CENTERIS - International Conference on ENTERprise Information Systems / ProjMAN - International Conference on Project MANagement / HCist - International Conference on Health and Social Care Information Systems and Technologies 2020

Understanding Client-Consultant Collaboration within Information Systems Design: A Case Study

Linh Thi Ngoc Nguyen[a], Asle Fagerstrøm[a]*,

[a]Kristiania University College, School of Economics, Innovation and Technology, 0152 Oslo, Norway

Abstract

This study provides an in-depth exploration of how clients and consultants collaborate in an outsourced design project and how this collaboration influenced the emerging design of an IS artifact. Findings show that the project development method (waterfall model) chosen on a macro-level (project delivery model) can cause a ripple effect that influences the client-consultant collaboration on a micro-level (design phase), which in turn, might influence the emerging design of the IS artifact. The findings suggest that the exercised control modes start with a high degree of self-control and reasonable outcome control. However, an increase in outcome control progresses over time if the measured outcome is perceived as poor by the client. Parallelly, the desire for behavioral control becomes more present.

Keywords: Client-Consultant Collaboration; Information Systems Desing; Case Study

* Corresponding author. Tel.: +47 95075325.
  Email address: asle.fagerstrom@kristiania.no

1. Introduction

Most businesses models nowadays include information technology in their value-creation processes. As a result, there is an emergence of business-to-consumer (B2C) information systems (IS) applications such as customer support websites, customer service touch screen, online shopping apps, and mobile food ordering [12]. Multiple stakeholders are needed in information systems development (ISD) to develop these B2C applications. The diversity of the stakeholder's span from different professions such as business stakeholders such as strategists, marketers, business to more technical professions such as developers and interaction designers. Different disciplines provide different cognitive frames in which participants understand a particular process. Companies that do not have experience with software developments may find it challenging to collaborate in terms of methods used, the technology used, and various communications, Thus, this paper aims to explore how companies with little experience in technological innovations should collaborate and participate in an outsourced ISD project. The following research questions are: How do clients and consultants collaborate during the design process of an information systems artifact, and how does this collaboration influence the emerging design? The goal is to find which collaborative factors influence project collaboration, project progress, and project outcome. Furthermore, we would like to find out how client and agency collaboration influences the emerging design through their social interactions.

2. Conceptual Model

Previous research in the ISD literature provided several methods and understandings of collaboration in ISD development. To provide an overview of the key concepts, a conceptual model is proposed (see Fig. 1). The conceptual model holistically covers client-consultant collaboration from a macro level to a micro level.
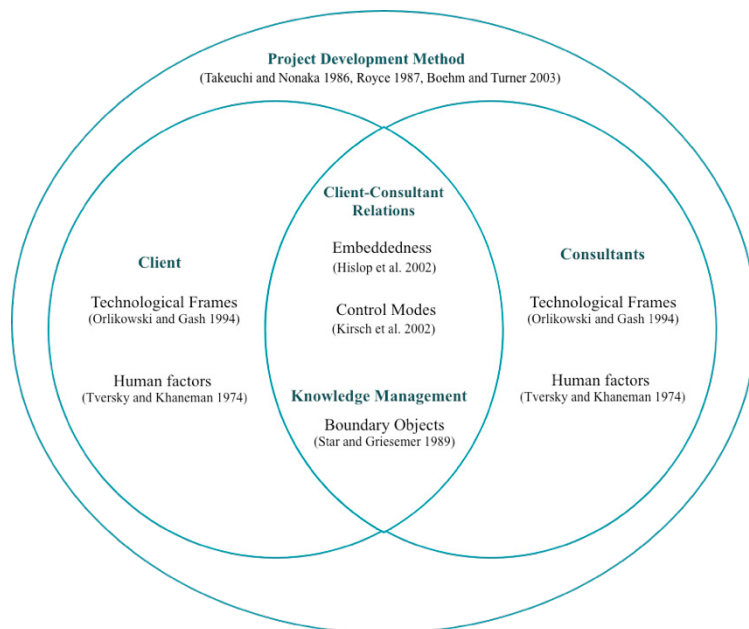

Fig. 1. Conceptual model for the study.

The model starts at a macro level to describe the context of which client-consultant collaboration resides within, seen from an overarching view using theories within project development methods, such as agile methods [1, 20] and plan-driven methods [17, 20]. The model then proceeds to the micro level, which focuses on client-consultant collaboration on an interpersonal level. The model illustrates this interpersonal client-consultant collaboration as two intersecting circles where both parties collaborate across their disciplinary boundaries. At this micro level, each party is regarded as information-processing humans who can be influenced by different technological frames of reference

[16, 18] and by the inherent human factors [18, 21] during a collaboration. These influencing factors could result in a different interpretation of various client-consultant interactions during the design of an information systems artifact. These client-consultant interactions are described by the theoretical concepts within the intersecting section of the model. These concepts explain and describe client-consultant relations and knowledge management within ISD. Previous research within client-consultant relations in ISD are well studied within the topics of control [8] and embeddedness [6], but few empirical studies have combined these theories to see how these factors of control and embeddedness influence an emergent design of an IS artifact. Also, research within knowledge management of boundary objects is also well studied within ISD and is an essential topic with regards to client-consultant collaboration within ISD [9, 14, 15, 19]. In summary, this conceptual model provides a holistic and interpretive lens on how the client(s) and consultant(s) collaborate on a macro and micro level and how this collaboration influences the emerging design of the information systems artifact.

3. Method

The case company in this study is referred to as the client company and is a medium to large Norwegian company that sells home improvement products. The client company has decided to develop an in-store touch screen display application that will be placed in a hardware store. The screen provides customer service by helping customers to select products they need for their home improvement projects. The screen is also supposed to be educational and help customers learn about the products and how to use them. To create the touch screen, the client company outsources this project to design agencies and a medium-sized screen supplier and development agency, which is referred to as the development agency. This forms a development project consisting of the client company, design agencies, and development agency. The timeframe of the project is one month (January 2019 to February 2019) and entails several events during this timeframe. The events happen in the context of collaboration between the client and designer. Using multiple sources of evidence is called triangulation; when the data is truly triangulated, research findings will be supported by more than a single source of evidence [22]. The sources of evidence collected in this study are (1) observations, (2) documents, and (3) interviews.

3.1. Observation

Due to the first author's employment in the client company, she was hired to work as the project assistant for the project manager. The observer role of practitioner-researcher seemed, therefore, suitable for the situation. The criteria defined for the observation is presented in Table 1.

Table 1. Criteria defined for the observation.

Processes	People	Occurrences
Project cycle - Evolution of the project cycle - Is there any method used? - Which method is used? - Project management style	Participants of the project - Role of participator - Communication flow between participants	Meetings/design reviews - Number of meetings - Meeting proceedings - Meeting agenda - Seating patterns - Frequency of participant contribution
Projects - How many projects were there?		Daily interactions - Conversation topic

3.2. Semi-Structured Interviews

The goal for the semi-structured interview was to create a situation for open conversations in which the informant reflects on experiences and opinions related to the subject set by the researcher. These interviews enable informants to elaborate their answers according to the context, which in turn generates deeper insights than a structured interview could accomplish. This can create digressions that are deemed relevant. Semi-structured interviews are not all about

the informants but can be used to understand context outside of the individuals. A completely unstructured approach was not adopted because of the need for structure to ensure that topics of relevancy were covered during the interviews.

3.3. Documents

Both found documents and researcher-generated documents are analyzed. The found documents are the design brief, meeting schedules, emails and high-, and low fidelity wireframes, and the researcher-generated documents was the observations made throughout the process and the project meetings. A comprehensive thematic analysis of the data was conducted. The data were categorized in chronological order and compared across themes that emerged, and where re-read multiple times during this process.

4. Analysis and Discussion

The research question has been analyzed through the proposed conceptual model outlined from the literature review (see Fig. 1).

4.1. Project Development Method

Regarding the project development method and how the client and consultant collaborate, the conceptual model demonstrates a relationship between the macro level of project development method of Project Alpha and the micro level of the project method during the design phase. The evolution of the client-consultant collaboration starts at the macro level of the client company´s project development method, which is depicted through the project delivery model. The model outlines the high-level strategies of how Project Alpha should unfold. The findings reveal that the holistic project delivery model was largely following a plan-based methodology similar to the waterfall process. As the name "waterfall" describes, the development process would move sequentially from phase to phase. Each phase is independent of each other in terms of involvement of different stakeholders and different goals. However, the phases are dependent on each other through the documentation's artifacts, and the precision of documentation is high [4, 20]. The findings reveal that the structure of the macro-level project development method had implications for the project method on a micro level (the design phase). In other words, the project delivery model influences how the client and design agency A start their collaborative practices. For example, agency A was not involved in the proof-of-concept phase, only in the design phase. The proof-of-concept phase is where the business requirements were conceptualized and formulated in the design brief. Agency A is, therefore, highly dependent on documentations (design brief) from the proof-of-concept phase. Although the design brief was passed to agency A, the design team still had to elicit necessary business requirements to understand and formulate solution requirements. The findings revealed that, throughout the design phase, some solution requirements were colliding with business requirements, while some solution requirements were misinterpreted or overemphasized compared to others. The latter findings could be described as a learning phase by learning from failure. The findings also revealed that the wrong assessment of requirements and the lack of agility in the process caused a slow design progression within the tight timeframe of three weeks. This, in turn, might support the earlier research of disadvantages of a plan-based method, and its rigidness in responding to changes that might occur later in the various phases of the life cycle [4]. This tight timeframe of the design phase might have benefited from an agile approach by involving the designer in the proof-of-concept phase. Although the project delivery model followed a plan-based method, the design phase itself had characteristics of both plan-based and agile methods. Boehm and Turner [1] benchmarking of agile and plan-driven characteristics is used. to determine the characteristics of the project method used in the design phase.

4.2. Client-Consultant Relations

Concerning client-consultant relations and collaboration, two fundamental theories are the embedded relations and control modes. The character of client-consultancy relations developed in this study influenced the emergent design of the IS.

4.2.1. Embeddedness of social relations

The empirical findings in this case study reveal how the active role of the client shaped agency relations, and how client behavior in relation to the agency was shaped by the embeddedness of pre-existing social relations, organizational structure, and previous experiences. The embeddedness concept [6] was used to analyze and discuss the patterns of client behavior in this case study to provide insight into the evolution of client-consultant relations and how this relationship influenced the emerging design. First, with regard to the client's choice of design agencies, the embedded pre-existing relations were apparent. Thus, essential decisions on which agency to use were partly shaped by the pre-existing social relations, reputational knowledge, and budget. Secondly, with regards to establishing a trustful client-consultant relationship throughout the design phase, the embedded pre-existing relations were also an important factor. The use of social relations, rather than relying on the use of a totally arms-length market-type relation, are closely related to the issue of trust and the attempt to reduce uncertainty [6]. Hislop [6] suggests that the use of embedded social relations represents an attempt on the part of client personnel to reduce uncertainties and dependence of such conventional trust. The findings also revealed that the client constantly compared the design outputs by agency A and agency B to reduce uncertainty about the design outcome. These comparisons shaped the opinions on agency A´s professionality and decisions of agency A's emergent design.

4.2.2. Control modes

Client governance of different types of control over a vendor is an essential part of project success in outsourced ISD projects [8]. For the context of this study, the distinction of the controller and the controllee is present. First, in outsourced ISD, the controller and controllee are members of different organizations [8]. Second, the controller and the controllee may not be single individuals but, rather, teams of individuals representing their respective organizations [8]. Thus, in this study, the "controller" refers to the client, the individual in the client company responsible for implementing controls while the controllee refers to the individual in the design agency A responsible for executing the project. The findings of this study reaffirm the conditions of formal control and informal control. The findings reveal that the client exercises outcome control when the outcome measurability is high, consistent with prior research [8]. The use of outcome control was also exercised in the distributed collaborative settings in which there was an exchange of design prototypes through emails. The findings of this study reveal that the client was not able to exercise behavior control [8] as the client was not able to observe agency A directly during each design iteration due to distributed work locations and other work obligations next to this project. The findings also revealed that the client expressed that he had a limited understanding of the design process of an IS and asked for agency A's guidance. Under these circumstances, it was difficult for the client to exercise behavior control. The latter findings also witness the client's high level of confidence in agency A's competence and knowledge. According to prior research, a high level of confidence in the controller's competence and knowledge of the project promotes outcome or self-control [3, 7]. Consistent with prior research, the findings reveal that the individual in the design agency A responsible for executing the project was the one who planned the whole design phase by scheduling and setting the agenda of meetings and defining goals of each iteration throughout the design phase. Although the client relied on an individual in design agency A responsible for executing the project exercise of self-control, the client was also dependent on outcome control, such as reviewing prototypes to understand project progress, reviewing design outcomes, and making decisions. These findings, therefore, confirm [8] research results, which suggests that exercised self-control occurs when behaviors are not readily observable or when outcomes are highly measurable. In addition to identifying the latter control modes, the chronologic nature of the design phase made it also possible to examine the evolution of control modes enacted throughout the timeline of the design phase. The findings from this study reveal that the evolution of the control mode enacted began with a high degree of self-control by agency A and a moderate degree of outcome control of the client. Parallel to the increased outcome control, a desire for behavior control became present. For example, as the design phase progressed, the client expressed a wish for a higher degree of informal involvement such as frequent phone calls to clarify requirements but did not enact these behavioral controls, instead passing the ball to the individual in design agency A responsible for executing the project to take initiatives to involve the client more, which in this case were not reciprocated. Therefore, this suggests that the exercised control modes in the outsourced design of an IS artifact start with a high degree of self-control and a moderate outcome control. However,

an increase in outcome control progresses over time if the measured outcome is perceived poorly by the client. Parallel to this, the desire for behavioral control becomes more present. These findings reaffirm earlier research on the evolution of control modes in ISD by Choudhury and Sabherwal [3].

4.3. Knowledge Management

With regard to knowledge sharing and client-consultant collaboration, the analysis depicts relationships of the theories within knowledge sharing, technological frames, human factors, and control modes.

4.3.1. Analysis of boundary objects through human factors and frames of reference

To better understand the practice of collaboration between client and consultants within the design of the IS, an assessment of boundary spanning and boundary objects was necessary. From the observational findings, many identified boundary objects played a role in shaping the client-consultant relationship and the emergent design of the IS. The concept of a boundary object, developed by Star and Griesemer [19], describes purposes of boundary objects, which are that are shareable across different problem-solving contexts. During the design phase, the client and agency A shared explicit knowledge [14] with each other through tangible material objects. The client shared pre-existing objects (e.g., website and retail posters) and objects made specifically for the designers (design brief and lo-fi), while agency A reciprocated with various versions of lo-fi and hi-fi prototypes through a knowledge conversion process of the requirements elicited from the client´s boundary objects. The latter objects became boundary objects as they were used to span (or were an attempt to span) knowledge across boundaries [2]. In this case, the boundary objects were shared for the purpose of communicating with each other by transferring explicit knowledge of the problem domain, solution requirements, and business requirements. Through these tangible objects, a knowledge conversion process could be dissected by the client and the designers in agency A. However, the boundary objects' effectiveness in spanning knowledge between boundaries varied by interpretation, context, and participants [2].

4.3.2. Implications of client's boundary objects

The context in which the design brief was presented by the client could be interpreted as cognitive strain imposed on designers. Human working memory can be overloaded during information processing if their cognitive resources are exhausted [21]. From the observational findings, it was revealed that the designers were quiet during the presentation of the design brief and from the interview with one of the interaction designers, the design brief was perceived as thought-through and informative, but that it was a lot of information. The implications of cognitive strain can be that designers might have a limited amount of cognitive resources to cope with the new and increasing amount of information in such a short time and potentially experience information overload. This cognitive strain is also imposed on the designers in other contexts throughout the design phase, whereas the findings revealed that the designers, in some cases, have overlooked or misinterpreted certain requirements. By experiencing such cognitive strain of increased information, the designers might have additionally been imposed upon by the heuristic driven bias of availability [21]. This cognitive strain was also imposed on the designers when the client sent over various documents after the first meeting. The client's intended boundary spanning was to provide the designers with enough product information and a starting point for inspiration. The results from the intended boundary spanning did achieve the client's purpose but also led to unintended results.

4.3.3. Implications of designer's boundary objects

A boundary object constitutes the shared space between interacting groups [5]. Boundary objects are interpretively flexible in that cooperating groups can recognize a common object, yet understand and appropriate it differently as part of their local practices [19]. The lo-fi and hi-fi prototypes became boundary objects-in-use through their use and recognition as a design representation of the various groups involved in the joint field of IS development in the project studied [11]. Findings revealed that the client´s mental model of the lo-fi prototypes was different from the designer's. Also, the findings revealed that the client did not provide any feedback directly related to the lo-fi during the meeting

but said that he needed time to review them independently and that the feedback on the lo-fi would be given through emails. The boundary-spanning attempt in the first design review could be interpreted as ineffective. Although the initial boundary-spanning attempt of the lo-fi prototypes during design review 1 was relatively ineffective, the client perception of the lo-fi prototypes seemed to change throughout design iteration 2. The findings revealed that the client could provide feedback related directly to the lo-fi prototypes during design review 2. A possible explanation for this is that the client exercised individual reflection of the design outputs from iteration 1. According to Lavoué and Molinari [10], "reflection is considered as crucial for learning as it helps individuals to internalize and reconstruct what they have (socially) learned, and to transfer their knowledge and skills." In addition to the individual reflection process, the client also made a lo-fi herself during design iteration 2 as a visual attempt to convey changes in solution and business requirements to agency A. This could be interpreted as a learning process, whereas the client reflects on the solution requirements needed while constructing the lo-fi, thus learning from this action. The latter process is related to the notion of client learning. Client learning can be defined as the acquisition of new knowledge that causes changes in requirements, which reflects an enhanced understanding of the technology, organizational, and work environments [13]. Client learning has been recognized as an important factor for the successful development of ISD [13]. As the analysis reveals, client learning is considered as a crucial factor to describe how the client-consultant relation evolved from the first design iteration.

4.3.4. Knowledge sharing in co-located context

When making sense of the design of the IS System, both client and designers used both intangible (language) and tangible (sketches) boundary objects to communicate their ideas. Verbal language proved not always to be enough; language and sketches were used to visualize what they wanted to say. The negotiation of meaning is also involved in the telling of stories, which implied that the knowledge of the context was extremely important for common ground to be achieved.

4.3.5. Knowledge sharing in distributed context

Regarding the use of technology to facilitate boundary spanning, the findings revealed that the commenting feature of the design tool (Adobe XD) that agency A used differed from the design tool (Figma) that agency B used. The client preferred Figma as a design tool compared to Adobe XD due to the possibility for precise feedback and the possibility to add GIFs, which gave the look and feel of how the IS artifact would appear when video is added. These findings may be aligned with the findings of control modes enacted during the design phase. As the control modes of outcome control increased during the design phase, the client checked on the Adobe XD link frequently to see if any updates to the prototypes were done. These links provided support for live updates of the prototypes in contrast to static PDFs. These findings imply the need for research within collaborative technologies that enhance and support distributed collaborative environments between clients and design consultants. Larsson [9] has suggested a similar call for future research on virtual environments where global design teams can collaborate.

5. Conclusion

The study uses a case study to provide an in-depth exploration of how clients and consultants collaborate in an outsourced design project and how this collaboration influenced the emerging design of an IS artifact. These provide us with a holistic picture of how clients and consultants collaborate the perspective on a macro level of the project development method to the micro level of social interactions and behaviors of client and consultants. To summarize the most critical findings concerning the research questions: The project development method (waterfall model) chosen on a macro level (project delivery model) can cause a ripple effect that influences the client-consultant collaboration on a micro level (design phase), which in turn might influence the emerging design of the IS artifact. Client-consultant relations and its power relations influenced how the client perceived agency A and agency B, which in turn also influenced how the client exercised modes of control over agency A. The findings suggest that the exercised control modes start with a high degree of self-control and a reasonable outcome control. However, an increase in outcome control progresses over time if the measured outcome is perceived as poor by the client. Parallelly

the desire for behavioral control becomes more present. These findings reaffirm earlier research on the evolution of control modes in ISD by Choudhury and Sabherwal [3] which demonstrated a greater reliance on informal controls (especially self-control) at the beginning of a project. They explained that the control mode was modified and adjusted over time, as the controller gained experience with the vendors [3]. The findings and discussion regarding knowledge management serve several purposes. First, the knowledge management of human factors, frames of reference, and gestalt principles play an essential role in how different participants interpret boundary objects and that this interpretation influences how the client perceive Agency A's professionality. Second, the findings imply the need to re-think the ways in how boundary objects are supposed to be shared between the client and design consultants during collaboration, as human factors and frames of references needs to be addressed to achieve intended results of boundary spanning. Third, the analysis also reveals that different technology could support the client's outcome control in distributed work environments.

References

1. Boehm, B. and R. Turner, *Using risk to balance agile and plan-driven methods.* Computer, 2003. **36**(6): p. 57-66.
2. Carlile, P.R., *A pragmatic view of knowledge and boundaries: Boundary objects in new product development.* Organization science, 2002. **13**(4): p. 442-455.
3. Choudhury, V. and R. Sabherwal, *Portfolios of control in outsourced software development projects.* Information systems research, 2003. **14**(3): p. 291-314.
4. Dahiya, D. and S. Dahiya. *Role of software process models in enterprise system development*. in *9th RoEduNet IEEE International Conference*. 2010. IEEE.
5. Doolin, B. and L. McLeod, *Sociomateriality and boundary objects in information systems development.* European Journal of Information Systems, 2012. **21**(5): p. 570-586.
6. Hislop, D., *The client role in consultancy relations during the appropriation of technological innovations.* Research Policy, 2002. **31**(5): p. 657-671.
7. Kirsch, L.J., *The management of complex tasks in organizations: Controlling the systems development process.* Organization science, 1996. **7**(1): p. 1-21.
8. Kirsch, L.J., et al., *Controlling information systems development projects: The view from the client.* Management science, 2002. **48**(4): p. 484-498.
9. Larsson, A. *Making sense of collaboration: the challenge of thinking together in global design teams*. in *Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work*. 2003.
10. Lavoué, É., et al., *Reflection-in-action markers for reflection-on-action in Computer-Supported Collaborative Learning settings.* Computers & Education, 2015. **88**: p. 129-142.
11. Levina, N. and E. Vaast, *The emergence of boundary spanning competence in practice: implications for implementation and use of information systems.* MIS quarterly, 2005: p. 335-363.
12. Lucas Jr, H.C. and J.M. Goh, *Disruptive technology: How Kodak missed the digital photography revolution.* The Journal of Strategic Information Systems, 2009. **18**(1): p. 46-55.
13. Majchrzak, A., et al., *Managing client dialogues during information systems design to facilitate client learning.* MIS quarterly, 2005: p. 653-672.
14. Nonaka, I., *A dynamic theory of organizational knowledge creation.* Organization science, 1994. **5**(1): p. 14-37.
15. Nonaka, I. and R. Toyama, *The knowledge-creating theory revisited: knowledge creation as a synthesizing process*, in *The essentials of knowledge management*. 2015, Springer. p. 95-110.
16. Orlikowski, W.J. and D.C. Gash, *Technological frames: making sense of information technology in organizations.* ACM Transactions on Information Systems (TOIS), 1994. **12**(2): p. 174-207.
17. Royce, W.W. *Managing the development of large software systems: concepts and techniques*. in *Proceedings of the 9th international conference on Software Engineering*. 1987.
18. Siau, K. and X. Tan, *Technical communication in information systems development: The use of cognitive mapping.* IEEE transactions on professional communication, 2005. **48**(3): p. 269-284.
19. Star, S.L. and J.R. Griesemer, *Institutional ecology,translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39.* Social studies of science, 1989. **19**(3): p. 387-420.
20. Takeuchi, H. and I. Nonaka, *The new new product development game.* Harvard business review, 1986. **64**(1): p. 137-146.
21. Tversky, A. and D. Kahneman, *Judgment under Uncertainty: Heuristics and Biases.* Science, 1974. **184**: p. 124–1131.
22. Yin, R.K., *Case study research: Design and Methods*. 6 ed. Applied social research methods series. 2017, Thousand Oaks, London: Sage publications, Inc.