Plan.it

Concept Development with Industry

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Abstract

This study documents and analyzes the process of developing a novel concept to address problems faced by the transportation industry training academy UCplus. This process begins with evaluating the problem description furnished by the company and roughly outlining the business concepts. After further investigation via several research methods, we accurately define the problem space and begin a more targeted concept development process. Our academic backgrounds in business development, IT use in organizations, and user-centered design allows us to clearly identify points of improvement. We found that teachers were spending far more time than they were comfortable with just locating and downloading class resources. We confirmed this with administrators and found that much business value was wasted in this process. Our final concept returns this time and value to the company by streamlining the process of organizing class resources.

1. Introduction

1.1 Designing a business concept

Shaping and designing a concept for a company and their customers is a combination of understanding the problem space, designing for the users' conceptual model, and assessing the company's needs and resources. Even though creativity and innovation are sometimes mistaken for the same, today's common definition of innovation is the result of creativity and (successful) implementation. Innovation scholar dr. Bettina von Stamm (2008) notes that creativity is the basis for innovation. However, without the implementation of the concept, all that is left is the idea (von Stamm, 2008). In this specific study, the process prior to designing the presented concept and implementing it consists of an analysis of the business context and the company's resources and identifying the needs of the end users. Balancing these different aspects when designing a concept may lead to innovation in the end.

1.1.1 Company work cycles

Other prerequisites for successful innovation include company processes, as certain procedures can be more fertile for innovation than other. von Stamm contrasts characteristics of operating organizations to those of their innovating counterparts, and outlines that operating organizations usually are hierarchically ordered into specialized divisions, whereas organizations focused on innovation rarely have hierarchical constraints, but are comprised of task-oriented project teams to drive idea generation (von Stamm, 2008, p. 106). Most organizations probably lie somewhere in between these two extremes, but common for all is the need to recognize the potential for innovation. One traditional approach to innovation is what von Stamm calls the 'planned strategy', starting out from an internal and external analysis of the business context and leading to the identification of potential areas of improvement. Another approach is the 'emergent strategy', where companies earn insights from trial and error experiments in a bottom-up flow and can take action accordingly (ibid., p. 100). Even so, companies have to balance innovation and organization. Indeed, successful implementation of the creative effort requires organization. In reference to consultancy firm Synectics, von Stamm illustrates the relationship between the two 'cycling worlds' as seen on Figure 1. Here, the identification of opportunities to challenge current workflows or procedures can lead to the development of new solutions. The implementation of this creative input is considered successful when it becomes the new standard practice (routine).
In the present case, the opportunities for change were identified prior to our introduction to the project. Further, the company had already initiated speculations on possible improvements of the current workflows. Therefore, as an external design team, we were invited to develop solutions (see Figure 1 top right) to realize these improvements.

1.1.2 Iterative development

To approach the presented problem space, we chose to work in an iterative fashion, sketching a possible solution, discussing its relevance to the involved stakeholders, and adjusting accordingly. To adequately inform the design process, we chose to complete a number of such iterations before deciding on a tentative concept to present to the company. With this approach, we aspired to minimize the risk of potentially fixating on a less than ideal concept. As von Stamm notes, "a lack of attention [in the early stages] can lead to costly and time-consuming changes later in the development process" (von Stamm

2008, p. 53), which is why we aimed to extensively explore the fuzzy front end of the design process.

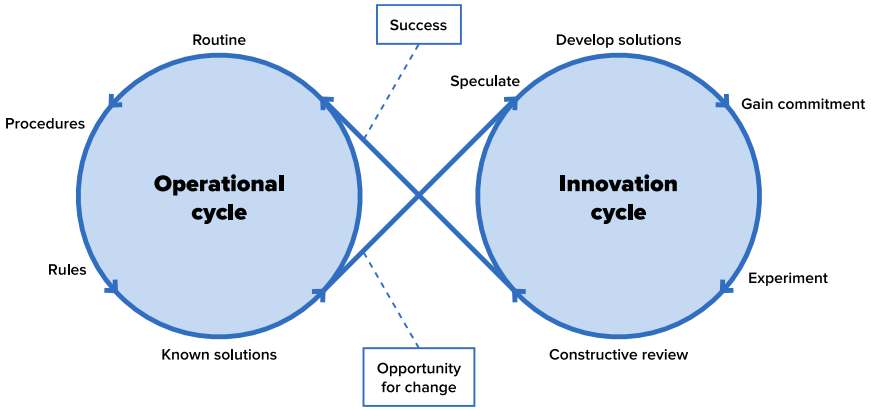

Figure 1: The co-existing work cycles as proposed by Synectics. Successful innovative companies acknowledge the importance of following up innovation with implementation, thus empowering day-to-day operations with the creative outcome of the innovation cycle (reproduced from von Stamm (2008, p.6)).

1.2 Brief from the company UCplus

UCplus is a small, privately operated academy owned by Arriva, the operator of public transportation in Denmark. They specialize in basic and advanced training of drivers in the transportation industry. UCplus has also combined Danish courses and driver training targeted to immigrants with insufficient language skills. The company's digital development is conservative with basic IT-solutions, for example Microsoft products. Their current projects include upgrading to Microsoft Office 365, gaining an exchange server, adding automatic backup from clients computers and file sharing across branches (Placing, 2014). Prior to the study presented here, course administrators from the IT University of Copenhagen (ITU) had made an arrangement with UCplus management, agreeing that the company could serve as an innovation case study, and in return reap the benefits of student research into optimization of UCplus' business. Jesper Placing, head of IT at UCplus, held a presentation at ITU on January 30th in which he introduced the company, their digital initiatives and current projects. Presumably, during an internal evaluation of the company, UCplus drew up a list of areas that could benefit from further research and creative input from external sources. These insights were presented by Placing at the kick-off meeting, formulated as eight different issues for which he asked us to design a concept that would create value for UCplus. . When discussing such product portfolio management, von Stamm (2008) mentions "project portfolio planning" as one of the approaches. It is a way to define the current and future projects and to evaluate how to allocate the resources affiliated with the projects (ibid., p. 59). Out of the eight challenges we were presented with, the focus of this report is the issue Placing referred to as "the book container". The original aim for the book container was to design a tool for employees in which they could create their own teaching materials.

1.3 Target group

We were especially interested in working with the people who would use our final concept in the end. Taking a user-centered approach meant trying to understand the challenges and difficulties that occurred during the teachers' current workflow. This meant getting to know our target group and making sure that our concept reflects their opinions and ideas. Placing described the teachers of the transportation area as mostly male, aged 35-65 with a medium educational level. Their IT competencies could vary from standard to expert user. After our first meeting with UCplus we were presented with possible dates and contact persons for our research at UCplus,

and made arrangements with the end users (teachers and administrators), as well as other stakeholders such as the person in charge of deciding on a possible solution to be implemented, which in this case was Placing.

1.4 Preliminary concept ideas

Our initial exposure to UCplus' challenges was via Placing, who pitched the book container concept. This would be a tool that would allow UCplus' teachers to gather and create material they would like the students to study during the courses. According to Placing, it had to be very user-friendly, work across multiple platforms, and provide both digital and printable output. Initially we considered existing products like Podio: a well-designed web application that offers a user-configurable platform to share information within an organization. Our initial concept sketches used a similar layout and included a chat feature for student-teaching communication outside of class (see Figure 2).

We understood from the initial pitch that UCplus needed a project management tool with overarching organizational capabilities for administrators, a more focused tool for teachers for planning each class, and a limited read-only and conversation medium for students. Issues such as communication and sharing prevailed in our early concept sketches, as well as what medium best provided for asynchronous learning opportunities. However, these features were based on a problem we thought existed from the rather narrow window to the real problem space.

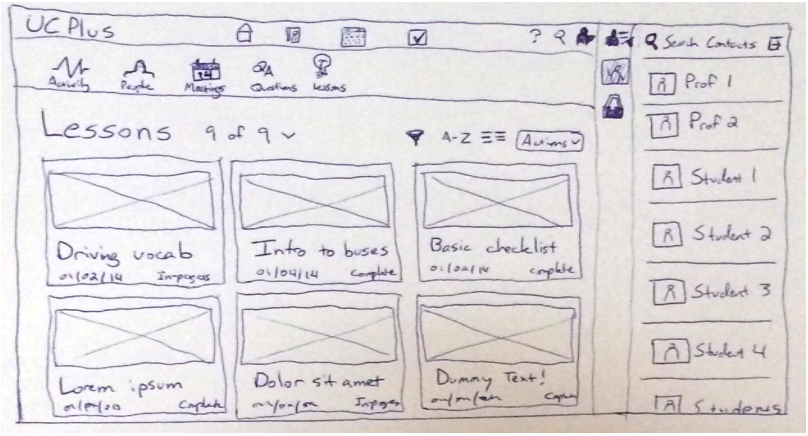

Figure 2: Preliminary concept sketch of the book container. The sketch shows lesson overview, recent activity and chat function.

1.5 From brief to problem space

The brief from UCplus provided us with a preliminary research field but left us without a well-defined problem space in which we could operate. Therefore our research aimed to locate the *right* problem. Having the right insights would put us in a position where we could find the real problem. Don Norman, an academic in the field of user-centered design, stresses this matter in his book *The Design of Everyday Things* (2013). His approach to design is to never solve the problem he is asked to solve, "because, invariably, the problem I am asked to solve is not the real, fundamental, root problem. It is usually a symptom" (Norman, 2013, p. 217). He continues by saying that as opposed to problem solving in universities where problems are delivered in neat packages, problem in the real world need to be discovered. Scratching the surface of the problem space is not enough. With an ethnographic approach, we set out to study the underlying needs of the end users, bearing in mind the say/do axiom;

instead of only listening to what people say (they want), we wanted to also study how they behave, to (hopefully) find out what they really need (Blomberg et al., 1993).

1.6 Research question

The identification of the real underlying problem and definition of a more precise problem space led us to the following research question:

How can we remove the difficulty for the teachers at UCplus to access the daily tasks and course material?

The research process of getting from brief to problem space will be elaborated in chapter 2.

2. User perspective: Finding the *right* problem

In the following we will provide a short overview of our research and choice of methods, before presenting our findings.

2.1 Overview of research method and analysis

Inspired by the workflow presented by Rasmus Thomsen of *Is It a Bird* (Thomsen, 2014) we needed the right insights to be able to formulate the right problem. When in the 'fuzzy front end' of the development process, several uncertainties can hinder the creation of a research plan (von Stamm, 2008, p. 41). As mentioned earlier, we were uncertain if the initial problem space defined by Placing actually corresponded to the problem the teachers were experiencing.

All of the project groups from ITU were encouraged to plan their ethnographic studies on one single day (the 27th of March 2014). On this day, UCplus personnel were in high demand due to the many involved design teams. To make the most of our limited time with the personnel, we decided that interviews and a class observation were the most viable research options. In summary, we conducted four studies; see Table 1 for an overview.

Table 1: Overview of the research methods used to gather data about UCplus

#	Methods	Preparation	Data output
I	*Observation of a class taught by Tim Christensen*	Appendix A (preconceptions)	Appendix D (observation notes)
II	*Interview with Tim Christensen*	Appendix B (interview guide)	Appendix E (condensation of meaning)
III	*Interview with Peter Farver & Henrik Rasmussen*	Appendix B (interview guide)	Appendix F (condensation of meaning)
IV	*Interview with Jesper Placing*	Appendix C (interview guide)	Appendix G (condensation of meaning)

Considering that we did not have sufficient information from previous interactions with Placing to tune in on the core problem, we wanted to conduct a semi-structured interview as suggested by Kvale and Brinkmann (2009). A semi-structured interview allows more flexibility

to follow up on things discovered during the interview and thus make use of our limited time. Overall, we conducted the ethnographical methods (Figure 3) consecutively in a tight schedule. Throughout the process, we employed the quick and dirty approach, which is a way to gain rapid feedback from the conducted research (Sharp, Rogers and Preece, 2007). In optimal conditions, however, we would have assessed the individual qualities of each of the methods, in order to plan a design process in which each technique could inform the next in the best way.

In retrospect, the observation was not an important factor of the study. The classroom observation confirmed one of the points from the conducted interviews, but other than that it did not lead to any insights essential to the identification of the real problem.

We have outlined the themes of the interviews schematically by using the analytical approach 'condensation of meaning', proposed by Kvale and Brinkmann (2009, pp. 227-230). The most important parts of the interviews have been quoted or rewritten in a shorter and more concise form.

2.2 Findings

The following describes the four most distinctive findings from our ethnographic studies.

2.2.1 Teachers do not create their own materials

As proposed in the challenges presented by Placing, one of the future goals for UCplus was to have a tool for employees to create their own teaching materials. On these grounds, we implicitly expected that the teachers at UCplus would be creating their own teaching materials. However, the interview with full-time teacher Tim Christensen revealed to us that the teachers use the materials available on the platforms TUR (Turteori, 2014) and Køreklar (Køreklar, 2014) (Table 2). The use of several external teaching materials gave us the idea to design a portal to collect them all for easy access.

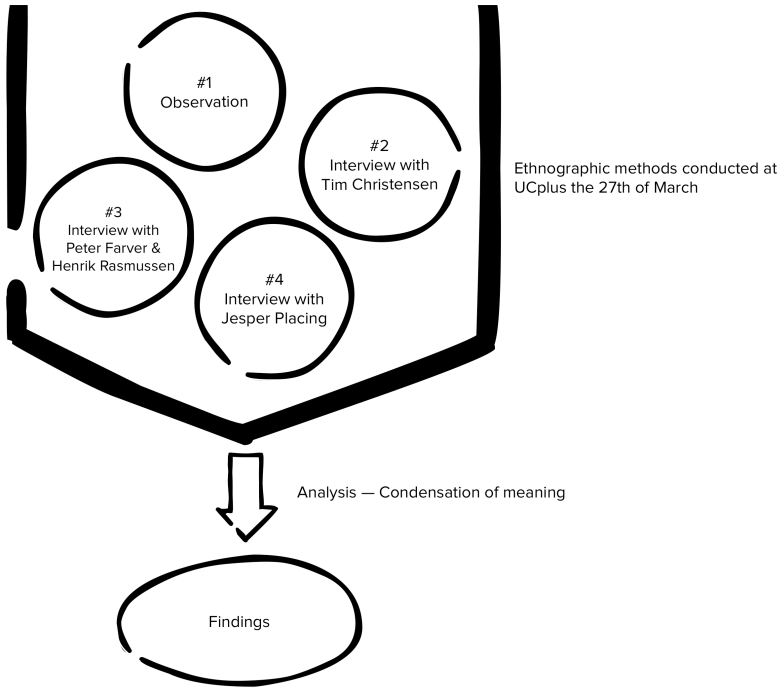

Figure 3: An illustration of our process from research to findings

Table 2: Excerpt from the empirical study, illustrating finding 1

Theme	Quote
(Online) teaching materials	"I use the teaching resources given by Køreklar — this is the core of my teaching. Besides this, UCplus has a few assignments that I can give the students." (Appendix E, [08:34–09:43])

2.2.2 IT infrastructure is very limited

Throughout the tour of UCplus, we found that the internet could only be accessed through wired connections. We had assumed that wireless connectivity would be available, but after the tour it was clear that there was no real need for it in the current environment.

During the interview with head of education Peter Farver and training consultant Henrik Rasmussen, we were informed that technical difficulties and failures had been of some concern. In the past, test booking, execution, and feedback had been prone to error due to incompatible IT system interfaces. These insights proved essential to our design process, illustrating the need for a platform independent concept (see Table 3).

Additionally, at the interview with Placing we found that some network issues have occurred in the past, causing significant paralyzing outages. This imposed the design criterion that our concept should be very robust to prevent any accidental network issues. If we were to only consider existing infrastructure for our concept, the target devices would be anything that can connect to the wired-only network. Placing also told us that UCplus is currently upgrading and improving the network and offerings, such as Microsoft Office 365, which would give all personnel access to cloud services. Office 365 could be the means for authentication if we were to include it in our concept.

Table 3: Excerpt from the empirical study, illustrating finding 2

Theme	Quote
Compatibility issues	"We are also challenged by the fact that our computers run Windows XP. The support on this system will soon be terminated, and we might be forced to upgrade to Windows 7 — will the tests operate flawlessly on a new operating system? We have already experienced the lag of support on our current platform." (Appendix F, [16:16–21:15])
Business	"The challenge is that government-controlled courses' price is set so we can't compete by saying we have a discount. So the only way we can try to position ourselves would be to make the teaching better. That is our only competition parameter." (Appendix G, [06:20–08:00])

Most importantly, Placing told us that UCplus' market and budget are volatile, based on governmental decisions and macroeconomic trends (see Table 3). In order for a new product like ours to be viable, it must be robust and cheap to maintain so that only few extra resources would be required—Placing indicated that the marketing department, which handles the company website, or interns could handle issues in addition to himself. In the past, external professionals, such as a previous developer at UCplus and freelancers, have been contracted to handle issues that could not be solved with core personnel, but they should not be relied upon. Additional resources could be requested from UCplus' parent company Arriva, but a simple product like our concept describes would likely not require it. Further budgetary analysis from the company's published annual reports would need to

be done before the end of the fiscal year when the next budget is made.

2.2.3 Current workflow involves many separate systems

By observing the lecture, we found that teachers use both digital materials, in this case a Powerpoint presentation, and physical materials such as prints and technical models. Additionally, during the interview with Christensen, we were informed that the interplay between the different teaching systems - specifically with regards to exam or equipment booking - was very non-dynamic, and that the use of those systems was very time consuming. This issue was also touched upon in the interview with Farver and Rasmussen (Table 4).

Table 4: Excerpt from the empirical study, illustrating finding 3

Theme	Quote
Workflow	"The tests are ordered in several different places and systems. It works very slowly and it is not at all user-friendly. That is really an area where I would love to see some improvements. It is often very frustrating. Both the speed and the structure of the computer and the test-booking work very poorly. (...) The connection between the tests works poorly." (Appendix E, [22:01–25:00])
Concept proposal	"It is not about developing one common platform, but instead creating a platform that describes everything that needs to be done (...)." (Appendix F, [21:16–29:10])

2.2.4 Finding: Knowledge sharing occurs face-to-face

During the classroom observation, we experienced that one of the other teachers came in and asked Christensen for help, demonstrating that face-to-face communication between the teachers at UCplus is an important part of the workday. Even though the teachers work in separate classrooms, they still communicate face-to-face, even during classes. The encounter we witnessed seemed like a common event during class, but it also appeared to disturb both the teacher and the students. In the interview with Christensen, it was confirmed (Table 5) that the teachers help each other all the time, and that knowledge sharing is an important part of the work culture. Specifically, Christensen underlined the importance of being able to help each other order tests.

On a similar note, we observed a substantial amount of dialogue in the form of q-and-a sessions between Christensen and the students during class. Interestingly, the teacher revealed in the interview that he did not find digital support channels, such as e-mail or chat between teacher and student relevant, as the students could ask questions in class (Table 5). Additionally, Farver and Rasmussen pointed to the fact that students need to show up to have their attendance sheet signed, thus obviating the need for remote support.

During the classroom observation, we noticed that the student-teacher communication seemed very free and natural. This contradicted one of our preconceptions that the teaching style would be very formal and inspired by one-way communication (Table 5).

Table 5: Excerpt from empirical study, illustrating finding 4

Theme	Quote
Current knowledge sharing	"We [the teachers] help each other all the time. We are split up in different classrooms, however we still help each other with ordering the tests [including reminding one another to order tests etc.]." (Appendix E, [22:01–25:00])
Online communication with the students	"I do not think that the ability for the students to communicate from home would improve anything, and I would not want to do that." (Appendix E, [17:20–18:20])
Face-to-face communication	'At one point, one of the other teachers came in to the class asking Tim for help' (Note from observation, Appendix D)
Attendance	"The system is very strictly built — every student have a student plan that has to be kept up to date; the teacher and the student have to sign the plan every time a subject has been completed." (Appendix F, [02:14–07:06])

3. Designing the concept

Having conducted and analyzed our ethnographic studies, the next step was to turn our findings into a possible solution for UCplus. In the following, we will describe how we used our findings to shape our concept, whilst also taking advantage of known conventions and guidelines for interface design. Our main aim was, as outlined in our research question, to design a concept for UCplus that would remove the difficulty for the teachers at UCplus to access the daily tasks and course material.

3.1 From findings to design sketches

Our analysis of the findings from our research yielded a general need by the teachers, our target user group, to more efficiently organize and sort resources, which is currently time consuming and cumbersome. The primary functions of our concept, which we have aptly named **Plan.it**, are based on these needs.

3.1.1 The bookmark container

All of UCplus' teaching resources are created and hosted externally, including tests, classroom materials, evaluations, and absence registration. For that reason, teachers do not create their own materials, as first assumed. Therefore, our final concept should not aim to actually host or store them locally. Instead, it should help teachers manage links and other metadata about those resources, as Rasmussen and Farver suggested in our interview. The challenge proposed by Placing in the beginning was merely a symptom of the real problem, and thus the basis for our concept has been to create a bookmark container rather than a book container.

3.1.2 Designing for UCplus

To meet the demands of a company with limited IT infrastructure, we needed to create a concept that would be available for any device that the teachers use. For that reason we propose a browser-based system in order to make it accessible through as many different devices as possible. Making a browser-based system would also create a minimum demand of maintenance as discussed earlier.

3.1.3 Optimizing the workflow by providing an overview

Finding three made us realize that the current workflows involve many different systems. As proposed by Farver and Rasmussen, our concept should help organize which resources are available each day. Christensen echoed this need, stressing that the use of many different systems was time consuming and cumbersome. He specifically pointed out that the connection between the systems was very poor. By providing an overview of the entire course including lecture subjects and available material, we hope to improve the current workflow of having to know when to use what system. The overview shows the 30-day course, which is the estimated time for the bus driving course. The current day is highlighted and stands out, and the available materials are illustrated with small icons. When designing the course overview, we intentionally did not write dates or create a full-functional calendar with time slots. This somewhat simple functionality should give the teachers and administrators an overview over the assigned materials and current day. When clicking on a course day, the user will get an overview of that specific day. Having an overview of all the ongoing courses also gives UCplus the possibility of easily introducing substitute teachers into the workflow.

3.1.4 Knowledge - shared and saved

In our preliminary concept sketch we had considered a student-teacher chat function for communication outside the physical confines of UCplus. During the ethnographic studies, we realized that there was no need for such a function, as the teacher, Christensen, did not find it relevant to communicate with students when not in class. However, both the observation and the interview with Christensen made us realize that knowledge sharing between teachers is of great importance. Right now, knowledge sharing occurs face-to-face, but can be done via a note function in Plan.it, where teachers can attach notes for each individual lecture. The fact that knowledge is shared between all teachers and furthermore saved for a later time hopefully increases the knowledge sharing between teachers, and provides further guidance for any substitute teachers.

3.2 Designing for the end user

During an internal iteration of our concept sketches, we considered including a navigation bar and a separate message function for the teachers. Going over our findings one more time, however, made us realize that the teachers did not need yet another function to figure out. Everything should be presented at just the right time, creating a natural flow for the user in which only choices relevant to the current vew are available. Norman (2013) discusses this matter when mentioning how to signal the intended actions in design. “One important set of signals comes through the natural constraints of objects, physical constraints that limit what can be done” (Norman, 2002, p. 82). Taking Krug’s perspective about “satisficing,” if presented with a lot of options, users choose the one that seems best. “In reality, though, most of the time we don’t choose the best option—we choose the first reasonable option, a strategy known as satisficing” (Krug, 2014 p. 58). Navigation would force the user to make a choice

instead of being guided through the workflow. Therefore we integrated the navigation directly in the flow instead of having it as a separate set of options on the side.
With Plan.it, we wanted to make an interface as simple and familiar to the user as possible, since one of the challenges would be for them to overcome having to learn or adapt to a new system. Steve Krug describes his single most important rule of design, “don’t make me think” (ibid., p. 50) as: “I should be able to ‘get it’—what it is and how to use it—without expending any effort thinking about it” (ibid., p. 51). One way to make it familiar while still being able to keep it simple was using known conventions from web user interfaces as a defining part of the design (ibid., p. 72).

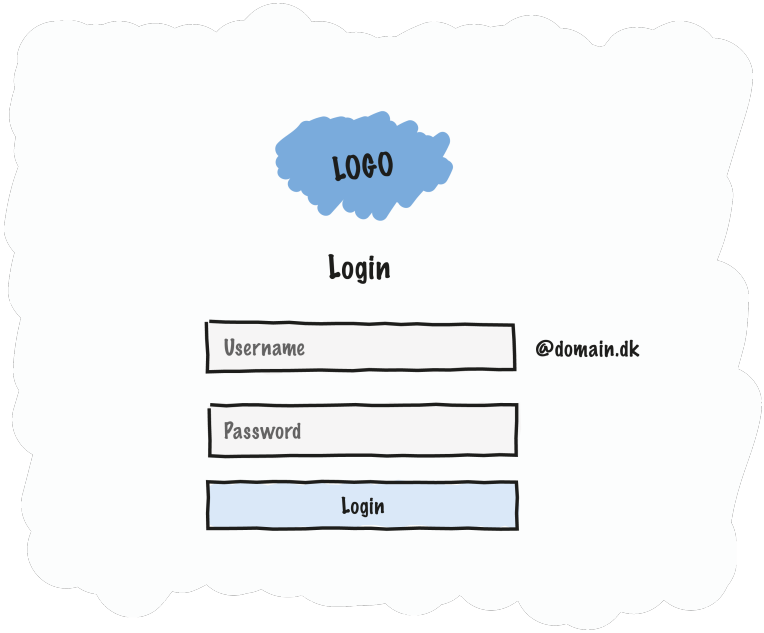

Figure 4: Mockup of the Plan.it login screen

By designing the system following those guidelines, we aspire to create a concept that is self-evident and does not require an investment in user education. As Krug notes: “Your goal should be for each page or screen to be self-evident, so that just by looking at it the average user will know what it is and how to use it” (ibid., p. 58). Consequently, the login page shown in the mockup (Figure 4) was based on all known conventions from systems like Microsoft Outlook, which we know the teachers and administrative personnel at UCplus are already familiar with.
Bringing together best design practices for a good user experience, as Krug (ibid.) describes, brings us to what Norman (2013) labels as successful human-centered design. Ensuring that the user’s needs are met and that the design is user-friendly, meaning that the desired tasks can be solved in an enjoyable and positive way (ibid., p. 219).
Continuing from the login page to the actual course content, the system provides a daily view of the current day after logging in, if he is assigned a class (Figure 5). If not, it provides the course overview. The mockup in Figure 6 shows Plan.it with the navigation pane, which was later removed due to its redundancy, as described earlier.
We designed the course overview to appear similar to a normal calendar, optimized for the features we offer. Compared to a normal calendar’s inclusion of weekends, where weeks are organized in Monday–Sunday fashion, we structured the interface more akin to a list, while still signifying that each row (or week) is a period of consecutive weekdays. Jenifer Tidwell (2011) describes the importance of overview in her discussion of use cases for lists: “What impression will someone get from the list as a whole. […] a user should be able to skim down the list and understand what it’s about.” (ibid., p. 192).
The overview also necessitates a responsive layout. We wanted to make sure that as many items of the list would be shown as possible, no matter what size the device’s screen is. Tidwell (ibid., p. 192)

argues that if the user is looking for something in specific, being able to find it quickly is of great importance. When designing Plan.it, we wanted to limit the number of clicks, time spent on scrolling and moving back-and-forth in the system, and instead create a smooth and simple flow. When clicking an item on the list to enter the daily view, we found it important that the navigation here would be particularly easy to use. Tidwell (ibid.) calls 'browsing item by item' as being able to easily go back when choosing an item on the list or navigating directly to the next one.

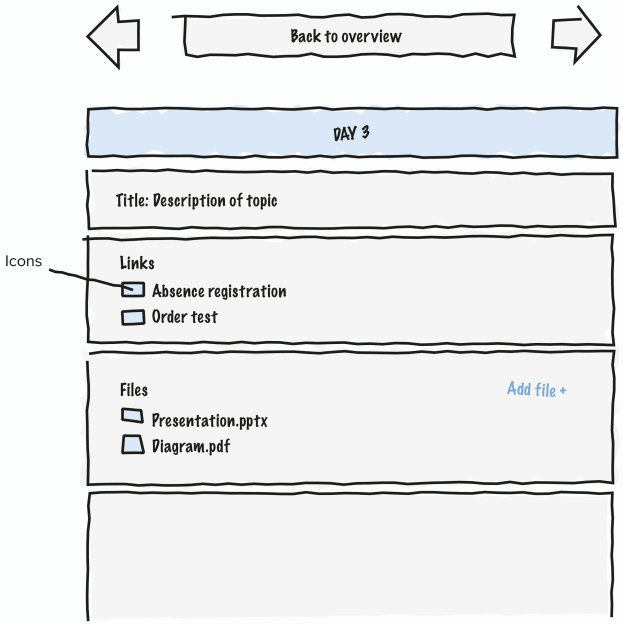

Figure 5: Mockup of the daily overview in Plan.it

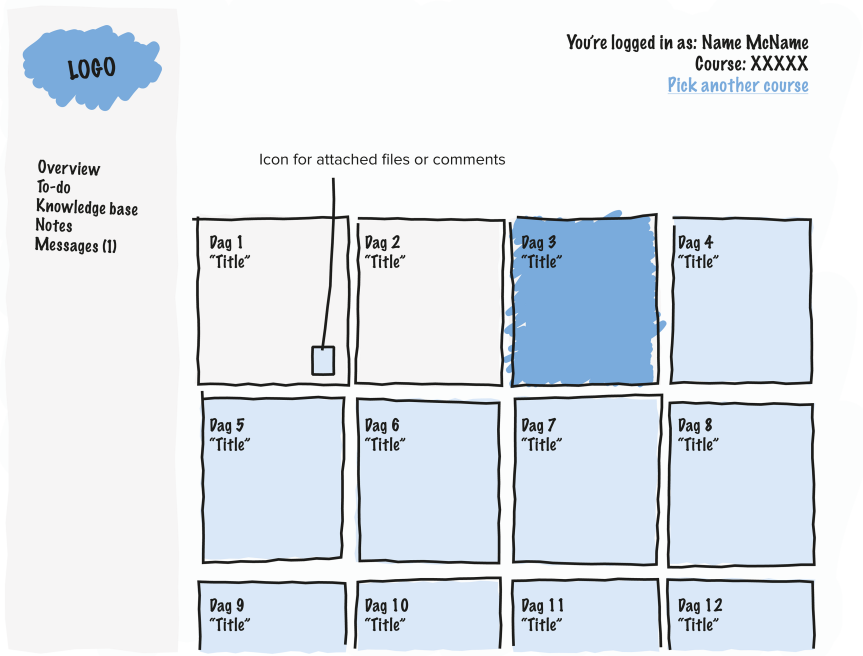

Figure 6: Mockup of the Plan.it course overview

3.3 Feedback session with UCplus

In the beginning of this paper, we mentioned how we set out to identify the real design problem instead of just trying to solve the one we were presented with. And certainly, the concept we presented for UCplus at the first intermediate project deadline was not a book container.

Following the pitch was a feedback panel comprised of Jesper Placing, Vibe Kittelmann (vice president), Majbritt Lindberg (project manager), and Preben Bødker Nielsen (senior consultant). The first thing Placing told us, was that our solution was "quite different than what I thought it would be. And only for the better, I think" (Appendix I). In addition to this, Placing said that if we had only taken his word for it, we would never have come up with this concept. He continued saying that Plan.it looked intuitive and easy to use and that the calendar view would especially come in handy when a substitute teacher would have to teach a class. Here, the administrator could refer to one place that would contain everything needed for the class. Vice president Vibe Kittelmann agreed on this view and used the term 'organizer' when describing the value of Plan.it: "I think it is more than the materials, it is like an organizer and that is very important, especially for the driver license courses because there are so many administrative details the teacher has to remember during everyday" (Appendix I).

Senior consultant Preben Bødker Nielsen added an interesting point about the government-driven platform called Elevplan—a similar solution to Plan.it of which none of us had heard. Nielsen said that Elevplan has a monopoly on the market, and continued: "it might be set free in a few years, but it is not user-friendly. We don't use it, we should, it can do a lot more than that [Plan.it], but it is not user-friendly" (Appendix I). Finally, he added that he "would like that idea [Plan.it], maybe as a compliment for Office 365" (Appendix I).

4. Business perspective: Contextualizing the concept

As outlined in the previous sections, the design rationale behind Plan.it crystallized from user insights, and as such, we've taken a user-centered approach to concept development. To assess overall company viability, it is also relevant to investigate how the proposed concept would fit in current business infrastructure as well as how it would influence other stakeholders.

4.1 The Business Model Canvas

A great tool for gaining an overview of such relations is The Business Model Canvas proposed by Osterwalder and Pigneur (2010). In the case of Plan.it, the concept is not immediately in touch with UCplus' customers, the students. Therefore, the following discussion of business modeling should be viewed as an "internal" business model, where the aim is to provide a service to UCplus' teachers, who, in a sense, become the customer focus of Plan.it.

Figure 7 shows what such an internal version could look like. Many of the relations outlined in the canvas already exist in the workflows we wish to improve upon. Even so, the canvas does highlight key activities and resources vital to the successful implementation of Plan.it, for example the availability of hardware (computers) and the training of personnel in the use of Plan.it.

As an internal tool, Plan.it serves a highly specialized part of UCplus. Their specific needs define what value we should create. In the present case, we focus on better time management and performance during preparation of classes. As an internal tool just for teachers, Plan.it serves a stable, niche user group. We do not aim to revolutionize current workflows with radical, discontinuous innovation;

rather, we simply intend to streamline current procedures and provide a common space to store materials. Therefore, the focus of Plan.it is accessibility, usability, and convenience by proposing an automated self-service platform that also provides space for a co-created knowledge base.

An implementation of Plan.it does not directly create a new stream of revenue, as the concept is for purely internal use and is not employed at the interface between UCplus and their customers, the students. Instead, the aim for Plan.it is to create value by reducing the time spent on organizing teaching materials and increase the time actually spent teaching.

Whereas Osterwalder and Pigneur take a somewhat positivistic innovation-driven perspective on business modeling, von Stamm (2008) offers another approach, identifying common pitfalls and reasons for failure. Even though Plan.it has not yet been implemented (and may never be), we can plan to alleviate any such potential symptoms of Plan.it.

von Stamm identifies existing organizational processes and procedures as possible constraints, pointing to the fact that ingrained habits can impose restrictions on how innovative the concept proposal may be (von Stamm 2008, p. 381). This may turn out to be the case for Plan.it, an incremental innovation, tailor-made to the current organizational infrastructure without challenging and optimizing it. As such, it may be difficult to measure the actual benefits from Plan.it on the bottom line of the budget report.

Instead, it could be seen from the perspective of opportunity cost. The value of a teacher's time is wasted on steps that have no effect on the quality of teaching in the classroom, whereas the value of a teacher's time when planning what and how to teach in the classroom enriches that time. Therefore, our concept returns value otherwise lost to wasteful processes such as looking up and downloading resources.

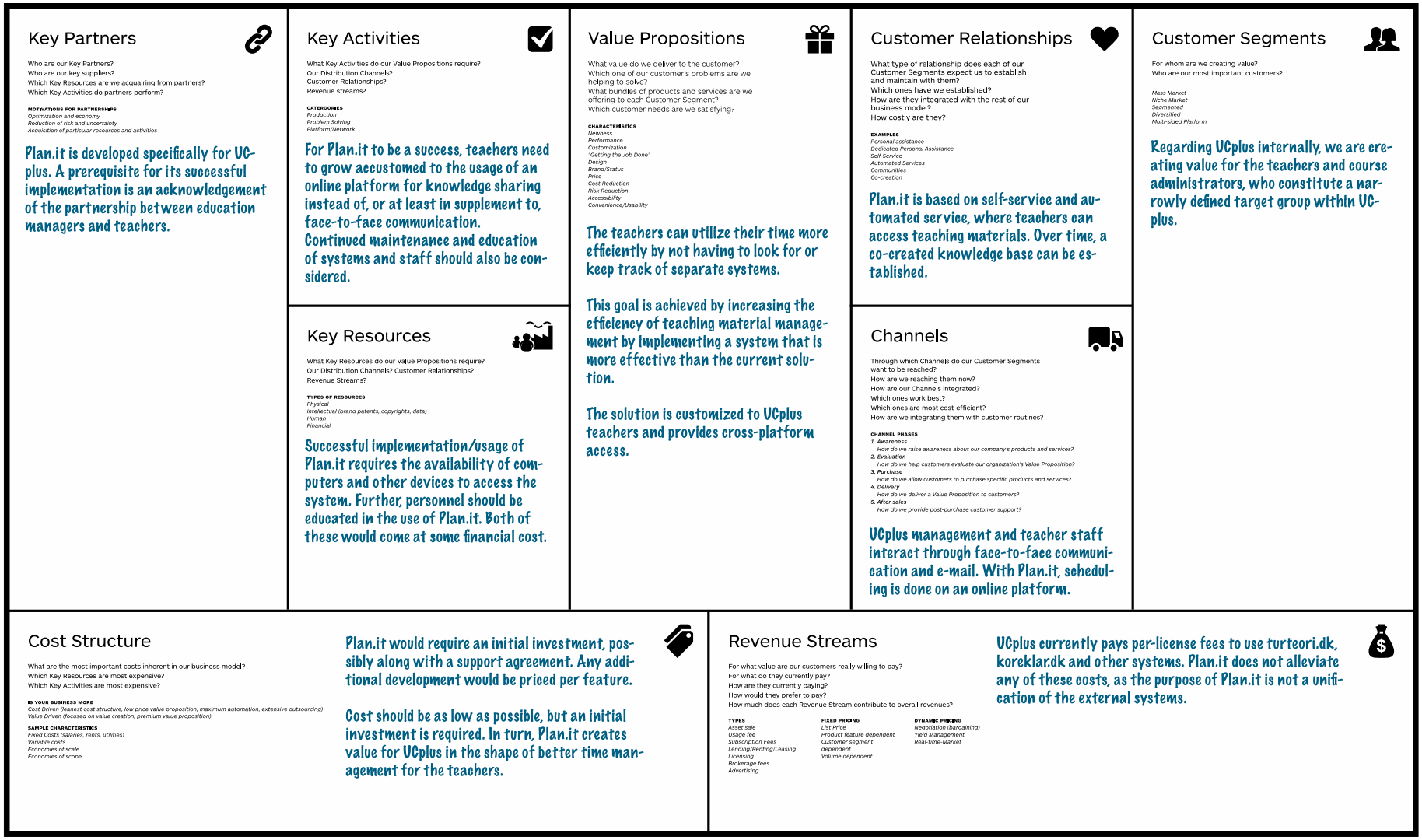

Figure 7: Plan.it business model canvas

4.3 SWOT analysis

Another tool for assessing business viability is the SWOT analysis, a marketing tool for strategic planning. It is used to gain an overview of a business' strategic options in relation to internal and external factors. The focus of the SWOT can be a company, product, service, or a market. SWOT is an acronym for the internal conditions' **s**trengths and **w**eaknesses and the external conditions' **o**pportunities and **t**hreats.

As mentioned by Avison and Fitzgerald (2003) the analysis forces us to explicitly consider the internal positive and negative factors of our concept in relation to the environmental and somewhat uncontrollable influences. The tool can be used for a thorough and highly researched analysis or one can take the 'back-of-the-envelope' approach in order to gain a quick overview of strategic possibilities. In our case, we use the SWOT in the latter sense, as a project method to contextualize our concept within the reality of UCplus, and then decide on which strategic path is the most favorable if an implementation of Plan.it should become a reality. Avison and Fitzgerald argue that the SWOT is a way of "searching for insights into ways of realizing the desired alignment" (Avison and Fitzgerald, 2003, p. 270). The feedback session with UCplus contributed with new insights for the development and marketing of Plan.it. We have outlined the internal and external conditions in Figure 8. Using these new insights to align our final concept is the main aim for the SWOT matrix. For an overview of this matrix, see Figure 9.

4.3.1 Internal conditions

The internal conditions cover the strengths and weaknesses of Plan.it and are identified by evaluating the advantages and disadvantages of our concept in relation to UCplus.

SWOT ANALYSIS **Plan.it**	**Positive**	**Negative**
Internal conditions	**Strengths (S)** **1.** Optimizes the workflow. **2.** Collective knowledge sharing. **3.** Tailor-made for UCplus.	**Weaknesses (W)** **1.** No immediate revenue. **2.** Low initial cost, but long-term service agreement required. **3.** Limited user base (it is designed exclusively for UCplus).
External conditions	**Opportunities (O)** **1.** Integrating the different systems (Turteori, Køreklar etc.) into one complete system. **2.** Incorporating all of UCplus' needs into one system. **3.** Other educational institutes could have the same need for a customizable day planner.	**Threats (T)** **1.** Elevplan is a similar system for organizing courses. It has a monopoly on the market and UCplus might implement it in the future. **2.** Office 365 is a part of UCplus' future and will give the company access to email, calendar and other features that might make Plan.it superfluous. **3.** The new work process may be hard to break in.

Figure 8: An overview of the SWOT analysis outlining the internal and external conditions (strengths, weaknesses, opportunities and threats)

Strengths: The primary strength of Plan.it is that it optimizes the work process and eases the workload for teachers when preparing for lectures and organizing a course. Currently, when a teacher needs assistance, he sends an email or asks another teacher for help, possibly even interrupting a lecture. Even though we are not trying to obviate face-to-face communication, Plan.it does make communication more effective if a teacher has a question for a specific lecture. The benefit of online communication is that it also enhances collective knowledge sharing. Notes between teachers are saved and shared for everyone to see. Another advantage of Plan.it is that it is tailor-made for UCplus with regard to functionality as well as appearance. The most central of our findings is that what UCplus needs is not a book container or a calendar, but a day-to-day course planner with bookmarks for all the different systems the teachers need to use. Plan.it is modular and scalable, with no features that are redundant to UCplus, and the administrators can take away or add functions if necessary.

Weaknesses: The fact that Plan.it is designed exclusively for UCplus is not exclusively advantageous, though. A very limited user base makes training and support a very important feature of the system, since it will not be possible to look for help elsewhere. If UCplus were to invest in Plan.it, the initial cost would be relatively low, because the core functionality is basic and easy to implement. A long-term service agreement would, however, be required in order to cope with future requests for additional features or further development. Seen from a business perspective, the most apparent weakness of Plan.it is that it does not create any immediate revenue streams for UCplus. It is not a tool or marketing strategy for gaining more customers, but rather an initiative that will hopefully create value within UCplus, especially for the administrators and the teachers who can ultimately use their time more efficiently.

4.3.2 External conditions

The external conditions are defined by the opportunities and threats of the surrounding environment, however still within the reality of UCplus.

Opportunities: The overshadowing finding from our research was that the teachers are obligated to work in numerous separate systems when planning a lecture. This includes two separate systems for teaching materials (Turteori and Køreklar), another system for booking tests, another one for registering absence, and yet another to conduct student surveys. As stated in the findings section, teacher Christensen stressed that the individual systems (for ordering tests, etc.) work slowly and have poor focus on usability. The dream scenario as described by Christensen, Farver, and Rasmussen in the interviews would be to have *one* system where all teaching resources were integrated. Fulfilling this wish, however, would require a lot more research and a whole new definition of the stakeholders.
When Placing presented us with UCplus' challenges, the need for a test container and a system for managing resources were also among the issues. Therefore, another opportunity would be to design one intranet for all UCplus' needs, not just the ones regarding teaching.
The final opportunity is seen in a wider perspective. Other educational institutes might have the same need for a concept like Plan.it, when struggling with the same difficulties of organizing courses. If we (through market research) found a need for a customizable day planner in similar small businesses, Plan.it could expand its customer base.

Threats: At the final pitch and feedback session with UCplus, we learned that a system called Elevplan, which has a monopoly on the market, would be set free in a few years. Although very similar to the functionality of Plan.it, Elevplan has a lot more features but, as Senior Consultant Preben Bødker Nielsen described, "is not at all user-friendly. We [UCplus] don't use it—we should do—it can do a lot more than that [Plan.it], but it is not easy to use" (Appendix I). Opting for Elevplan would most likely render Plan.it redundant.
We were already aware of the fact that an integration of Office 365 is a part of UCplus' near future, as Placing informed us of this at the very beginning of the development process. This upgrade will give the company access to email, a calendar, and additional features that might make Plan.it superfluous. A final and possibly inevitable threat is that the new work process may be so different from the current situation that it will be difficult to achieve in practice.

4.4 SWOT matrix

Once the SWOT analysis has been conducted, the prescribed way to continue is to make a 2×2 SWOT matrix. This is used to examine how the business can take advantage of opportunities and minimize threats by exploiting strengths and overcoming weaknesses. The SWOT matrix and possible strategic initiatives are outlined in Figure 9.

4.4.1 Possible strategic initiatives

Combining the earlier identified internal and external factors provides us with four strategic approaches and a series of possible strategic initiatives for Plan.it. Figure 9 gives an overall view of the SWOT analysis and matrix. In the following we will present the four different strategies. The aim is to maximize the influence of the concept's strengths and opportunities and minimize the influence of the concept's weaknesses and threats.

The *maxi-maxi strategy* uses a concept's strengths to maximize opportunities. In our case, this strategic approach would fit a long-term plan for our concept. Integrating all the systems used by the teachers into one interface is the dream scenario, but it would have to include external stakeholders and require further research and extensive system development. The same would apply if we were to design Plan.it for all of UCplus' needs instead of just the teachers' needs. By assembling all the issues regarding internal management systems, the collective knowledge sharing across UCplus would be increased. Finally, we identify the prospect of creating a customizable system to sell to other similar small businesses on a license basis.

The *maxi-mini strategy* uses the strengths to minimize threats. One initiative would be to have Plan.it function as a launchpad for Elevplan. Plan.it could be a way to bridge the gap before Elevplan becomes a reality for UCplus and prepare teachers and administrators for a new online workflow when it comes to organizing courses. The maxi-mini strategy includes strategic initiatives that seem to be the most realistic and favorable for UCplus, considering they do have to use Office 365 and eventually might also have to convert to Elevplan. A benefit to UCplus' disposition towards Plan.it, as opposed to Elevplan, is that the company may get a surplus of irrelevant features with latter, and as Nielsen mentioned in the feedback session, "[…] I would like that idea [Plan.it], maybe as an addition to Office 365" (ref. feedback sesh). Making sure that Plan.it can integrate with Office 365 is of great value. If Plan.it succeeds in meeting all of UCplus' needs for organizing courses and has an inviting, customizable and user-friendly interface, they may want to keep it instead of investing in a new system.

SWOT MATRIX
Plan.it

	Strengths (S) **1.** Optimizes the workflow. **2.** Collective knowledge sharing. **3.** Tailor-made for UCplus.	**Weaknesses (W)** **1.** No immediate revenue. **2.** Low initial cost, but long-term service agreement required. **3.** Limited user base (it is designed exclusively for UCplus).
Opportunities (O) **1.** Integrating the different systems (Turteori, Køreklar etc.) into one complete system. **2.** Incorporating all of UCplus' needs into one system. **3.** Other educational institutes could have the same need for a customizable day planner.	*Strategic initiatives (maxi-maxi)* **SO1.** The workflow would be further optimized if Plan.it integrated all the systems used for planning a class into one large system. **SO2.** If Plan.it also included managing of resources, the collective knowledge sharing would go across the entire company. **SO3.** Creating a customizable system to sell to other similar small businesses on a license basis.	*Strategic initiatives (mini-maxi)* **WO1.** The valuable return of Plan.it is most likely to be seen in an easier workflow for teachers. If the return was significant, an investment in one integrated system could be worth considering. **WO2.** From a long-term perspective, if agreeing on a service contract of some sort, it might be beneficial for both UCplus and the design team to look into other UCplus needs Plan.it could solve. **WO3.** If other companies were interested in a solution like Plan.it, there would both be a market to exploit, but also a growing user base to both finance further development and address the need for support.
Threats (T) **1.** Elevplan is a similar system for organizing courses. It has a monopoly on the market and UCplus might implement it in the future. **2.** Office 365 is a part of UCplus' future and will give the company access to email, calendar, and other features that might make Plan.it superfluous. **3.** The new work process may be hard to break into.	*Strategic initiatives (maxi-mini)* **ST1.** Plan.it could function as a launch pad for Elevplan and prepare the staff for a new work process. In that way, Plan.it could bridge the current gap. **ST2.** Office 365 is also a part of UCplus' future. Email and calendar invites/notes could be integrated with Plan.it for further knowledge sharing. **ST3.** The teachers may be so set in their ways that the new system will be hard to break into. However, if it is tailor-made to their needs and not just another overwhelming system, they might be encouraged to use it.	*Strategic initiatives (mini-mini)* **WT1.** Plan.it could function as a test to see if a similar system even functions within UCplus, before they decide to invest in Elevplan. **WT2.** The initial low-cost investment in Plan.it might suffice until UCplus gets Office 365 and perhaps also Elevplan, and therefore extra features will not be needed. **WT3.** Only a few people will have to be trained in the system and these few people are already working closely, making the training and introduction of a new work process more manageable.

Figure 9: An overview of the SWOT matrix with possible strategic initiatives. The matrix is used to examine how we can take advantage of opportunities and minimize threats by exploiting strengths and overcoming weaknesses.

The *mini-maxi strategy* minimizes the weaknesses by exploiting opportunities. The value of Plan.it will be difficult to measure, but aims to create value for the teachers in their everyday work. However, if UCplus realizes that internal workflows are worth investing in, a basis for one integrated system could be up for discussion. If UCplus agrees on a service agreement with us, a contract for further research into how to include UCplus' other needs in Plan.it would be one way to proceed with the project. And finally, if other companies were interested in a solution like Plan.it, there would be a market to exploit as well as a growing user base to finance further development and address the need for support.

The *mini-mini strategy* is used for minimizing weaknesses and avoiding threats. First, before UCplus decides to invest in Elevplan, Plan.it could function as a test to see if a similar system even functions within UCplus. Second, the initial low-cost investment in Plan.it might suffice until UCplus gets Office 365 and Elevplan. In that case, extra features for Plan.it will not be needed. Third, only a few people will have to be trained to use the system. These few people already work closely, making the training and introduction of a new work process more manageable than if they were to integrate a new system in all aspects of the company.

4.5 Minimum viable product

Turning, for a moment, away from the proposed strategic initiatives presented above, we note that it can be fruitful to consider the minimum viable product (MVP) that would solve the problem we identified through our research. An MVP would not only bring us the benefit of actual *in situ* testing of the concept, but also help us identify good and bad aspects of the concept, while still allowing the development process to continue (Ries, 2011). The MVP mentality does not focus on creating one product that solves every conceivable aspect of the design problem, as in a classical 'planned' innovation strategy. Rather, it focuses on a product that allows the completion of one revolution of the iterative cycle, including the learning outcomes of such a revolution (ibid., p. 77). In the following iteration, errors would be corrected, ultimately leading to the launch of a new and better product.

We argue that Plan.it can be viewed as such an MVP. Whereas the potentials identified in the SWOT analysis would certainly contribute to a more full-fledged product, they would also prolong development time, possibly even interfering with the upcoming Office 365/Elevplan implementation. Even though we've sought to anticipate these technical upgrades, we can only guess about their actual influence on the workflow and mentality at UCplus, and thus their influence on the relevance of Plan.it.

We've hinted that Plan.it could serve as the basis of further development cycles, which is certainly in line with the MVP idea. Still, it may be counterintuitive for UCplus to launch several consecutive products if their innovation strategy is more planned than emergent (von Stamm 2008, p. 100). In this case, however, the product is purely for internal use, and does not relate directly to the revenue stream(s) generated by UCplus' customers. As such, the launch of an incomplete product in the shape of an MVP would not lead to missed revenue in the same sense that, say, a reduced number of students passing the courses would.

4.6 Designing a service

In relation to von Stamm's perspective on service design, Plan.it can be characterized as a service because of its intangibility (von Stamm, 2008, p. 360). Even though the final concept would be housed in an

IT system, the function of the concept is to provide a service to UCplus' teachers.
In service design, as opposed to product design, we need to be aware of the consequences of the intangibility. von Stamm points out that "[...] you cannot look at [the designs] or touch them and that they are difficult to assess before a purchasing decision is made." (ibid., p 361). This means that we have to sell the concept to UCplus solely by its idea. Consequently, this necessitates the formulation of strong selling points immediately related to the strengths of the concept, as we don't have an opportunity to test drive a tangible preliminary solution. Further, the internal value creation needs to be underlined since, as we saw earlier, the policy makers of UCplus do not gain access to any previously inaccessible revenue streams as a direct result of Plan.it. Luckily, the feedback panel seemed eager to develop and implement Plan.it regardless, quickly realizing the benefits of such a concept (see chapter 3.3).
In service design, the creation and consumption of the service usually happens simultaneously (ibid., p. 361). This is also the case for Plan.it, where the value arises from the teacher interacting with the system, thus saving time, and immediately leading to the use of said value (time) elsewhere. Compared to the face-to-face services that are currently available to teachers at UCplus, Plan.it has the advantage that teachers can effortlessly go back and reference the system in cases of doubt or forgetfulness.
Another more general challenge we face when developing the Plan.it service is to protect property rights. As von Stamm states, "unlike tangible products, which often are built around complex technologies or formula that can be patented, services are very difficult to protect." (ibid., p. 364). The most evident way to protect property rights is to keep the concept a secret to any potential competitors until it is implemented. In this case, however, other project groups from the IT University of Copenhagen involved with UCplus already know of Plan.it, because students were required to participate and listen to each other's project pitches. One vulnerability of Plan.it is its similarity to other available systems, which could just as easily be implemented by competing entrepreneurs. Still, one could argue that neither our project colleagues from ITU (who are deeply focused on their own ideas), nor competing companies would be conscious of the existence of Plan.it, let alone steal the idea. Indeed, Eric Ries points out the near impossibility that a startup company has their idea stolen: "The truth is that most managers in most companies are already overwhelmed with good ideas. Their challenge lies in prioritization and execution, and it is those challenges that give a startup hope of surviving." (Ries, 2011, p. 111).

5. The final concept

Our pitch of Plan.it via user journey to a panel of UCplus personnel was well received. To repeat that success, we would like to present the concept again as a user journey in this report. An overview of the journey is presented on Figure 10.

Let us follow Tim Christensen, a teacher, as a regular user of Plan.it. Tim is at work planning for his next class. Before he used Plan.it, he would be spending this time figuring out what he needs to talk about next class and also remembering the links to those resources. Now, he uses his computer to log in to Plan.it with his UCplus email or just his first name (e.g. "tim" from tim@ucplus.dk—see Figure 11). In order to keep UCplus' edge over the competition, access to Plan.it is closed to only UCplus domains, thus allowing the simpler name-only input.

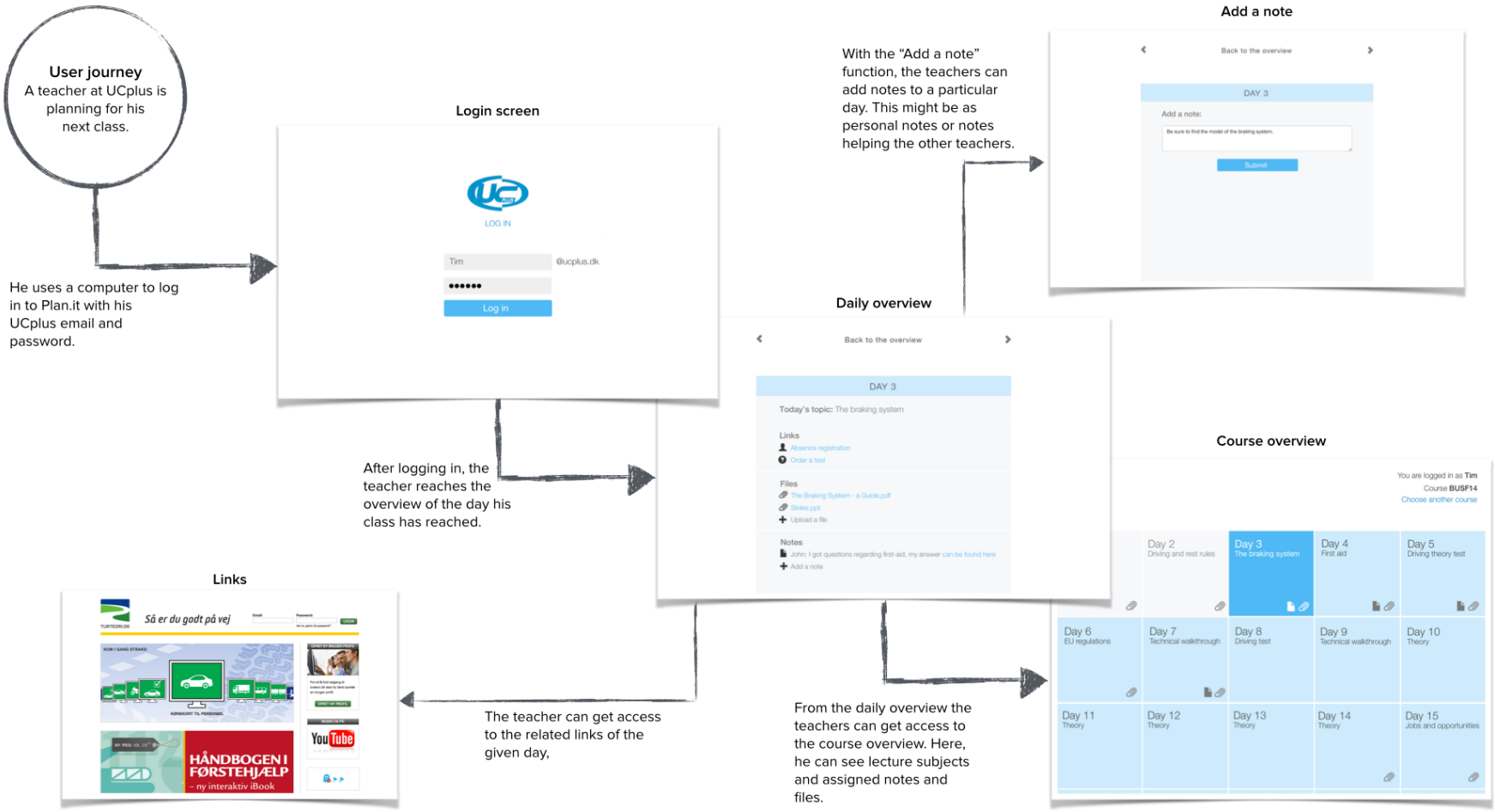

Figure 10: An example of a user journey using Plan.it

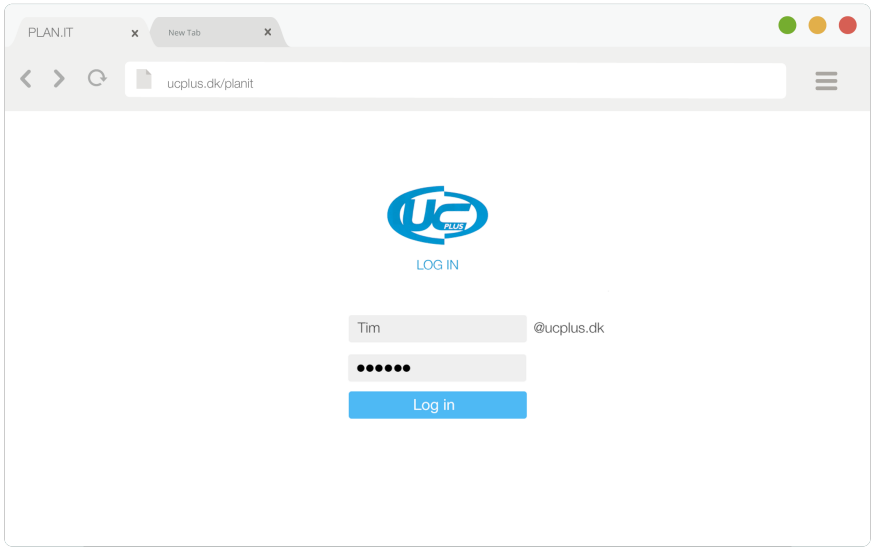

Figure 11: The login page of Plan.it

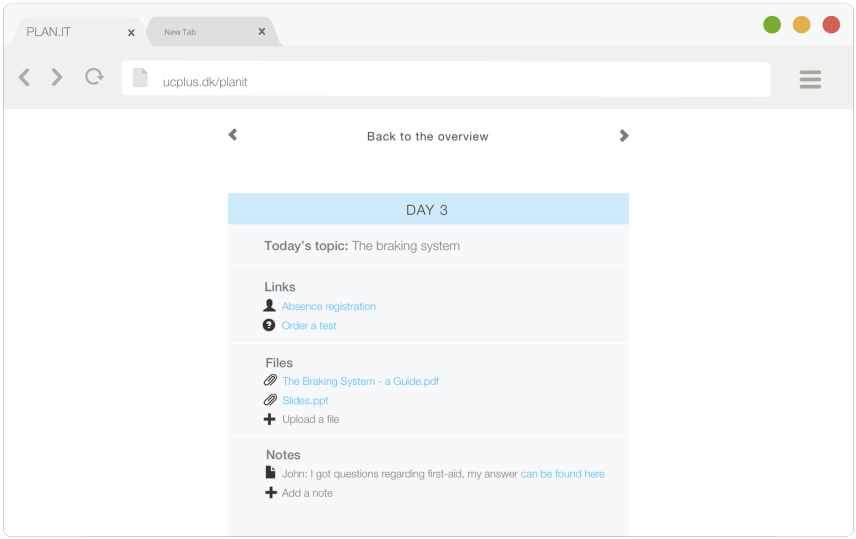

Figure 12: Plan.it's daily overview

After Christensen logs in, the first thing he sees is the next day's lesson plans. Today he's getting ready for day 3 of 30. Peter Farver, a Plan.it administrator, has already added the links for each day (Figure 12).

Farver can edit the links and files on any class. Christensen is not involved in this process and can only add files and notes. This would help prevent any accidental or mistaken edits by less tech-savvy teachers and allow Farver more strategic control.

The topic for day three is brake systems, so Farver has already attached the relevant guide and Powerpoint file. Tim opens the Powerpoint file in Microsoft Office 365, adds a couple of notes to a slide, and re-uploads it. He also takes note of what John Oksquist, another teacher, mentioned about the first aid and skims through the web page he linked to. This reminds him of a student's question from a previous class and he adds a reminder note of his own.

Now that Christensen is ready for his next class, he clicks the link at the top to view the full course plan to check that the next day's files are ready and uploaded (Figure 13).

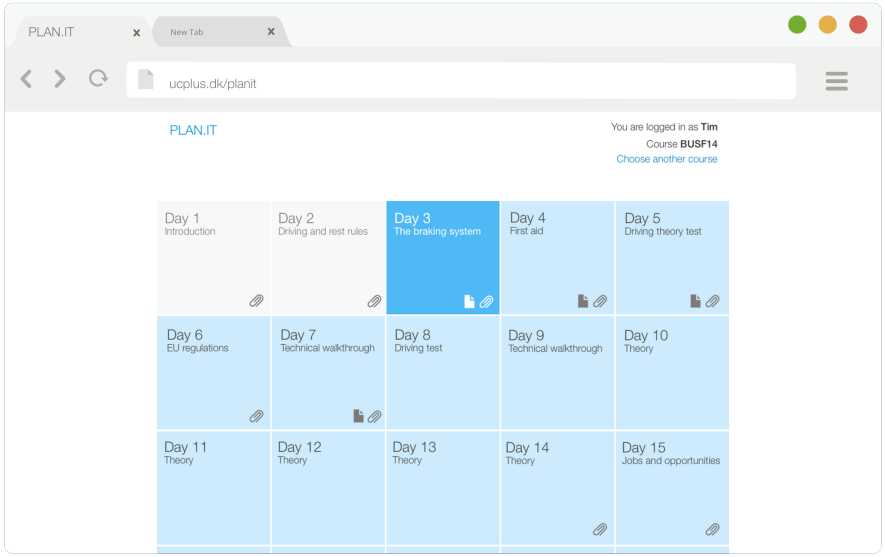

Figure 13: Plan.it's course overview

The upcoming day is highlighted in the sharp blue color, past days in grey, and later days in light blue. Files and notes uploaded to each day are indicated by icons in the lower-right corner. User information is in the top-right.

Christensen spots the paperclip icon in the bottom-right corner of days four through seven, meaning that Farver has prepared well in advance for the teachers. He notices a few of the days have note icons, meaning other teachers have comments. It's almost time for lunch, so he decides to check it on his phone later.

Since UCplus uses desktops and tablets, and teachers have their own phones, Plan.it is designed once using a responsive layout. This allows only one product to be created and maintained and used across any device, instead of creating several different instances specialized for certain devices. This should save UCplus money and budgeting headaches in the future as government decisions can suddenly spell trouble for projects such as this. The system is also modular and scalable, allowing the product to simply be built upon like a platform well into the future should different needs arise.

By improving teachers' time management, Plan.it provides value in savings and efficiency. It will accommodate for the current difficulties of planning and managing the course lectures by organizing daily resources. Streamlining the long and cumbersome process of accessing booking systems for tests, downloading classroom materials, or sharing resources internally, we are returning wasted time and effort back to UCplus' customers. The planner will of course be individual, following each teacher's course, giving him or her a simple overview and schedule of today's tasks, lecture slides and reminders. However the mission is also to create a common file- and note-sharing service for the teachers and thereby avoid having files stuck on a local computer or not making use of each other's knowledge. These affordances and features were derived from the invaluable insight to teachers' daily tasks. However, it was not without some difficulty in actually finding the right problems, as we discuss in the following section.

6. Discussion

6.1 Reflections on methods

Overall, our methods of interviews, observation, and an e-mail correspondence yielded sufficient results for our concept. The initial correspondence with and presentation by Placing gave us some initial insight to start investigating; however, they were limited due to Placing's second-hand account of the actual problem. We could have better understood the problem by speaking to a teacher already from the beginning of the process. Furthermore, our observation of a class at UCplus did not result in much usable information other than accounting for the IT network and equipment. We could have instead observed teachers planning their lessons for a live demonstration of what we learned in an interview; however, the volume of requests by other project groups precluded us from arranging more research opportunities.

After the kick-off meeting with Placing, we requested directly contacting him in order to investigate further. However, our course instructor did not allow this and instead required us to submit a questionnaire. This questionnaire was combined with others—unrelated to our concept—in a document attached to an email sent to Placing. This resulted in a longer, less-focused method than one we would have prepared ourselves, and it yielded responses inferior in quality and insight, as reported in the findings of Michaelidou and Dibb (2006, pp.291-293).

Our interviews with teachers and administrators at UCplus, though, were insightful enough to understand the context of use of our concept. On this basis, we sought to create a user-centered design, and were interested in getting to know the end user. This prolonged the initial research stage in order to fully inform our choice of design pathway. Consequently, we never had the chance to gain prototype feedback from Christensen, Farver or Rasmussen themselves, who would ultimately use Plan.it. Had we presented them with our initial idea—the Podio sketch—we may have gained other insights than our ethnographically inspired studies. Still, this approach might also be vulnerable to bias, as it may be difficult for the user to identify strengths and weaknesses in a design that is only presented on paper. In line with this notion, Norman advises that designers ask their clients what they want no less than five times to identify the underlying problem (Norman, 2013, p. 165). Thus, by already presenting UCplus with a sketch so early in the process, we might lead them down a design path and potentially close off other, more relevant, pathways.

6.2 Asking people what they want

That being said, the phrase "ask them what they want" may be dangerous to use here. At the outset, we wanted to identify the underlying problem that had prompted Placing to come up with the book container. However, as Henry Ford, founder of Ford Motor Company, is often quoted for having said, "if I had asked people what they wanted, they would have asked for a better horse" (Thomsen, 2014), pointing to the importance of identifying the problem without asking specifically what it is. Paradoxically, in our approach, we ended up asking just this question, albeit formulated differently, in our interview with Farver and Rasmussen. In the interview, we introduce Placing's book container, and ask the interviewees how they feel about it. What they go on to describe provided, for the larger part, the design criteria for Plan.it. To regain a more user-centered focus, one further point of study would be to introduce Christensen, the core user of Plan.it, to the concept, and go through another design iteration. As Placing mentioned, "[...] the only way we can try to position ourselves

would be to make the teaching better. That is our only competition parameter" (see Appendix G). In other words, it would be relevant to investigate whether a system such as Plan.it would actually ease the access to materials used in the classroom, enabling the teachers to utilize their time more efficiently, ultimately giving UCplus as a whole an edge over competitors.

6.3 The influence of the design team

Our initial team composition was a group of people with similar interest in an idea. As we developed the idea, we each reached upon our past experience and individual strengths to contribute equally to a final concept. As a small group of five members, each accountable for the outcome of our concept and each contributing to its success, we comprise what von Stamm describes as a "real team" (von Stamm, 2008, pp. 125-126). By fragmenting the overall structure of the project, we have been able to act in parallel, allowing us to work autonomously with our individual functional strengths and come together periodically to synthesize and share our knowledge. This structure is well suited to our concept, which seeks to enhance UCplus' existing methods by more innovative means (ibid. pp. 126-128).

Our organization could be compared to a brain, where we maintain our identity despite the flux in our concept from idea to implementation. We have distributed our capacity for concept development and control throughout the team as we often work in parallel; however, our holistic identity and drive has been constant. Considering the initial pitch, our initial concept, subsequent research, and final concept were all quite different. It is by our brain-like organization that we could maintain the real concept throughout the process. This has been important for this phase as an external design team investigating the problem space, but it would likely not quite suit us as an internal—or at least less external—implementation team. Instead, it would likely be more important that our culture merge with that of UCplus so the final product can be improved among, rather than externally for, the users (Morgan, 2006).

That being said, we inevitably enter into the design challenge with our own agendas. As design students following a concept development course, we have to meet learning goals and get good evaluations, a lot of which requires theoretical discussion on a somewhat elevated level of abstraction. In theory, we can meet such goals discussing whichever concept, including ones not necessarily suitable to UCplus. Indeed, we've focused on both strengths and weaknesses in the presented work, whereas a "real" design agency might work harder to minimize weaknesses and empower strengths. As such, the gap between the outcome we aim towards and the one relevant to UCplus may be bigger than in truly real-life scenarios.

7. Conclusion

Our preliminary methods, including referencing pre-defined problems presented by Placing, yielded a rather misguided solution. These solutions were trying to solve the problem that we thought UCplus had. By tracing the presented problem back to the original complainants, we first defined our user groups: teachers and teaching administrators. Next, we observed them in the context we initially thought their problem lied in, which yielded few helpful insights. After interviewing teachers, a teaching administrator, and the head of IT, we discovered they had problems in their class preparation process. That is, it took an inordinate amount of time and effort to remember where to find class resources and then access them before and during class. We focused on returning this wasted time and effort to

them by offering an information management solution. Plan.it provides teaching administrators a place to list class resources for each day in UCplus' courses. With these in place, teachers can then access pre-listed resources before class and use that time to prepare how to use it. UCplus as a whole benefits from this as teachers can improve the quality of their teaching and increase the amount of time available to students. Considering UCplus is a government-regulated company, its only business advantage over its competitors is the education value of their courses. By capitalizing on time management and designing for a small, focused set of users, we developed a concept that can increase the value of the company with little implementation cost.

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Appendix A – Observation preparations

Write down your preconceptions

Mark:
Teacher uses paper sheets, not digital material. Either printed or probably copied from books or earlier prints. I imagine the class as know from when getting my drivers license. paper sheets containing theory, picuressamples and followup questions, either individually or all together. The teacher may use a projector, smartboard or so.

Andrew:
Teachers gather material outside of class from recognized, accredited sources, probably recycled every year from sources used by previous teachers. They print the material for themselves and take some teaching notes, and print copies of material without notes for students. Each student gets a bunch of material over the year and likely keeps it all together in a binder. They may bring to class all material over the year or just from the previous class, or none at all. They probably write notes or highlight on the copies and reference them later. Their computer interaction with the course is likely limited to tests and seeking extra information rather than organizing and fetching per-class information, as we are intending to allow via Plan.it.

Toke:
I expect students to shuffle papers around. The teacher might say things like 'if you go to page XYZ, you will see [...]'. Some time will go to waste while students find the place in the text.

Nadja:
The teacher will focus on the whole class at once and not take the individual student's needs into account. I presume that the communication will be characterized by one-to-many communication and not so much class discussions or breaks of group work/smaller group discussions.

Write an observation guide - you can not focus on everything

The purpose of the observation is to observe the students in their natural surroundings in order to gain an understanding of the context we're designing for.
By doing an observation study we hope to reduce the gap between "say" and "do".

What do we want from the observation:

How do teachers apply their lesson plans to the actual class?
How do teachers interact personally with students?
How often students and teachers reference their computers?
To see how paper copies are handled (?)
What kind of material do students get in class, and how do the students use it?
Do teachers have the same material as the students?
How much material do students bring, get, and take away from each class?
Do teachers only offer material as paper copies in class, or can they be fetched online or from an always-available location like their office?

How many people and how long time?

1 teacher in a class of ? students.
In total at school: 40 teachers, 8000 students per year
We'll probably only be allowed one class period, or at most several class periods in one day

Brief your participants beforehand

We'll sit in the class, perhaps each of us focusing on something/someone in particular. Let participants know we're just observing and they should consider us invisible. Let them know we're not evaluating performance or anything that would make them nervous or shy.

Appendix B – Guide for interview with Christensen, Farver & Rasmussen

Date & time: March 27 08:30-12:00 (interview from 10:00-11:00)

Interviewees:
I. Tim Christensen
II. Peter Farver & Henrik Rasmussen.

Conducted by: Mads Fors, Toke Fritzemeier, (Nadja Toft)
Location: UCplus, Mileparken 12A

Presentation

- Who are we
- Our roles during the interview
- We'll try to keep it short (under 40 minutes)
- Please don't hesitate to add thoughts or comments during the interview if you're inspired by something your colleague said

Introduction

- Please introduce yourselves...
    - o What are your educational backgrounds?
    - o What are your professional backgrounds?
    - o How long have you worked at UCplus?
    - o How long have you worked together?
    - o Which topics do you teach?

Preparation for teaching

- [TURN TO ONE OF THEM] Imagine you haven't prepared for your next class yet. Walk us through how you prepare the lesson and gather material [MOVE PAPERS, DOWNLOAD FILES, SOUND, VIDEO]
- Why do you choose to prepare in this way? [EXAMPLE FROM WHAT WAS JUST SAID]

• How do you utilize teaching material during a class? [MAYBE WE JUST SAW THIS DURING OBSERVATION]
• [TURN TO THE OTHER] Do you do anything differently?
• Is there anything that could improve the preparation process? [EXAMPLE FROM WHAT WAS JUST SAID]
• How do you structure the entire 6 week course? [ONE DAY AT A TIME/THE ENTIRE COURSE AT ONCE]

Selection of teaching material

• How do you find the teaching material you need? [SCAN BOOK, DOWNLOAD FILE, ...]
• Which selection of teaching material is available to you?
• Who decides what should be available?
• What is your opinion of the available material?

Planning the course

• What is formally required of your teaching?
• Who makes these demands? [UCPLUS MANAGEMENT, MINISTRY, ...]
• What do you do in order to fulfill the requirements?
• Which liberties can you take to influence the teaching agenda with your own ideas/initiatives?
• If you had infinite time and resource to teach a student (or a class), what would you change?

Technology/computer use

• Which forms of hardware do you have access to in your work [COMPUTER, WORK PHONE, TABLET, PROJECTOR, OVERHEAD]
• [TURN TO ONE OF THEM] Walk us through your usage of these types of hardware during a typical work day
• When is [COMPUTER, WORK PHONE, TABLET] particularly useful?
• When/where could it be even more effective?
• Do you have any wishes for extra functionality?
• [TURN TO THE OTHER] Do you have anything to add?
• When/where do you use electronic communication with the students? [E-MAIL, PHONE, SMS]
• Are you satisfied with the options for dialogue between student and teacher outside the classroom [E.G. QUESTIONS RELATED TO CURRICULUM, ASSIGNMENTS]

Round-up

- Thank you for your time and answers!
- Do you have any questions or anything to add?
- Can we e-mail you with any follow-up questions?

Appendix C - Guide for interview with Jesper Placing

Interview with Jesper Placing, by Andrew Nelson
2014-03-27 10:00

Greetings, introduce team 10, ask if anyone else (especially business/IT) would like to join us for an interview (30-40 minutes)

Ask to tour the technical aspects of UC Plus (computer labs, server room, IT offices), while discussing general knowledge of UC Plus business, facilities, history

Find a place to talk in detail about the following:

Business
Who came up with your book container pitch? Why?
Did it stem from a problem, business issues, a chance to capitalize on something, etc?
To be used for motivation section of paper
Have attempts to reorganize lesson planning occurred before? What were the results?
What were the variables that impacted this?
To be used for research question section of paper
How does the business model or goals of UC Plus affect what is taught in the classrooms?
Are there any financial constraints on the classroom?
e.g.: resources, keeping teachers on site and available to students…
Do teachers ever ask for technical or financial resources beyond what's generally available?
e.g.: do they ever have unique ideas for their classes, or do they just teach with what they're given?
What is the current IT budget? Could you make a recent budget report available to us?
What financial impact do you think this could have?
Would this create value to the company as a whole or any stakeholders?
How do you think our (upcoming) concept would work with your budget?
What modifications to our concept would fit the current budget?

What modifications to the budget would fit our concept?
What would motivate administrators to modify the IT budget?
Would development and design be done in-house, or would you hire an external company to build this? What is your ballpark budget? Do you have any companies you currently use for such tasks?
Do you think this book container could be abstracted and used differently for other internal use, such as for administration, IT, or other departments? How so?
IT
What means of communication do teachers and students have?
Do teachers or students get UCPlus system accounts? Is it for on-campus machines, or network-access only (do you have a VPN access point?)
What features do teachers or students have access to via UCPlus systems? Email, website with personal information?
Do teachers and administrators get UCPlus emails? such as jp@ucplus.dk
What resources would the IT department be able to provide for a book container solution?
e.g.: hosting, DNS, tech support, data entry/organization
Who would be able to maintain the system technically? Would you add it to your task list or hire someone new? Perhaps it would only be made once and never updated?
We heard about some technical issues last week. Could your servers handle the load our solution may bring? Would you be able to afford more blades or an upgrade or a dedicated sysadmin?
How would you provide help and reference to users?
Direct questions and training to a person like you?
Provide written documentation?
Trainings or workshops?
What other technical resources are available to classrooms, individual students, or special projects (if there are any) upon request?
What material is UC Plus allowed to use in lesson plans? Does licensing, fair use, business partnerships, or copyrights prevent you from using or distributing certain material?

Conclude, discuss follow-up questions, ask about other business contacts for further questions

Appendix D – Observation notes

Classroom observation, 27/3 09:00-10:00 - notes from Toke
One student is surfing EB.dk in the break
Casual conversation among the students - “John’s bringing cake!”
Turteori.dk is the teaching platform. One student turns to us and says they need new computers.
The tone of voice among the students is informal and joking.
People get up and walk around the room during class.
The students don’t raise their hands when answering the teacher’s questions
The teacher is lecturing from the blackboard
The students pay attention and do not look at their computers when Tim is speaking (at least in the beginning of class).
One student logs into Facebook during class. Shortly thereafter, the student next to him goes to EB.dk
Tim asks questions to the entire classroom, and they are answered collectively.
Other times, Tim asks specific students.
At one point, one of the other teachers came in to the class asking Tim for help.
Tim lectures from a Powerpoint presentation. It contains pieces of text in list format along with pictures.
The students have to take an EU test very soon (in a matter of weeks).
There’s a break from 9:30-9:45
The lecture goes on from morning until lunch. In the afternoon, the students use the computers for self-studying and exercises.

Appendix E - Interview with Tim Christensen

Interview question	Category/Theme	Quotes	Timestamp
How long have you worked at UCplus?		"I started April last year [at UCplus] as a temporary teacher. In August I got permanently employed (...)"	[01:40 – 01:51]
What topic do you teach?		"I teach all theory related to the driving license and I teach most of the theory related to the EU- qualification certificate. Besides that, I am also a safe-driving instructor."	[02:09 – 02:32]
Imagine you haven't prepared for your next class yet. Walk us through how you prepare the lesson and gather material.	Preparation Teaching methods	"When I have to teach something unfamiliar; right now I have just been teaching 'City-Traffic in driving and resting hours' and 'the tachograph - which is a control device' – I have been compelled to prepare during the lectures because of limited preparation time. When the students solve assignments on the computers, I have time to prepare what to say next." "In the first part of the day I typically teach on the blackboard, in the second part of the day I am present in the classroom while the students work on their computers with exercises related to the subject I have just covered. During this session, I am typically able to prepare for future lectures." "I find that the more one acquaint oneself with the subject, the less time one needs to use to prepare. But I still have to prepare on some of the subjects. I usually prepare at home — unfortunately there is not enough preparation time as there ideally could be. But that is a decision from the management."	[03:04 – 03:42] 03:43 – 03:58] [03:59 – 04:26]
How do you utilize teaching material during a class?	Teaching materials/methods	"I use PowerPoint. I have a few materials within the classroom — the brake system as an example. I also have some tests, which I can give the students. However, for the most part of the lecture I teach at the blackboard. I think the best result is achieved this way, mainly because of the communication I have with the students."	[04: 28 - 05:25]
Why do you choose to prepare in this way? [example from what was	Preparation	"It is very important for me to have good control of the material. There is nothing worse than being caught unprepared and being questioned unprepared.	[05:27 – 06:27]

just said]		Some of the EU-qualification and first aid theory is very comprehensive, but the students ask about these things because they are part of the exam.	
Is there anything that could improve the preparation process?	Preparation	"To have some time set of for preparation, without having to answer questions from the students at the same time, that would be preferable."	[06:30 – 06:58]
How do you structure the entire 6-week course?	Lesson plan	"I know from the very beginning how the whole course is structured, which parts we have to cover, et cetera. That is determined by the Ministry of Education, in this way we now exactly what and when to teach the particular subject. Today for instance, I have to instruct in energy efficient driving." [Tim abruptly put in an aside] "I think that the students are happy with the way I teach – at the blackboard that is." "We have a few timetables on the screens in the alleys. I hereby know exactly what to teach the current date. If one day a supervising authority from the Ministry of Education comes, we are able to determine who is teaching what and where. The schedule is established/fixed, however it is possible to be flexible if some the students have difficulties in some parts of the curriculum."	[07:00 – 07:35] 07:20 – 07:26] [07:36 – 08:24]
How do you find the teaching material you need?	(Online)Teaching materials	"I use the teaching resources given by *KøreKlar* — this is the nucleus of my teaching. Besides this, UCplus has a few assignments that I can give the students. When I have finished a subject, the students are afterwards able to access the subject from a computer. In addition to *KøreKlar*, the students have also access to something called *TUR*. So [recap], the students are able to look at the subjects from the curriculum later on."	[08:34 - 09:43]
- Do the students have access to the material at home or only at UCplus?	Self-contradiction	"No, the material is only available for the students here at UCplus." [note: Selvmodsigelse — elevernes adgang til undervisningsmaterialet.]	[09:44 – 09:49]
Who decides what should be available?		"That is decided within the specific publisher. The curriculum is established. If there is any kind of change, this will automatically be changed in *KøreKlar* and *TUR*"	[09:51 – 10:42]
What is your opinion of the	Teaching	"I think they work just fine. I primarily use *KøreKlar*. *Tur* is very	[10:43 - 11:23]

available material?	preferences	pedagogical, whereas *KøreKlar* is more structured on the rules."	
What is formally required of your teaching?	Flexibility	"The education is clearly established; how much time we have to spend on what. However, we have the flexibility to supplement with something extra – if we feel it is necessary."	[11:24 – 12:22]
Who decides what should be available?		"That is the Police and the Ministry of Education."	[12:24 – 12:40]
Which liberties can you take to influence the teaching agenda with your own ideas/initiatives?		"I am assigned to fulfill the established schedule. However, I am free to choose *how* I will teach and arrange, as long as I keep within the established framework."	[12:43 – 13:25]
If you had infinite time and resource to teach a student (or a class), what would you change?	Utopia	"That is a tough question! It would be nice if the students took some more driving-courses and got some work experience at e.g. a truck company. But I do not see that as a obtainable goal."	[13:26 – 14:35]
Which forms of hardware do you have access to in your work?		"I use my computer and my PowerPoint, besides that I have some brake-systems and other analogue devices that I can show the students. However, some of these [the analogue things] are slowly phased out."	[14:38 – 15:52]
When is [COMPUTER] particularly useful?	The use of Computers	"Most of my work day actually. The computer is my main tool of teaching. The exams and the EU-tests are collected and made through my computer."	[15:54 – 16:54]
When/where could it be even more effective?		No comment — the Computer works all right.	[16:56 – 17:15]
When/where do you use electronic communication with the students? [e-mail, phone, sms, ...]		Nothing or very little.	[17:15 – 17:19]
- Do you think more commutation with the students could improve your work?	Communication with the students	"I do not think that the ability for the students to communicate from home would improve anything, and I would not want to do that. The students have the teaching resources to look at at home. Besides that, it is a legal requirement that a teacher is present whenever the students are instructed — here they are able to ask questions etc."	[17:20 – 18:20]
Nadja: "Do you feel a need for some kind of 'Knowledge-sharing forum'?		[Tim misunderstands the question and answers with his own education]	[18:28 - 20:40]
Mads: "How much communication and teamwork are there	Current knowledge sharing	"We [the teachers] help each other all the time. We are split up in different classrooms, however we still help each other with ordering the tests [including reminding one another to order tests etc.].	[20:41 – 22:00]

between the teachers at UCplus in the planning phase?"		I am not very familiar with the computer — John [one of the other teachers] is and he helps me out."	
Toke: "The ordering of the mentioned tests; do you order these tests in one place or in several places?"	Tests Computer workflow Improvements System coherence	"The tests are ordered in several different places and systems. It works very slowly and it is not at all user-friendly. That is really an area where I would love to see some improvements. It is often very frustrating. Both the speed and the structure of the computer and the test-booking work very poorly. If one has to order a EU-test, one has to go through 5-6 pages with a lot of tedious assignments (i.e. ticking off). The connection between the tests does work poorly."	[22:01 – 25:00]
Toke: "Are some of the teaching resources in other languages than Danish?"		"Not what I know of. It is required to understand and speak Danish to be an educated driver [in Arriva]."	[25:02 – 25:48]
		[Round-up and exchange of contact information.]	[25:50 – end]

Appendix F – Interview with Peter Farver & Henrik Rasmussen

Interview question	Category/Theme	Quotes	Timestamp
Please introduce yourselves…	Introduction	Peter: "I have been head of the training division since the first of February. Besides that I am also head of the course-administration." Henrik: "I am the combination of an educational consultant and the coordinator for the practical part of the educational courses. My area of responsibility is to make sure that the *student-teacher-vehicle* is interconnected with the appropriate place in the education. Besides that I am an educated driving instructor and therefore I am able to stand-in as a substitute in case it is necessary. You could describe my job as an *octopus*. And I've been here [at UCplus] for around eight and a half years.	[00:00 – 01:03] [01:04 – 02:02]
[turn to Henrik] Imagine you haven't prepared for your next class yet. Walk us through how you prepare the lesson and gather material [move papers, download files, sound, video]	Substitution Education plan Teaching methods Student plan	Henrik: "As I said, when I have to teach a class it is often in an acute situation; at first I will figure out what the students have to go through that particular day. Often I have no preparation time at all, which means that I am compelled to teach from memory/routine. It is often easier when the students have to be out in the vehicle; here, I can use the course plan to figure out how far the students are and what I have to go through." [Toke asks about the course plan] Henrik: "The boilerplate is made for the whole year; the detailed drawing is made on the way. Peter: "What happens in a certain time in a certain class is predetermined. There is a permanent set of framework – directed by the police – which dictate the teaching. The content of – let's say - 'lesson 1' is the same wherever you are in Denmark." Henrik: "It is op to me if I will use the blackboard rather than the Computer, as long as I follow the education plan. (…) My preparation often lasts around fifteen minutes, which is the time from when we know	[02:14 – 07:06]

		that for instance a teacher is absent to when the lesson begins. I have the freedom to take the pedagogical approach that I find necessary for the given subject; I can chose my own method based on the experience I got as a teacher. But, my main task is to coordinate and plan the educational course." [Peter interrupts] Peter: "The system is very strictly build — every student have a student plan that has to be kept up to date; the teacher and the student have to sign the plan every time a subject has been completed. Because of this strict structure, there is not time for sidetracking and off-topic discussions during the class." [Henrik summarizes] Henrik: "The subjects are established, however we are free to chose how to teach the given subject. From the very beginning a 30-days schedule is given to the students; this way the students know exactly what will happen within the next 30 days. If the schedule is due to a change, the students will receive an updated schedule. In this way, one always know what the students have to do next. The advantage of this is that anyone that have been teaching in the particular subject can pick up where the students were left off."	
Toke: Peter, can you elaborate what you do?	Planning	Peter: "I am in charge of the annual calendar. I structure the basic information of the main part of UCplus. In every class we have a list of information; e.g. *how many students can we accept*. In the continuing education I comminute the teachers and distribute them to the appropriate classes. In the basic education, I distribute the teachers more roughly. Here, Henrik takes care of the details. When that is said, I am also responsible for an acceptable quality in the teaching among the teachers and something along those lines." [Henrik continues] Henrik: "I take care of the distribution handed over by Peter; this involves assigning and instructing a teacher for each class. Most of the driving instructors are paid by the hour. It is also my job to make sure that we have enough driving instructors."	[07:08 – 09:52]
Mads: "How is this [the job-	Communication	Henrik: "Every Thursday I mail out next weeks' schedule to the driving	[09:53 – 11:06]

assignment of the teachers] passed on to the teachers?"		instructors. If the schedule is due to larger corrections, the teachers are also made aware of this though email. The monitors in the alleys notify the students — this is updated once a day. [Mads: "Is the information on these monitors available online?] Henrik: "No, the students have to use the monitors. Changes happen ad hoc — e.g. a vehicle might break down, or a teacher might call in sick. We do not want the students to constantly go online and check the schedule. Instead, the students can check the monitors during their breaks.	
Toke: "When you communicate about the basic information, does that also happen via email?"	Dropbox	Peter: "There is not much information to communicate. The planning is stored within Dropbox and all the teachers have access to it, whenever needed. The DropBox is updated regularly. " [Henrik continues] Henrik: "The teachers also have access to the planning that I do."	[11:07 – 12:46]
Toke: "Which forms of hardware do you have access to in your work [computer, work phone, tablet, projector, overhead, ...]"	Mobile devices	Peter: "All the tests are conducted on an electronic device of some kind. Some courses do not have an established base — the tests on these courses are conducted on tablets. However, a stable internet connection is required."	[12:50 – 14:04]
Toke: "We talked with Tim [the teacher, cf. other interview] about the used system. Can you elaborate on these?"		[Henrik talks about how the tests are conducted] Henrik: "(...) A supervisor has to be present during the tests. He is i.e. responsible for reading aloud questions for the students – if the students have difficulties understanding a particular question. [Toke asks about the connection to 'tur.dk'] Peter: "*TUR* is the intermediary between the Ministry of Education and the service providers of transportation." [Henrik agrees]	[14:05 – 15:58]

Mads: “Do you think the use of tablets and mobile phones are sufficient?”	Tests Responsive Compatibility issues Technical problems	Henrik: “We have access to the tests through a website, and can thereby access them via any electronic device. However, I do not believe that it is durable to use the smart-phone — the pictures etc. are just too small.” Peter: “Because all the tests are run electronically and on the internet, we are forced to be a place with a strong and stable internet connection. Because of this we primarily stay here [at UCplus].” Henrik: “We are dependent on an stable internet connection, however it is also important to notice that the internet connection at the transport authority has to be stable as well.” Peter: “We are also challenged by the fact that our computers run *Windows XP*. The support on this system will soon be terminated, and we might be forced to upgrade to *Windows 7* — will the tests operate flawlessly on a new operating system? We have already experienced the lag of support on our current platform [an example is given…].” Henrik: “We do experience some compatibility problems when the systems are updated — our nerves are on the edge whenever Microsoft updates.” Peter: “Technical problems are very critical for us, particular because of the pressure from the job-centers as well as the strictly conducted courses.”	[16:16 – 21:15]
Toke: “By way of introduction, Jesper Placing presented a need for a digital archive system to collect the teaching resources in one common place. After talking to Tim, we have gotten the perception that this is very rigidly defined in relation to the demands of the Ministry of Education. Do you think	Concept/Platform proposal (?) - Day-organizer - Knowledge sharing - Material sorting	Peter: “It would be REALLY efficient if we had a system were one could click on ‘day 1’ and get the relevant information about day 1. This could be the subject of the day, links to sites to useful sites, and common information on how to present the stuff. Subsequently, a form of checklist with the reminders of the day would be handy (“Remember to order this, and when you want to do so remember to click here, etc. etc.”). It is not about developing one common platform, but instead creating a platform that describes everything that needs to be done on ‘day 1’. All the necessary stuff for ‘day 2’ is collected there, and so on. The description could be as accurate as ‘remember to bring back the coffee pots to the canteen. If for instance Henrik has a brilliant way to present something, then we	[21:16 – 29:10]

that this idea by Jesper Placing could be a viable solution?"		are not — as it is right now – able to share this knowledge between the teachers. Right now the teachers have to walk around and ask each other for tips. To have one page — electronic or hardcopy — that collects all the links, anything and everything on *day 1* and so on. How the days are sorted is not important. [Henrik supplies...] Henrik: "The thing with links is a really good idea I reckon. Having one big system that collected everything in one educational system would require enormous amounts of maintenance. Because of this, I find it better to collect all the useful links in one place." [Peter agrees with Henrik] Peter: "Down to the bone, it is *just* a job of sorting the material as well as finding a good way to present it. It can be done electronically — and that would be REALLY smart. It has to be structured so that everyone can access and everyone can access the same information." [Henrik supplies with an example...] Henrik: "Recently we had an example with a teacher who had to use some material supposedly available on a shared drive. However, that was not the case — the material was instead situated on someone's private drive. Because of this the teacher had to improvise." Peter: "A database with buttons for day 1 through 30 — each day with its own content and presentation. It would also be obvious to store PowerPoint presentations, assignments, evaluation [*viskvalitet*] and absence-registrations (as an offer for the teacher) on the particular days. Every link should also have a related instruction/guidance." Peter: "Right now, one has to write down all the important links on paper to be able to remember them. You have to remember the necessary hot keys, etc. If all this can be presented in the mentioned *day 1 to 30* system in a way so that the teacher's does not have to remember all the relevant day-to-day stuff."	

		[Peter gives an example on how the information could be structured…] Peter: “Remember to evaluate with the students on day 29 — this is done by clicking *here*(…). In this way the teachers are guided through the whole day.” Henrik: “Use of related icons would really improve the usability of the system as well.”	
Toke: “Is it conceivable that some of this [referring to the metioned system] — dependent on the specific rights — could be available for the students as well?”	Accessibility (privileges)	Henrik: “If the students should have access, this has to be a passive read-only privilege. However, I do not think that this is necessary because the students already have a schedule for the whole course — handed out in the beginning.” Peter: “It could be a plausible solution — because then the students would be able to read through the slides from the lecture from home.” Henrik: “It might not be possible with some of the licensed connected to i.e. *tur.dk*.”	[29:15 – 30:26
Ending remarks		Peter: “If you can create a system like this to us — that would really be a smart solution.” Thank you for your time and answers!	[30:30 – 31:20]

Appendix G – Interview with Jesper Placing

Interview question	Category/Theme	Quotes	Timestamp
Who came up with your book container pitch? Why?	Motivation, problem space	[Placing was referencing second-hand knowledge of the problem space, so it was not used for our concept.]	[00:00 – 02:42]
What is the business case for a book container?		"If we had an information system that does the job… that system could be used for internal [use] as well."	[02:42 – 04:40]
Have attempts to reorganize lesson planning occurred before? What were the results?		"Not to my knowledge."	[04:40 – 05:03]
Do teachers operate on a standard curriculum?		"Yes… but still every teacher is different… they have their own pieces of gold they use to make their teaching better than the next guy."	[05:03 – 06:20]
[Following up on the "pieces of gold" comment]: Does that make UCplus different from your competitors?	Business	"The challenge is that… government-controlled courses' price is set… so we can't compete by saying we have a discount. So the only way we can try to position ourselves would be to make the teaching better. That is our only… competition parameter."	[06:20 – 08:00]
Are there any financial or business constraints on the classrooms?		"If a solution would come up where we would buy a lot of stuff… there are no constraints from the government."	[08:00 – 08:50]
How are teachers scheduled to be at UCplus?		"The ones that teach our basic bus driving… have to teach from 8 to 3:24 or something. It has to be exactly 7.4 hours per day… So if they need to prepare something, then that has to be taken out of their teaching schedule and someone else has to fill in for them… They plan here… at this facility."	[08:50 – 12:34]
Do teachers ever ask for technical or financial	Finance	"Not a whole lot. Their IT abilities vary a lot. Some of the ones are very active in using tablets privately. Sometimes they see some	[08:50 – 14:53]

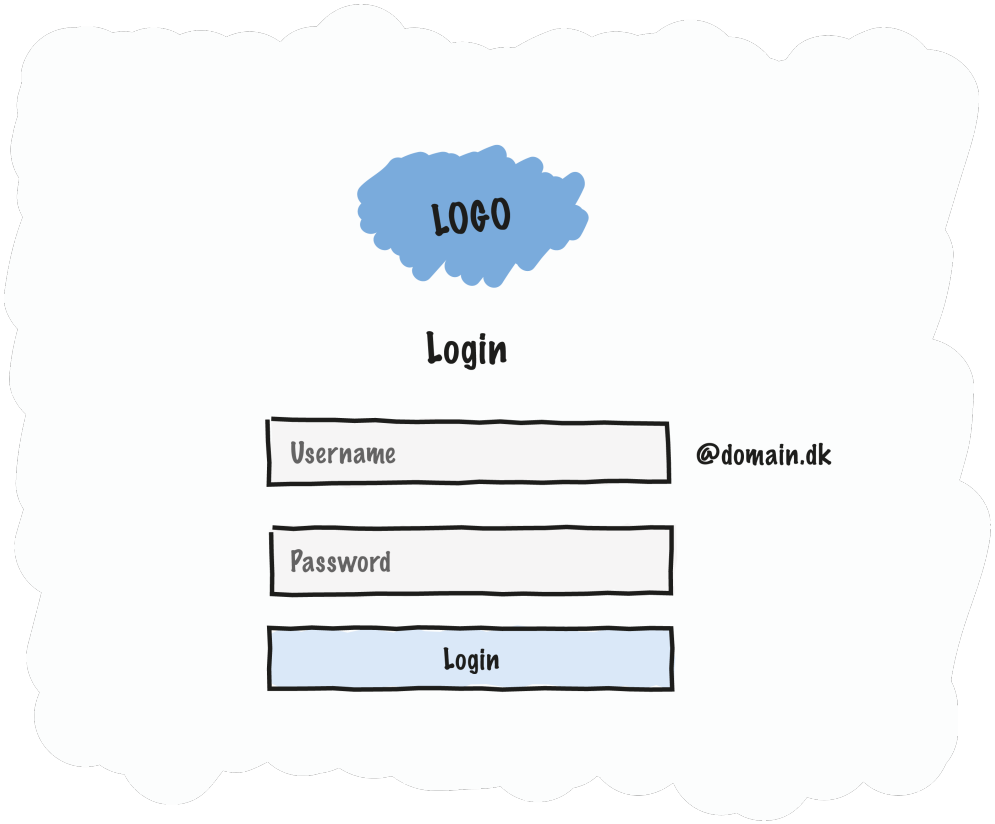
resources?		advantages for the company to gain… and we talk to see if it's a good idea…for the company or if it's just for this particular teacher. Of course we have to balance if it's worth the money… If it makes sense, then we're very open to it and encourage people to contribute."	
Do you have a general IT budget?		"There is sort of a general IT budget but there's no specific money set off for more project-related subjects." [The general budget is available online].	[14:53 – 16:20]
What kind of financial impact this book container could have?		"That's one of the things we really haven't discussed… we would probably benefit by the teachers being more satisfied."	[16:20 – 17:50]
What would be the proper channels for accepting and implementing our concept?		"First, it would probably be that we took the concept to upper management, and if the expenses were at a certain level we would have to have the project approved by Arriva and the shareholders. That's probably it. And then I think it would probably end up at my desk. If it's an online thing we would bring in [our web design company]… If he can't do it himself, that would probably go through marketing."	[17:50 – 20:26]
What means of communication do teachers and students have with each other?	IT	"They pretty much only talk here [at UCplus]. I don't thing they use electronic communication at all. The teachers have an email address at UCplus… and all the computers that the students are using right now have a file-sharing server that they can use if they have something they want students to read or do. When we switch to Office365, there's going to be something similar. It might be online, sort of a Sharepoint document library. I'm not sure yet if we're going to skip our servers or maintain our servers just for that reason. Just for having file sharing for our students, where the teachers could put things for them."	[20:26 – 23:05]
How open should access to our concept be?		"We would like to have it require some sort of login…. Because of competition, we would like to keep it closed. But it would be good if it were something they could access… outside the	[23:05 – 23:52]

		classroom. [Office 365 can do that]."	
What resources would the IT department be able to provide for the book container?		"[Our website] is hosted by an external company, and once we switch to Office 365… we will be able to make domains of our own. And we would be able to make things that would be publicly accessible or folders that would let only certain users log in. And of course we could just buy a domain… or website for this project."	[23:52 – 25:02]
Who would be able to maintain this concept?		"It would probably be either me or marketing… Maybe we could ask some of the interns to help us."	[25:02 – 28:40]
What is a ballpark budget for this concept?		"100,000 kroner is a lot for us… If the government decides that unemployed people are not allowed to take… AMU courses… or they set a limit to how much it can cost… Bus driving is one of the more expensive courses… then we are very vulnerable… or dependent on what the… government has decided. We always have to… think of new ways to… teach our courses. It's a tough business. If we have to make big investments, then we have to plan if we have the money for that… At the end of summer, or early fall, we start making the budget for next [fiscal year].	[28:40 – 36:57]
What operating systems do you use?		"Right now it's XP on all the machines in the classrooms… They're phasing that out by 8 April, and we have to figure out what to do. We can probably still use it, the problem is that [Microsoft] will stop making security updates and make them more vulnerable to attacks, and they are [open to the internet]. They have software on them that when you turn it off and turn it on again, it erases everything on them… When it comes to robustness it's a huge advantage. The next step would be [to install] Windows 7. Right now we use Google Chrome, because it's proved itself to be pretty stable and can still be upgraded."	[39:18 – 41:30]
What is your Office365 subscription?		"When you are an educational institution you can buy instances that are cheaper… and for students there is a free license that gives full functionality… like Office web apps, Sharepoint, email,	[41:30 – 44:00]

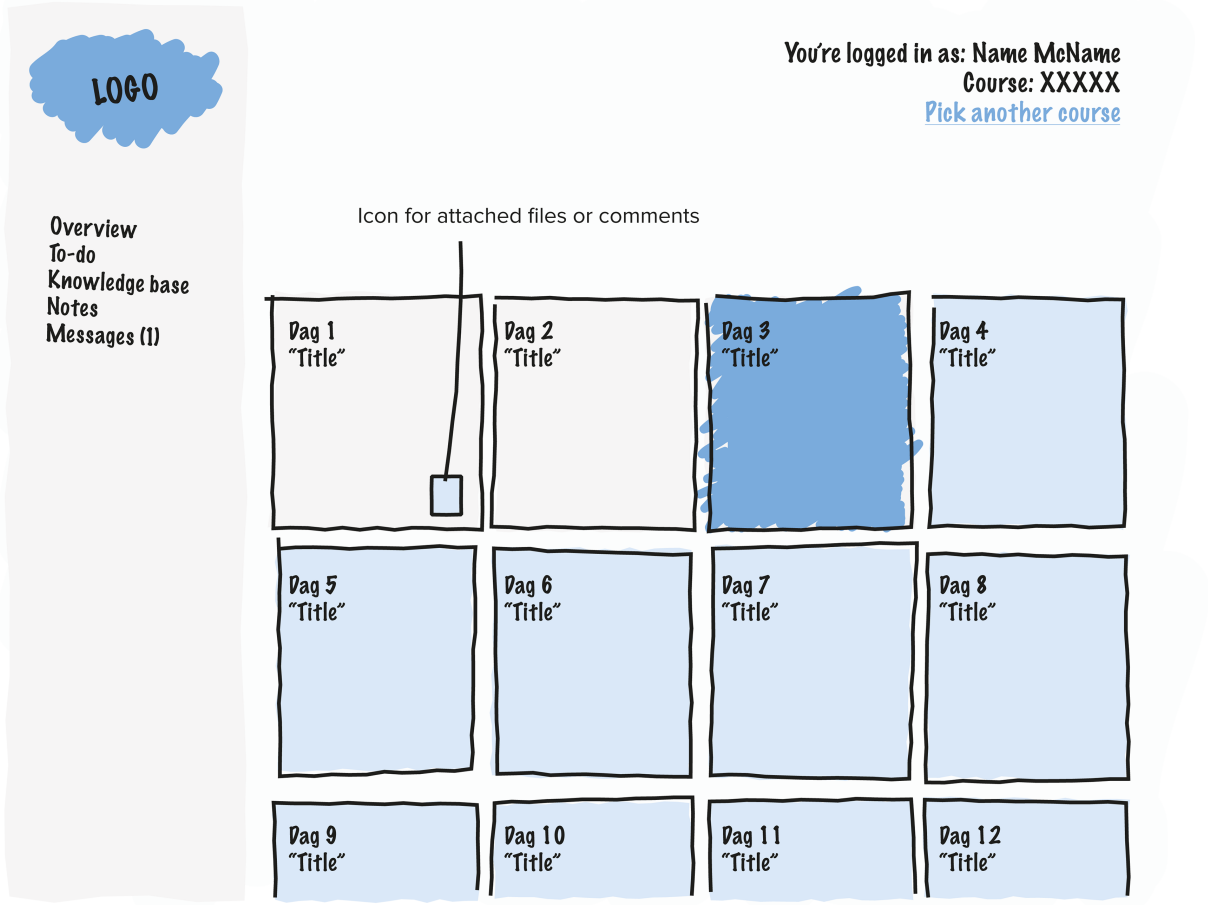
		calendar… online. The next step would be to buy a license to download and install an offline copy. We will look into giving each work station a login… and that will be [access to] the online-only [Office365].”	

Appendix H – Early mockups

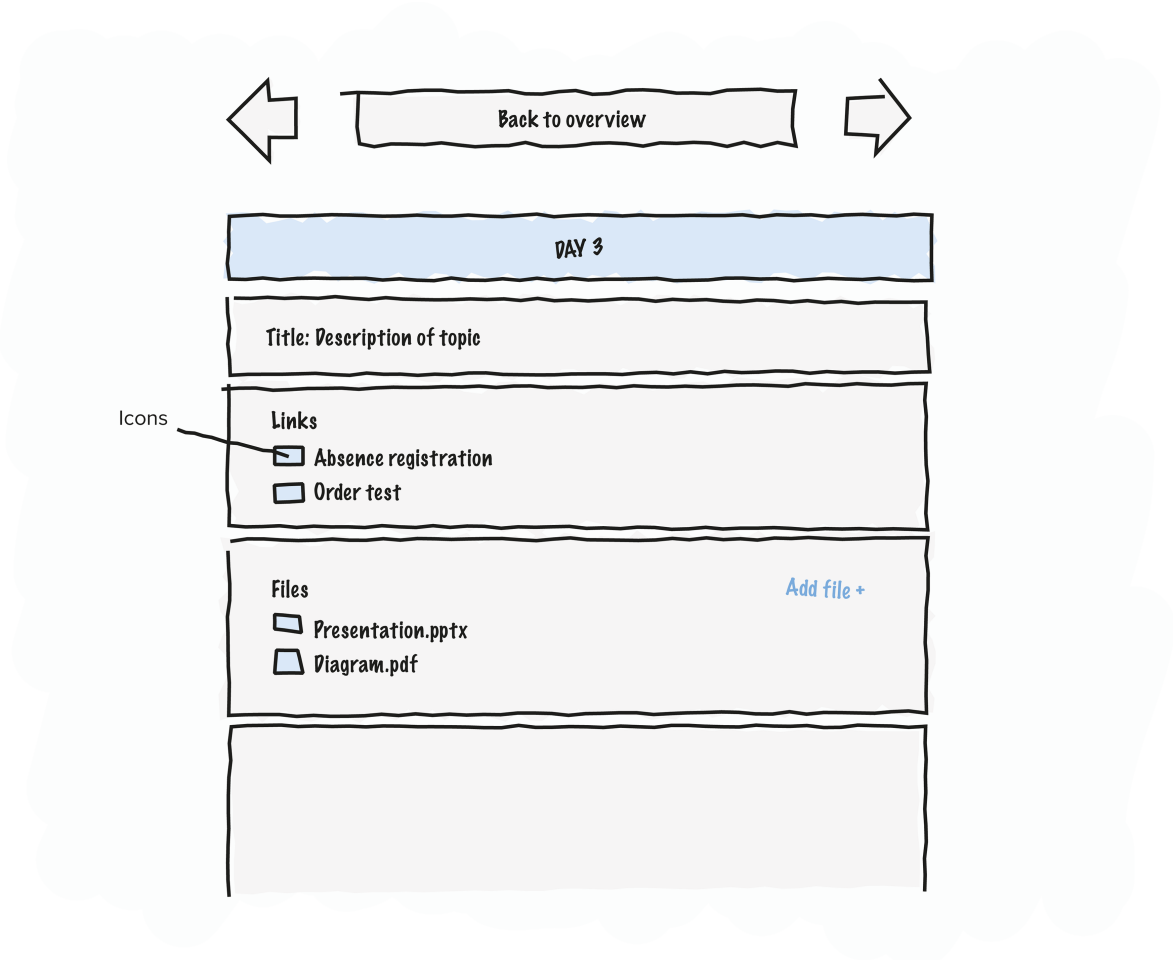
1. Login mockup



2. Overview mockup



3. Daily mockup



Appendix I – Feedback session with UCplus

Transcribed from sound recording at the feedback session

Jesper Placing, head of IT:
"Quite different from what I thought it would be… Err, and only for the better I think. It was, err, I don't know what I had imagined, but it wasn't a portal and wasn't a sort of a schedule-based solution, err, but I think it's a really good idea. I'm really glad that your research, when you talked to people, realized that this was actually the, cause I think this a good example of actually gathering your data is important, because if you'd just taken my word for it, you wouldn't have come up with this. So that's a really good, err, very good job. And it looks very intuitive to use, very easy to use for the teachers. And I think the idea of having the calendar view where you have that day is førstehjælp for example and this day is this and this lecture, is a really good idea, if you have a substitute teacher coming in and he would say oh I need to figure out what to say, err, for førstehjælp for example, you would find the day where you would have all the material gathered in one place. So I think it's a really good idea. Very nice."

Preben Bødker Nielsen, senior consultant:
"I think it's a great idea. Why don't we get rid of Office 365? [Jesper interrupts here, saying: "We're not even there yet!"] Actually there is a government-driven platform called Elevplan, I don't know if you have heard of it? No. It's a mastodon. It might be set free in a few years, but it's not user-friendly. We don't use it, we should do, it can do a lot more than that [referring to Plan.it], but err, it's not easy to use. So I would like that idea, maybe as a compliment to Office 365. I'm a mac man."

Vibe Kittelmann, vice president:
"I think it sounds as a very good solution and I thought it should be a book container or materials for the training, but I think it is included in it. But I think it's a good idea with a calendar. Err, where you can, and I like very much that you can have a dialogue between the teachers in the bottom, I hadn't thought of trying to solve it that way. So I think it is more than the materials, it is an organizer and that is very important, especially at the driving license courses, because there are so many administrative details the teacher have to reminder during everyday. I think it's excellent."