innovation		1
Competitiveness		
Market share, profitability, growth, return on investment		3
Innovativeness	1	1
Cost leadership		1
Other perspectives		
Active user participation		1
Multi-party coordination, relationship management capability	1	2
Customer responsiveness		1
Products and services innovation (Complementarity, lock-in)		4
(Organizational) political benefits		1

Perspectives used in eHealth-focused articles are marked with italics.

The perspectives seem to differ with the sector studied. Eleven articles studied or included healthcare. There seems

to be a gap in the inter-organizational CBPM eHealth literature concerning the use of important performance indicators of satisfaction (job effectiveness, information system quality, achieving legitimacy through standardization), effectiveness (improved work practices, improved user interface, IT innovation), competitiveness (market share, profitability, growth, return on investment, cost leadership), active user participation, customer responsiveness, products and services innovation (complementarity, lock-in), and (organizational) political benefits.

B. *Success rates in the eHealth studies compared to other contexts*

Our review shows that the literature reports a lower rate of success for inter-organizational CBPM in eHealth than in other sectors. Of the 11 articles on eHealth contexts, three articles (27%) described successes, while three articles (27%) described full or partial failures. In five of the 11 eHealth articles (45%) this classification was not applicable.

Three articles combine eHealth and other contexts. A total of 42 articles reported on other contexts. Of these, 18 articles (43%) described successful outcomes. Eleven articles (26%) described full or partial failures, and in 13 articles (31%) this classification was not applicable.

From the studies, we cannot conclude whether eHealth has a lower success rate in inter-organizational CBPM projects, or that this level of success is not reported. This may be an indication of gaps in our knowledge on inter-organizational CBPM in eHealth.

C. *What critical success factors are identified in inter-organizational CBPM research?*

We define critical success factors in the context of CBPM (following Butler and Fitzgerald [3] and Eid et al. [4]) as the areas or functions where things must go right to ensure successful performance of the Collaborative Business Process Management efforts. These areas or functions represent barriers or drivers that need managerial attention to ensure that CBPM achieves the projected benefits. In 49 of the 50 articles we identified critical success factors (CSFs), or what could be inferred as CSFs from the narratives, related to CBPM cases or other studies. We organized the list of identified CSFs by the level of analysis of the studies and by the phase of development they reflect in the collaborative BPM projects. The level of analysis ranges from the inter-organizational or network level to the intra-organizational level. Three phases in the life-cycle of CBPM can be identified, following the same pattern as in the work of Blut et al. [2]: phase one, initiation and development; phase two, implementation and early maturation; and phase three, late maturation and renewal or termination. One final group includes studies of critical success factors that did not fit into this framework of phases.

TABLE 2. OVERVIEW OF CRITICAL SUCCESS FACTORS
(with no. of reports)

Critical success factors (#)	eHealth	Other
Inter-organizational level		
1. *Management*	1	4
2. *Maturity*	1	7
3. Partner knowledge	0	3
4. Scalability	0	2
5. Simplicity	0	4
6. *Governance, inter-org.*	1	1
Intra-organizational level		
7. Benefits	0	8
8. *Co-opetition*	1	4
9. *Democratization*	2	1
10. Diffusion of innovation	0	4
11. Experiences	0	2
12. *Finance*	1	2
13. *Governance, org.*	1	3
14. *Information sharing*	2	4
15. *Involvement*	2	3
16. *IS tool quality*	1	5
17. *Resources*	1	5
18. *Support*	1	3
19. *Transparency*	1	5
20. *Accessibility (users)*	1	0
21. Coherency	0	1
22. Consistency	0	1
23. Continuity	0	2
24. Contract clarity	0	2
25. Culture	0	1
26. *Decision promptness*	1	3
27. *Equality*	1	1
28. *Legitimacy*	1	2
29. *Organizational size*	1	0
30. Relationship portfolio	0	1
31. Relationship quality	0	2
32. Responsibility	0	1
33. *Adaptive standards*	1	0
34. *Stepwise implementation*	1	0
35. Strategy and vision	0	2
36. *Terminology*	1	0

Critical success factors used in eHealth-focused articles are marked with italics.

The CSFs found are synthesized into concepts following Webster and Watson's recommendation [20], and numbered for later reference. We identified 36 different concepts reflecting critical success factors for CBPM. These factors can describe different activities depending on the phases of the collaboration life cycle they represent.

Looking at an inter-organizational unit of analysis, successful management style (CSF #1) changes from highly adaptive in early phases (J17, J21) to less adaptive and more determined closer to implementation (J21), with the exception of one study (C8), which also includes adaptive management style in a later phase. Process maturity (#2) is important throughout the first phases, but emphasis changes over the phases from collaboration maturity to technological maturity, including the capability to use CBPM tools. Partner knowledge (#3) is important for the outcome on a business network level. New joint processes, IT solutions, and inter-organizational standards must be scalable (#4) and simple (#5).

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One study (J27) stresses the importance of governance and measurement systems for the collaborative network (#6). Another study claims that it is important that the owners of the e-business 'hubs' do not profit at the participants' expense (finance sector; J11).

On the individual participating organization level, benefit management (#7) seems important. Participants must have a clear idea of what benefits to expect, how to realize them, and how to measure them. Co-opetition in terms of simultaneous cooperation and competition (#8) must be managed throughout the collaboration lifecycle, or benefits may be lost.

Democratization of decision-making and the development of a common vision (#9) are important in the earliest phases of collaboration. Diffusion of collaboration (#10) offers participating organizations additional market and innovation channels, and helps to overcome resource scarcity.

Joint community learning is also identified as a positive side effect of this diffusion. Some studies (C5, C17) found that prior experience with collaboration and experience with performance during the implementation phase (#11) explained success on an organizational level.

Cost reduction (finance; #12) is important. In the implementation phase the financial status of partners may also explain success or failure (J15). Good governance of projects, contracts, and IT are identified as a CSF (#13). One paper (J4) argues for a service broker function for better governance (in the context of implementing cloud computing services; J4). Information and knowledge sharing across functions (#14) are dominant factors, especially in the early phases of collaboration (J27, J28, C12, C20). One study from the health-care sector explores the importance of information handoff processes for patient safety. User involvement (#15) is a dominant factor in both the development (J17, J28, C3) and implementation phases (J3, J24). Resources (competence, capacity, capabilities; #16) are needed for change management, and training employees in new practices. Support (#18) must be provided for the innovation and collaboration processes. Many studies emphasize the need for transparency (#19) in process design and technological solutions.

User accessibility plays a great role in e-government solutions (#20). The need for coherent public policies is also apparent in e-government standards development (C4; #21). Within supply chains it is suggested that collaborative solutions (using the Internet) should have a consistent strategy and focus on value creation, not just cost reduction (J6; #22). Other special critical success factors found in some studies are continuity (in use of collaborative tools; # 23), contract clarity (#24), and management of cultural differences (#25). Decision promptness is identified by some studies (J17, J27, J28, C17; #26), but seems to contradict other studies (e.g. J21) that emphasize adaptive management and democratization. Equality of participants is found to be a factor in some business networks (J11, J27; #27). Legitimacy of the change process in the eyes of the organization's constituents is found to be of importance, especially in public administration (J12, C15, C17; #28). Organizational size is also identified as a success factor in public sector CBPM projects (J15; #29), with smaller organizations more eager to collaborate with others. Concentrating the portfolio of partner relationships is identified as a success factor in some chemical and mechanical industries (J18; #30). Organizational size and portfolio concentration may arguably be related to the resource concept (#17) as a success factor. Relationship quality (#31) involves external partners in business process outsourcing (J8) and process collaborations in industries (J18). Responsibility (commitment to change process objectives; #32) is identified as a success factor by a panel of BPM experts (J24). Standardization can in some instances be a barrier for performance. Transparency (#19) is important, but premature standardization that conflicts with actual workflows has in one case proven to be detrimental to collaborative performance in healthcare (J7), so an adaptive standardization process is a success factor (#33). A stepwise implementation of new processes can be one way to avoid issues (J1; #35). Developing a common terminology stimulates CBPM in processes characterized by high quality and intensity, such as in healthcare (J5; #36).

We found some CSFs that seem to be of potential significance in eHealth:

Decision promptness (#26): Prompt actions when issues were raised in an implementation project, taking feedback seriously, and solving issues before further rollout of new solutions were significant factors in a physician order entry system and in patient health record systems (J28).

Equality of participants (#27): Power balances in partnerships are necessary to attract participants, as reported by case studies in the Global Healthcare Exchange (GHX) (J11).

Legitimacy (#28): Legitimacy of initiatives (in the eyes of stakeholders) is necessary for successful e-government initiatives and in the adoption of Service Oriented Architecture (SOA) and information infrastructure for governmental services (C15, C17), and is a prerequisite for implementing welfare technologies for assisted living at home for elderly and chronically ill patients [42; p. 90].

Organizational size (#29): Smaller organizations, such as smaller municipalities, may have restricted opportunities for sourcing new services internally and are more dependent on external sourcing and collaboration (J15). In Norway, as in other countries with a geographically scattered population, ideal municipality size is debated. The assumption is that bigger municipalities may provide better services, but smaller organizational size can make collaboration less complex and easier to manage and may be a positive driving

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force for CBPM. This might result in a higher success rate of CBPM in small municipalities.

Flexible/mature standards (#33) and a stepwise implementation (#34): Kauffman and Tsai (J7) cite a case study in Norwegian hospitals where a premature standardization project (electronic patient record) had negative effects on organizational performance and care practices. The proposed new standards did not fit the information system environment and did not capture the needs of the work processes, resulting in more fragmented patient records. Albani and Dietz (J1), using examples from healthcare, argue for a stepwise implementation, where experiences are gradually taken into consideration when going from local to global coordination. They call this the 'choreography of business processes'.

On the other hand, many inter-organizational non-eHealth CBPM critical success factors are missing in the eHealth context (Table 2; CSF# 3-5, 7, 10-11, 21-25, 30-32, and 35). We cannot conclude whether awareness of some factors is irrelevant to eHealth or simply not reported. This gap indicates that further research is needed.

IV. DISCUSSION

In general, studies from the public sector are more often concerned with satisfaction of involved stakeholders and quality of services and less concerned with efficiency and competitiveness. As McNulty (J12) reports, an emerging process perspective on eHealth, with its emphasis on value creation, will challenge deeply rooted functional perspectives that emphasize control.

Most studies have adopted a perspective where collaboration in the inter-organizational context of BPM is seen as largely free from competition and conflict. Five notable exceptions study competition as a barrier to collaboration (J2, J9, J12, C2, C17). Organizations also compete in the public sector; for example, municipalities and institutions compete for positions, location of shared functions, and funding resources. Competition as a barrier may extend from an individual level to become an inter-organizational challenge. These barriers can become a major problem for society.

In the cases described, some critical success factors seem to be particularly context-dependent (CSF # 6, and 20-36 in table 2). Further studies should investigate their generalizability. More research is needed to understand critical success factors across different sectors and phases of collaboration, and to create a more holistic understanding of inter-organizational CBPM.

As we have shown, there are gaps and inconsistencies in success factors within eHealth. For example, intra-organizational governance is also important in the eHealth sector, but there is limited information on what performance measures or perspectives of success such governance initiatives should focus on. This corresponds also with some of the lacking critical success factors, for instance the benefits concepts and relates to the success rate of eHealth research in general. These gaps suggest a need further research. We believe that researchers of CBPM in eHealth can benefit from critical success factors identified in other contexts and can use them as a basis for conceptualization and empirical testing in an eHealth context.

The eHealth sector in particular poses special challenges for both decision-makers and lawmakers. A coherent roadmap for successful implementation of complex eHealth inter-organizational CBPM initiatives will require attention to multiple factors; thus far, we only have scattered case studies on which to build our understanding of these factors.

Our review identified a wide variety of theoretical approaches used to date. A unified theoretical framework could stimulate further development in the field. An interesting starting point for this integration could be studies of value creation in e-business models (Amit and Zott [1]) that are inter-organizational and process-focused [5], covering many challenges similar to those in inter-organizational CBPM.

V. CONCLUSION

There are gaps in our understanding of inter-organizational process collaboration in eHealth. Many critical success factors and perspectives reported in other contexts are missing in the eHealth context but could prove important in the field of eHealth. The reported success rate of CBPM in an eHealth context seems to be lower than in other contexts, but the sample size of eHealth-related studies is too small to allow for any decisive conclusions. Some critical success factors must be given special consideration in an eHealth context. Are we missing pieces of the puzzle for successful inter-organizational CBPM implementation in eHealth?

Further research is needed on the content, relevance, and impact of sociotechnical factors like *co-opetition* management (ref. Appendix; J2, J9, and J12), as the successful balance between simultaneous *cooperation*, or collaboration, to achieve coherent patient treatment, and *competition* for positions, resources, and funding. Further research is also needed on the relative weight of the different factors over different phases of collaboration.

This research will inform further eHealth research and successful eHealth initiative implementation, and will be of use to lawmakers and regulators.

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VII. APPENDIX

1) Journal articles reviewed

ID	Reference
J1	Albani, A. and Dietz, J. L. (2009), 'Current trends in modeling inter-organizational cooperation', *Journal of Enterprise Information Management*, 22(3), pp. 275-297.
J2	Baruch, Y. and Lin, C. P. (2012), 'All for one, one for all: coopetition and virtual team performance', *Technological Forecasting and Social Change,* 79(6), pp. 1155-1168.
J3	Bochicchio, M., Bruno, A. and Longo, A. (2011), 'Supporting Continuous Improvement in Care Management with BPM', *Software Engineering,* 1(2), pp. 32-38.
J4	Demirkan, H. and Goul, M. (2013), 'Taking value-networks to the cloud services: security services, semantics and service level agreements', *Information Systems and e-Business Management*, 11(1), pp. 51-91.
J5	Gogan, J. L., Baxter, R., Boss, S. R. and Chircu, A. (2013), 'Handoff Processes, Information Quality and Patient Safety: A Trans-Disciplinary Literature Review', *Business Process Management Journal*, 19(1), pp. 70-94.
J6	Jonsson, S. and Gunnarsson, C. (2005), 'Internet technology to achieve supply chain performance', *Business Process Management Journal*, 11(4), pp. 403-417.
J7	Kauffman, R. J. and Tsai, J. Y. (2010), 'With or without you: The countervailing forces and effects of process standardization', *Electronic Commerce Research and Applications*, 9(4), pp. 305-322.
J8	Lacity, M. C., Solomon, S., Yan, A. and Willcocks, L. P. (2011), 'Business process outsourcing studies: a critical review and research directions', Journal of information technology, 26(4), pp. 221-258.
J9	Lin, C. P., Wang, Y. J., Tsai, Y. H. and Hsu, Y. F. (2010), 'Perceived job effectiveness in coopetition: a survey of virtual teams within business organizations', *Computers in Human Behaviour*, 26(6), pp. 1598-1606.
J10	Magdaleno, A.M., Cappelli, C., Baiao, F.A., Santoro, F.M. and Araujo, R. (2008), 'Towards collaboration maturity in business processes: an exploratory study in oil production processes', *Information Systems Management*, 25(4), pp. 302-318
J11	Markus, M. L. and Bui, Q. N. (2012), 'Going concerns: the governance of inter-organizational coordination hubs', *Journal of Management Information Systems*, 28(4), pp. 163-198.
J12	McNulty, T. (2003), 'Redesigning public services: challenges of practice for policy', *British Journal of Management*, 14(s1), pp. S31-S45.
J13	Münstermann, B., Eckhardt, A. and Weitzel, T. (2010), 'The performance impact of business process standardization: An empirical evaluation of the recruitment process', *Business Process Management Journal*, 16(1), pp. 29-56.
J14	Niehaves, B. and Plattfaut, R. (2011), 'Collaborative business process management: status quo and quo vadis', *Business Process Management Journal*, 17(3), pp. 384-402.
J15	Niehaves, B., Plattfaut, R. and Becker, J. (2012), 'Business process governance: a comparative study of Germany and Japan', *Business Process Management Journal*, 18(2), pp. 347-371.
J16	Pramatari, K., Evgeniou, T. T. and Doukidis, G. (2008), 'Implementation of collaborative e-supply-chain initiatives: an initial challenging and final success case from grocery retailing', *Journal of Information Technology*, 24(3), pp. 269-281.
J17	Puschmann, T. and Alt, R. (2005), 'Developing an integration architecture for process portals', *European Journal of Information Systems*, 14(2), pp. 121-134.
J18	Rai, A. and Tang, X. (2010), 'Leveraging IT capabilities and competitive process capabilities for the management of interorganizational relationship portfolios', *Information Systems Research*, 21(3), pp. 516-542.
J19	Rajaguru, R. and Matanda, M. J. (2009), 'Influence of inter-organisational integration on business performance: the mediating role of organisational-level supply chain functions', *Journal of Enterprise Information Management,* 22(4), pp. 456-467.
J20	Reijers, H. A. (2006), 'Implementing BPM systems: the role of process orientation', *Business Process Management Journal*, 12(4), pp. 389-409.
J21	Ritala, P., Hurmelinna-Laukkanen, P. and Nätti, S. (2012), 'Coordination in innovation-generating business networks–the case of Finnish Mobile TV development', *Journal of Business & Industrial Marketing*, 27(4), pp. 324-334.
J22	Rohloff, M. (2011), 'Advances in business process management implementation based on a maturity assessment and best practice exchange', *Information Systems and E-Business Management*, 9(3), pp. 383-403.
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