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# A Checklist For A Successful PD Student Project

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## ABSTRACT

We identify and exemplify a general checklist of eight important conditions required for a successful Participatory Design (PD) student project with external partners. We address projects aiming to embrace both analysis, design, implementation, and evaluation in complex real-life settings. The checklist is intended to support students, academic institutions, and private/public collaborative partners in planning, initiating, conducting and realizing larger student-driven PD projects.

## CCS CONCEPTS

• Human-centered computing~Interaction design~Interaction design process and methods~Participatory design • Social and professional topics~Professional topics~Computing education • Applied computing~Education~Collaborative learning

## KEYWORDS

Participatory design, Student project, Checklist for projects, Conditions for success, Pilot implementation, Real-life settings, External partners, Student-driven project

## 1 Introduction

Many university programs may include relatively large Participatory Design (PD) student projects, typically as part of a bachelor, master or PhD thesis. These projects are typically initiated by the student with a desire for close collaboration with external partners and with a wish to help these partners make desired changes. The initial plans for the empirical PD project often include the ambition of conducting one or several iterations striving for real-life change.

Usually the initial plans are never fully realized because interacting with real-life change is very unpredictable, complex, and entails a high dependency on the involvement and deliveries from the external partners that the student has very little or no power to influence.

We present and review a PD student project that, within only five months, successfully managed to establish a close collaboration with clinicians at a hospital in Denmark, complete analysis, design, and implementation of IT-supported desired change (using the Epic healthcare platform, epic.com), and evaluate the effects of the change. The project hereby resembles the iteration recommended for healthcare PD projects [1] and the iterations done in several recent PD PhD-projects [e.g. 2–5].

Our literature review[1] reveal PDC workshops on teaching PD [7–10], and a recent book release on how PD contribute to the learning sciences [11]. However, "the existing literature is noticeably lacking in publications concerning teaching PD" [12, p. 1]. PD has been discussed as part of the curriculum of university programs [13; 14]; as a key subject in university courses [15; 16]; including courses engaging students in PD processes though live projects [12; 17]. Other papers include use of PD-techniques in teaching [18; 19]; using collaboration tools to support educational group work [20]; a students' reflections on a PD project [21]; and teaching PD for secondary school students [22]. This paper contributes to the research on learning PD through real-live projects [e.g. 12; 17]. We elicit eight general conditions required for larger PD student projects to embrace both design, implementation, evaluation, and collaboration with external partners in complex real-life settings.

In the following we introduce the hospital setting, starting point, main activities, and evidence of the high impact as a result of a PD master's thesis project[2]. We then present our analysis[3] identifying and exemplifying eight conditions that enabled the success of the project. We elaborate and describe these eight conditions as a general checklist for student projects with ambitions of conducting a full PD-iteration implementing changes to a real-world setting.

## 2 Setting, Material and Baseline Flow of Work

The project took place at the Digestive Disease Center, named in Danish "Abdominalcenter K" (AK), a hospital department comprising the specialities surgery and gastroenterology-hepatology. Within the department, there are outpatient clinics, patient wards, and operation- and endoscopy units. AK is situated at Bispebjerg Hospital, a teaching hospital in the Capital Region of Denmark, providing surgical care for 465.000 inhabitants in the city of Copenhagen and for some diseases the Faroe Islands and Bornholm. The staff of AK is familiar with the process of doing projects, and AK includes a research unit for health informatics, facilitating the inclusion of master and PhD thesis projects into the clinical field of work. The center received 4.104 referrals (2018), mainly from general practitioners. Among these 1.320 were referred for the care of inguinal hernia (DK40.0, DK40.9), umbilical hernias (DK42.0, DK42.9)), and gallbladder stones (DK80.2)[4]. These referrals, including the clinical visitation, comprised the material for this study.

At baseline, three medical secretaries in an organized workflow and with functionalities in Epic, managed the referrals' administrative tasks, coordination, and communication. Incoming

[1] Review conducted by the PRISMA approach [6] including a search on the complete archive of Participatory Design Conference Proceedings (pdcproceedings.org) with the search string: "Participatory design" AND (Teaching OR supervis* OR student* OR "thesis project*").

[2] A master's thesis concludes a 5-year university master program and must, in Denmark [23], be of 30 ECTS [24], equivalent to one full semester's work and approximately 825 hours of student work. The PD student project in this paper is from the second semester of 2018 [25].

[3] Analysis made by the authors, i.e. the university professor supervising the student, the master's thesis student, and three clinicians from the hospital that participated in the project: the quality responsible chief physician, a nurse specialized in IT, and the executive chief physician.

[4] Codes are referring to the Danish version of WHO´s ICD-10 classification of diseases (who.int/classifications/icd/icdonlineversions/en).

referrals were registered and forwarded to three designated physicians. They then assessed the cases on referring physicians' information and on available previous notes and test results documented in Epic. If accepted, subsequent examinations, appointments and treatment were planned. Judgements and plans were forwarded to the secretaries, who made the registration work, the booking of tests and appointments, and informed patients, mainly by digital mail.

The present workflow posed several challenges to AK: (1) Plans were not standardized and could be ambiguous imposing secretaries to search physicians for clarification. (2) Referrals changed hands from secretaries to physicians and back, which implied secretaries had to deal with the same referral twice, often several days apart, causing both errors triggered by oversights and a rise in secretaries' workload. (3) Physicians' flow of assessing referrals was irregular as they were busy in the operating theatre, doing ward rounds, etc. Hence, referrals could await assessment for days and be assessed in large batches disorganizing secretaries' work. (4) Turnover time for referrals was one of several obstacles for compliance to the time-limits for the start of patients' investigation and treatment given by the Danish parliament.

## 3 The Student Project

The establishment of the student project was facilitated by AK having experience and motivation of including student projects. The student was familiar with clinical work and Epic from her background being part-time employed for 1.5 years in a student job as Epic supporter for the hospital. The student was granted daily open access to AK, a nurse specialized in IT was allocated as resource for establishing project activities (meetings, observations, interviews, workshops, etc.), and the student and the project was highly recognized by management including the executive chief physician, the executive medical secretary, and the quality responsible chief physician. Management participation was highly important as the research question of the master's thesis developed into "*How can PD and effects-driven IT-development improve the visitation process through a re-allocation of tasks from physicians to medical secretaries?*" [25, p. 12]. While a re-allocation of the visitation had potentials for meeting the workflow challenges described above, it is also sensitive, especially to the medical secretaries who are to undertake this task. This gave the project a crucial focus on PD.

The student project was grounded in PD literature, with the analysis and design part based on the MUST PD-method [26; 27], and the implementation formed as a pilot implementation [28], that is, a field trial implementation of the change for a limited period of time to evaluate real-use experience. The project and its evaluation were effects-driven [29; 30], specifying the wished-for effects and measuring these effects before as well as after the implementation. Additional theory supported sensemaking [31], genuine PD [26; 32; 33] and change management [34].

Activities during *analysis and design* included one week of observations of the medical secretaries and one day observing a physician handling the visitation. Observations were supported by quantitative data of the process extracted from Epic. Observations and meetings with the medical secretaries identified a number of challenges in their work processes and extensive use of Epic. They also expressed their worries facing a project of re-allocating (i.e. adding to their field of work) a task usually done by the physicians. This legitimate concern and the conditions for the medical secretaries' current work practice was brought to management meetings by the student. The student held workshops with the medical secretaries where they designed a visitation process to be managed solely by the medical secretary (depicted in figure 1, left side). They also outlined the challenges experienced by the medical secretaries along with wished-for effects to meet these (depicted in figure 1, right side). Through a close collaboration with management, the nurse specialist, and the secretaries, a pilot implementation was co-designed including and evaluating: (1) The overall wished-for effect of reduced patient response time due to re-allocating the visitation process; (2) whether the re-

allocation would in fact reduce the work of the medical secretaries as an effect of completing the visitation in one step by one medical secretary (as opposed to being exchanged between a physician and several medical secretaries); (3) how the medical secretary, if needed, immediately could hand over complex visitation cases to the executive chief physician; and finally, (4) how to remedy other related challenges experienced by the medical secretaries.

The pilot *implementation* was organized and conducted by the student, the nurse specialist, and management. They made a detailed guideline including a decision framework for which type of visitations should be handled by the medical secretaries or the physicians. The student was allocated as Epic-supporter when the pilot implementation was initiated. An unanticipated and emergent change [29; 35] related to checking patient medication status was quickly addressed, and the visitation process and guideline was re-considered and re-configured accordingly.

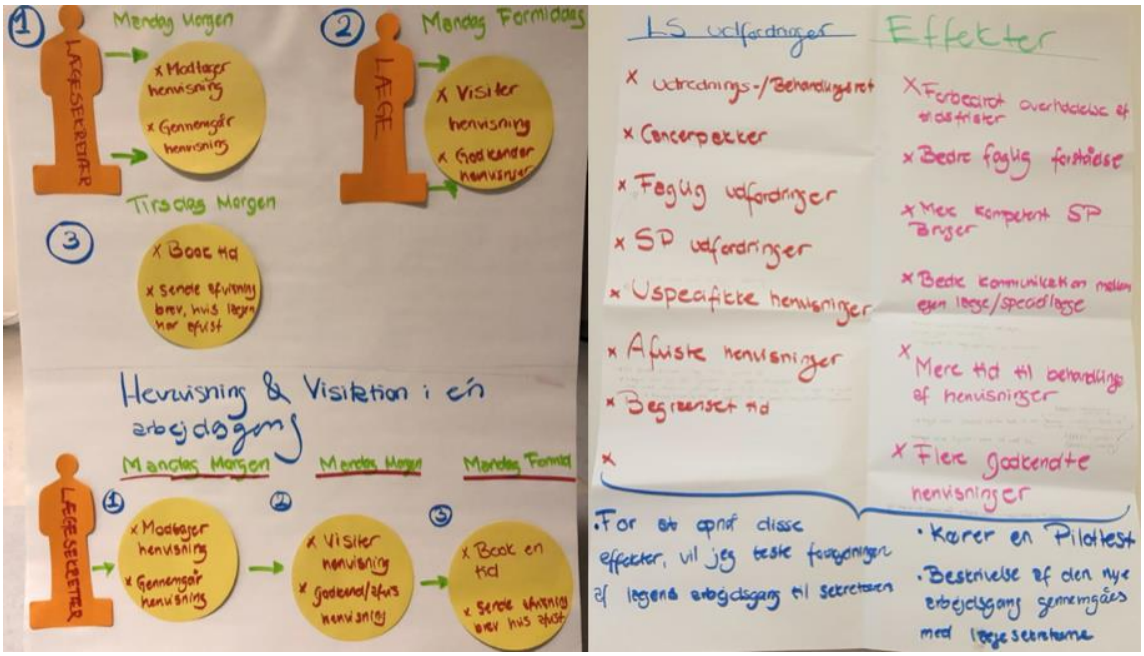


**Figure 1. Models of an 'as-is' and an envisioned 'to-be' process (left). Challenges and alleviating effects (right).**

The *evaluation* comprised effects assessments [29; 30] conducted by the student three weeks into the pilot implementation, including observations and an analysis based on data from Epic. The Epic data comprised 143 visitations from a three months period prior to the pilot implementation and 53 visitations from the three weeks period after the pilot implementation. These results might provide statistical evidence of the effects. The student, due to time constraints, made a random check of 12 cases and measured another two from direct observations: This indicated and convincingly illustrated the effects of a visitation process time dropping from up to a week and down to seven minutes. The evaluation of the project demonstrated a work-related win-win situation for both medical secretaries and physicians. The impressive impact of reducing patient response time from days to minutes led to a decision of permanently continuing the pilot implementation and to plans for scaling the project to more complicated cancer referral programs.

## 4 A Checklist of Eight General Conditions

The conditions for the student project were, overall, favored by a teaching hospital setting and management motivated and experienced in embracing student projects, and a student with

relevant contextual and technical prerequisites. Our review of the project identifies eight general conditions facilitating the project. No single condition explains the success. Rather, multiple conditions interact and reinforce each other, a point also given in a recent review of 'factors that influence the implementation of e-health' [36].

First, *the project shortly became clearly focused, defined and scoped*. The chosen clinical visitation process was delimited to three relatively simple diagnoses. This part of the referral workflow is handled by clinicians within AK, i.e. a process that does not involve or entangle inter-departmental coordination known to increase the complexity of a change project [37]. The aim of the project as a field trial of re-allocating the visitation task also comprise a focus and 'business case' that is easy to introduce and communicate to the participating clinicians. The visitation process could be illustrated in models of an 'as-is' and an envisioned 'to-be' process (see Figure 1) without special formalisms, but as simple drawings of the freehand drawing and collage type [26]. These models played an important role as a common reference point for the participants. Finally, the limited project scope eased a pilot implementation: Scoping is known to be a serious challenge for pilot implementations [28]. Defining, scoping, and focusing a PD student project in its early phase require support and engagement from both the students' supervisor and the external partner. A successful focus may typically include a specific 'as-is' business process that can be illustrated in a relatively simple model.

Second, *the project was of high relevance to the workplac*e. The physicians were very interested in allocating the visitation task to the secretary: The majority of these tasks are uncomplicated from a clinical perspective but administratively complex requiring several enquiries in Epic – a system that most physicians find very cumbersome [38]. The visitation process is also subjected to the Danish national cancer control plan including deadlines for fast-track fixed "packages" for diagnosis and treatment [39]. While the required deadlines were not critical for the chosen diagnoses, a successful project would inspire scaling similar changes to more complicated cancer treatments, which have tighter deadlines, difficult for AK to meet, and which have a political vigilance. A successful pilot implementation would therefor provide attractive opportunities for both physicians and management at AK, i.e. the project's most powerful stakeholders. The external partner's engagement and commitment might be closely correlated to the projects' relevance for the workplace. Contrary, lack of an evident need is known as an impeding condition [40].

Third, *the project received active managerial commitment*. A project that involves real-life implementation and changes for the users from the workplace requires acceptance by management. In our case the AK's executive chief physician went whole-hearted and dedicated into the project. This was important not only to support the student but because the intended change involved a sensitive and potentially conflictual re-allocation of tasks to the medical secretaries: They could fear both task overload and allocation of a task outside their area of responsibility that they could question if they had sufficient qualifications for. Management played an important role by guaranteeing promptly to take over any visitation case that the medical secretary did not feel confident doing. Lack of management commitment is a well-known risk factor [41]. PD projects engaging with potentially sensitive and conflicting changes should require up-front management engagement and support. It is the commitment from the department management rather than top-management that is known to be vital [40].

Fourth, *concerned users became engaged in genuine participatory design*. An important challenge from a PD perspective was the concern from the medical secretaries being asked to take over a task from the area of responsibility of the physicians. Positioned in the low end of the hospital hierarchy their concern included not only the obvious risk of task overload but, more importantly, fear of not being sufficiently qualified. This calls for 'genuine participation' with open-minded contact and authentic meetings that enable such worries can be voiced and taken seriously [33; 42]. The student succeeded to establish genuine participation with the

medical secretaries by allowing them to (1) respect their own interests, (2) being open to how they felt about the re-allocation, and their reflections on their own opinions about this, and, (3) willingly make them contribute to the achievement of the goals of the project. These three characteristics of genuine participation used in the project, were introduced in [32, p. 5], elaborated into a conceptual framework for genuine participation in [33], and supporting PD techniques are outlined in [42]. This approach to genuine participation transformed medical secretaries' understandable skeptical attitude into a shared and agreed-upon pilot implementation with a "win-win" prospect for medical secretaries as well as physicians.

Fifth, *adequate workplace resources (participation and time) were allocated*. The project received priority within AK and was not challenged by other competing activities or priorities. Resources were allocated when needed within the required timeframe of the project. This included management and staff participation in planned PD activities and instant support when needed, for example from management approaching the medical secretaries as described above. Also, the nurse specialist was delegated to take charge of all project activities at AK such as supporting the student in making arrangements with other participants (e.g., scheduling and allocating medical secretaries for PD activities), drafting clinical guidelines for the new visitation process, informing and preparing the pilot implementation (a comprehensive task in a 3-shift 24/7 environment), etc. Resource allocation may ideally be agreed upon and stated as part of a project establishment charter [26].

Sixth, *the project participants comprised the needed competences*. Project teams configuring information systems and work practices for each other requires a pool of local competencies including understanding of practice and technology, project management, competencies in preparing, making, and assessing change, and personal traits [43]. The student had specific technical and organizational qualifications due to a student job as Epic supporter for the hospital. The student's project management skills were shaped by a master program where 50% of the curriculum is independent project work [44]. Detailed knowledge of current work practices was acquired through observations and PD activities with clinicians. The student's competencies were supported by the delegated nurse specialist and management, among others with preparing, conducting, and managing the pilot implementation and changes to work procedures. All required competencies, skills and knowledge are elaborated in [43], and some of these might deliberately be acquired as part of the aim and learning activity of a pilot implementation [28].

Seventh, *technical and organizational change could be accomplished solely by the project participants*. The visitation process was chosen, among others, because it exclusively involved clinicians within AK. Technical and organizational implications of the pilot implementation turned out also to be accomplishable by the project participants themselves. This not always the case for pilot implementations and it is difficult or impossible to predict from the project start [28]. The needed technical changes were few, and could be configured in Epic by the student without further authorization or involvement by the central IT-organization. The organizational change setting up the new re-allocation of tasks could also be accomplished by the participants from AK independently from other external organizational units. An important condition for a successful local pilot implementation is the presence of the competencies required for the technical and organizational change [28; 43].

Eighth, *assessment of the effects and impact was possible within a short timeframe*. Making effects assessments of a newly established IT-supported work process often involve considerable resources and relatively long time periods [e.g. 45; 46], and sometimes the desired effects are not realized at all [47]. The effects measurements in this case were possible to do, by the student, using Epic's report generator where timestamps from the patient referral and the approval of the visitation were compared to calculate the time of the visitation process. A high volume of patient visitations enabled sufficient evaluation data three weeks into the pilot

implementation. If the technology does not support effects assessment an alternative dedicated evaluation infrastructure should be considered as suggested by [5].

# 5 Conclusion

A PD student project with the ambition of including a full iteration aiming for real-life change is a tremendous learning opportunity – also when the goal is only partly achieved. The project needs to ensure that students achieve their learning goals, while delivering practical benefits for the external partners, who place their trust in the students and the university program. We offer a general and exemplified checklist of eight essential conditions for students, their supervisors, and collaborative partners. The checklist aims at helping them initiate, conduct, and realize such PD projects. We hope this checklist can foster a collaborative culture of reflection and thought concerning the conditions needed to achieve the intended synergy to ensure successful PD student projects.

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