An approach to planning the Development of a new standard administrative software according to the Contextual Design process

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Introduction

Assumptions about the project

The administrative software to be developed is for the administration department of large real-estate companies. Administration involves resident handling, invoice handling and internal administration of the company such as employee salaries.

The project is about designing a new software to compete with other software already supporting the administrative work. Therefore, primary focus must be set on having the expected functionalities and doing them a slight bit better than the other software products, as well as focusing on a user-centered approach.

The Contextual Design process

Contextual Design is a customer centered design process with focus on understanding the work of the customer. The word “customer” is used rather than “user” to include not only those in direct usage of the system, but also the ones dependent on it.

Contextual Design has six key parts: Contextual inquiry, work modeling, consolidation, work redesign, user environment design, prototyping.

Contextual Inquiry

The Contextual Inquiry is a method for gathering and interpreting customer data to get an understanding of his or her work. The inquiry takes place in the customer’s natural work context. The interviewer should take the role of an apprentice watching his master when performing the interview, letting the customer do his or her normal work and describe all the activities in detail. From time to time, the interviewer should interrupt and ask questions like “Why did you do that?” and let the customer go through an activity step-by-step.

The interpretation of the observations after the interview is a key aspect to understand the work of the customer. This is done in a session where the whole design team reads or listens to all gathered observations and discusses the issues at hand. After finished with an interpretation it’s important to share it with the customer to let him or her verify or fine-tune it.
Work modeling

After the interviewer finishes the interview with the interviewee, much raw information will be gathered. What comes next will be the interpretation phase. It is necessary to introduce a special language to describe what people have done during their work. So the graphical language-work models will take you into the structure at once. Work Models will be made by a modeler in the project team. They are flow models, sequence models, artifact models, culture models and physical models respectively. They reflect the working communication, process, artifact, rules and environment in people’s work, and keep the team true to what really happened in the real work.

Consolidation

The design should fulfill the requirement of the whole customer population as well as the individual user. The remedy is to gather the individual data and consolidate it in one set of models that represents the one whole picture of customer population. Communication is an essential part to make sure that every member of the project team understands the user data.

Work redesign

Today's business puts a premium on thinking "outside the box" - coming up with the creative solution to a work practice problem that no one else has thought of. This can be a good idea for a commercial product. Internal systems are looking for the innovative work practice that will transform the work of the business. In both cases, customer data is the key to innovation. It is also the key to discover the needs that no one else knows how to articulate.

It’s the job of the work redesign step to invent the new work practice that a corporation will deliver by building systems, offering services and redesigning procedures. Invention of work practice is based on a foundation of customer data.

It requires a lot of creativity to go from customer data to a design. Customer data never dictates exactly what to design.

User Environment Design

The User Environment Design provides a way to model the structure of the new work design. It contains several focus areas which shows the different areas in the system that support a certain activity in the work. The focus areas should explain the functions needed to do that activity and show how they are related to other focus areas. The UED:s relation to the system can be compared to what a floor-plan is to a house. The focus areas are the different rooms and the work activity supported in the focus area is the purpose of the specific room.
Prototyping

The prototyping step is about testing the design with the customer before it is implemented. The first prototype is made of paper and a designer evaluates it with the customer. The point with the paper prototype is to have better communication with the customer and to make changes easier. Prototypes test the structure of a User Environment Design and initial user interface ideas. More iterations or alternative designs might be needed depending on the prototype test with the user.
Step 1: Gather customer data

The Contextual Design process relies very much on extensive gathering of customer work data. The data must be well enough documented, relevant to the project and representative for the whole customer base to be of any value for the later design work.

There are several ways of getting to know your customers and the work they perform. Some ways are better than other and all of them have their advantages and disadvantages. One problem is to get as representative data as possible. If you choose a customer as representative for the customer base, and have him or her show the work activities, there is a big chance that data does not represent enough of the entire customer population’s work. This issue might be solved by stationing someone from the development team at the work site to study different customers as they work. However, then there will be problem gathering all the data and communicating with the rest of the development team.

There are also problems with how to gather data from a customer. Having a common interview where the customer gets to describe his or her work in details could seem like a good and fast way of getting information about the work. This technique, however, relies on the customer’s ability to explain details of the work flow that he or she perhaps does not even recognize as an activity they do. Some, or most, activities we perform when doing everyday work are activities that come automatically. When asked to explain all the steps taken when performing a specific task, it is really hard to remember those coming naturally.

The Contextual Inquiry

In Contextual Design, the method used for gathering the data is called Contextual Inquiry. It is a technique used to get in touch with, and understanding, the customer’s real work. The idea is to interview the customer in his or her normal work environment. The designer works together with the customer as partners to understand the work.

There are several different common relationship models in life known to most people. Some examples are parent/child, scientist/subject, interviewer/interviewee and master/apprentice. To get the customer to have the right attitude towards the inquiry and the designer, efforts should be made to follow the master/apprentice model. It is the customer who is the master of his or her work, and the designer who is there to learn more.
Principles of Contextual Inquiry

These are the four key principles of the Contextual Inquiry: **context**, **partnership**, **interpretation** and **focus**.

The *context* principle is about learning to understand the customer’s work at the customer’s work place. The goal is to gather details of the ongoing process of work rather than getting a summary from the customer. When in the interview, the designer can stop the customer to get clarification on a certain step of the work, or elaborations on a series of steps.

Another goal of the interview is to make the designer and the customer work together as **partners** in understanding the work of the customer. The customer is the expert of what he or she is doing and the designer is there to support the understanding with his or her technical knowledge. A good practice is for the designer to alternate between observing the customer doing his or her work passively and asking questions. This way the interview gets dynamic and issues in need of clarification can quickly be resolved.

The raw customer data, the observations, needs to be **interpreted** into something meaningful and useful for the design work. The design will be built upon these interpretations, so they must be worked through properly to be accurate enough. Discussing the interpretations with the customer is the key to improve the accuracy. Even if the customer agrees to the interpretation, there is always some fine-tuning that can be done.

It is important to **focus** the customer to talk about the work relevant to the design in order to gather the right data. With the right focus, more details can be revealed about the problem at hand and more relevant observations can be gathered.

Interviewing the administrative staff

First off, who to interview has to be decided. At least five to ten interviews are needed to gather enough data. Since the customers all work in the administrations office there is not much differentiating them in their work practices if taken from the same company. Interviewing people from different companies using different administrative software would be better to get more diversity.

When contact with the customers has been initiated it is time to get the interviews going. Members of the development team are picked to be interviewers and split among the interviewees. It is important that the team together decide on the project focus to point the interviews to the same directions and to gather the same type of data.

The planning of the interviews is rather straight forward. There are no tasks in the administrative work that, for example, requires to be performed without interruptions (like a
surgical operation). The course of the interview is therefore as described above, alternating between observing the customer to work tasks and interrupting with questions.

The interviews are preferably video taped to make sure that nothing is missed. This wish is up to the customer to accept or reject but will surely be a useful tool in the interpretation sessions afterwards.

**Time estimation**

The interviews should not take more than one or two weeks to perform, depending on the availability of the customers. In the best case only one interview session is needed for each customer and the interviews should be covered over one week. However, if the customer is busy, the interviews might need to be split into multiple shorter sessions, leading to more time waiting for next session.
Step 2:
Interpret the data in a cross-functional team

Interpretation sessions

In this part, the team is mainly focused on interpreting the data gathered by the interviewer from the customer. Team interpretation meetings brings the design team together to hear the whole original story behind each interview and capture the insights relevant to their design problem. An interpretation meeting presents all team members’ unique perspectives to the data, sharing design, marketing, and business implications. Through these discussions, the team captures issues, draws work models, and develops a shared view of the needs of the customer whose data is being interpreted.

The interpretation session is very necessary and is a very important process in the administrative software design which lets every team member experience all interviews. In this session, an interviewer walks through a single interview for the benefit of the team. The rest of the team listens, asks questions, draws work models, and records issues, interpretations, and design ideas based on this interview. In the discussion of what to model and what to record, the team wrestles with the data and what it means, learns how each team member views the data, and develops a shared understanding of that customer. It is an efficient way to achieve several desirable benefits as following:

1. Because every member in the team asks questions about the interview, the interviewer remembers more than he or she would on his or her mind.

2. This session records the conversation between members in the team while it occurs, in the appropriate form to drive design. So by the end of the session, the work of the customer has been characterized in the work models, and the team’s insights, design ideas, and questions have been captured online. It saves the team much time to write up or analyze the customer interview afterwards. Those who miss this interpretation session can read the models and the notes to catch up on what was learnt during the meeting.

3. The session is a forum in which diverse job functions can cooperate, whether they be customers, marketing, engineering, documentation, UI, test, or any other group relevant to delivering the system. So it is a very effective cross-functional cooperation.
4. The interpretation session can provide multiple perspectives on the problem. Each team member have their own history, current job function, and understanding of the project focus, they will bring their own focus on the problem, so a cross-functional design team will always see more in an interview than any one person would alone.

5. The open discussion between team members enables them to learn and take on each other’s perspective, so they develop a shared perspective. By hearing everyone’s questions and insights on the data, every team member expands their own focus to include the concerns of others.

6. This session reveals the data interactively through questioning and discussion. Team members have to represent the data collected from the interview immediately in work models, so they must internalize it to write the models, and everyone else must internalize it to check them. Since everyone in the team has a job, it is hard for attention to wander and also come to the true involvement in the data.

7. Finally, it really saves much time for team members. Without the interpretation session, all the team members would still have to talk to the interviewers to ask questions about the interview and understand the implications. So members discussing in the session will make a better use of time.

**Roles in the interpretation sessions**

There are six roles totally in the session: the interviewer, the work modelers, the recorder, the participants, the moderator and the rat hole watcher. The interviewer who interviewed the customer is the team’s informant, describing everything just as it happened, in the order that it happened. Here, the interviewer do a retrospective account of the interview rather than summarize the information he or she got from the customer. In many ways, it is as though the team interviews the interviewer to find out what he or she learned in his or her interaction with the customer. Work modelers are people who draw work models on flip charts while they listen and do not slow down the meeting to capture data. They keep the team true to what really happened. The recorder keeps notes of the meeting online, displayed so everyone can see them using a monitor or LCD projection panel. They write thoughts of the meeting before they are expressed. Participants are the rest of the team. They listen to the story of the interview, ask questions to understand, and develop their own insight into the work and avoid discussing the design idea now. The moderator is the stage manager for the whole meeting whose job is to keep the meeting brisk and on the mainline conversation - what happened on the interview and what do we need to capture from it, and keep track of where the interviewer is in his or her story and reorient him or her when he or she has been interrupted and lost his or her place. The rat hole watcher is the person who keeps the meeting on track. A rat hole is any distraction from the mainline conversation. In practice, every team member acts as a rat hole watcher which means anyone in the team who discovers rat holes exit and waste of time have the permission to point out when the certain member is off topic. Then, instead of getting defensive and
angry when someone calls “Rat hole”, everyone laughs sheepishly and gets back to the subject of the meeting again.

The formal model language

In order to make a customer-centered design, the first task of the design team is to shift the focus from the specific software that the team has to build and redirect it to the work of potential customers. As we know, interviewers have gathered a lot of information from their interviewee. During the interpretation meeting, interviewers will tell everybody in the team the whole raw story without including anything or giving out their ideas. They want to interpret all the information with the team member so that useful data can be as abstract as possible. But how does members in the team communicate with each other during the process? Just using the natural language to describe the whole stuff in the standard software design process? That does not sound so good, does it? It is necessary to use a formal language for talking about work organization concepts that help people learn to see work and focusing thought. It is natural and convenient to embody a new domain of knowledge in a language that expresses ideas in that field. A language makes the key concepts of the domain concrete in symbols or words. This is a jargon with specialized words and specialized uses of ordinary words that embody concepts useful to some domain of expertise. This special language creates a way for people in the design team to see and talk together and directs members’ thought, because a language creates a focus, it is not neutral. It can say certain things easily - the things which it provides concepts. Even as artists have their own language of color, shape, and shade to talk about the sky, the software design team will also have its own communicating language for the design which can and will represent most aspects of work that matter for design. For example, the team will use the specific language to learn and describe the aspect which the resident administrator’s work matters by using the data gathered from the interviewees. Of course, languages do not have to be textual. Graphical languages share all the advantages of a textual language. Instead of words, graphical languages use symbols, each conveying a defined concept. For this design, a graphical language has definite advantages. Because the number of symbols in a graphical language is small, it focuses thought even more intensely than a textual language with thousands of words. In one word, sparse graphical languages provide greater guidance for thought and reveals pattern and structure of work. For these reasons, the team uses work models which can organize huge amounts of data as a graphical language to capture knowledge about the resident administration work.

Five types of work models

There are five different types of work model to represent the customer work practice according to the data collected during the interview and interpreted during this meeting:
• Flow, representing the communication and coordination necessary to do the work.

• Sequence, showing the detailed work steps necessary to achieve an intent.

• Artifact, showing the physical things created to support the work, along with their structure, usage, and intent.

• Culture, representing constraints on the work caused by policy, culture, or values.

• Physical, showing the physical structure of the work environment as it affects the work.

Each type of model provides its own perspective on the work and synthesizes all aspects of the work in its focus into a single, coherent diagram. Having multiple types of work model gives a team more ways to see issues and structure in the work, while allowing each model to focus cleanly on one aspect of work. All these five models will be sufficient to support all the design conversation the team needs to have and make the complexity of real work comprehensible - the combined focus they provide covers the main issues for most design problems.

**Flow model**

The flow model is drawn to divide up responsibilities among roles. No real work happens in isolation, so work flow defines how work is broken up across people and how people coordinate to ensure the whole job gets done. For example, in this project, the administrator would communicate with the workers, the cleaning staffs, the secretary, even the Bulletin board which announce news in this area which is not a person. From this representation, you can find good work practice to incorporate into a system, identify problems to eliminate, and see the pattern of communication a system must allow for.

**Sequence model**

The sequence model which reveals the detailed structure of work is designed to understand customers’ intent. As we know, work tasks are ordered. All work is a series of actions. They unfold over time. But the steps people take aren’t random; they happen the way people do for a purpose. How can we get this work sequence to draw the sequence model? We collect sequences during the interview where people will talk about the steps and the details of their work which can help the design a lot.

**Artifact model**

The artifact model is designed to reflect the creation, use and modification of objects by people doing the work. The things they use become artifacts, like the note book the secretary use or the apartment payment bill passed to the resident. All those artifacts capture traces of people’s work practice and make customers’ conceptual distinctions
concrete. Artifacts are collected during an interview and make it clear into their structure, information content, information annotations and presentation. It is also necessary to bring back copies of used artifacts to help the design in the team.

**Culture model**

The culture model is designed to define expectations, desires, policies, values, and the whole approach people take to their work. A successful system fit with their customers’ culture, for culture is as invisible as water to fish. So it is natural the culture model will make influences concrete.

**Physical model**

The physical model is designed to show the physical working environment, both site and workplace, and reveal design constraints. People reorganize their environment to reflect the work they do. Organization of space, division of space, group of people, organization of workplaces, and movement can all have an impact to the physical environment. The physical model should be a caricature of the workplace, not a floor plan.

Work models are primarily drawn by work modelers. It works well to have two work modelers - one person models flow and culture and another models sequences. Artifacts are put up, analyzed, and annotated as they come up in the interview. Work modelers have to be comfortable putting up one or two elements of a model as they hear them without waiting for the whole story how the administrator administrate the apartment issue in the reality to be complete. They can not get the whole story, then stop the meeting and repeat it so they can draw the model. They have to draw it as it comes out. Work modelers ask questions driven by their models. For example, if the flow modeler can not show where a communication flows to in the apartment administration process because the interviewer never said, he/she won’t be able to draw the model and will ask. The physical model is drawn by the interviewer, since it tends to be easier for the one who was there to draw it.

**Time estimation**

It takes one week at most to finish this step. First, the interviewer puts all the materials he or she gathered from the interviewee in the first step together. Second, he or she brings all the information to the meeting to tell the team members the whole story. Third, all the members in the team discuss it through the meeting. Finally, work models and a shared view of the customer’s need according to the data are produced in the meeting. Maybe the team should have two or three such sessions if the information is too much or they really have a lot of work to do. So approximately one week will be signed in this part.
Step 3: Consolidate the work models

To get the data to be representative for the whole customer population, it is very essential to bring together different aspects of various people. Consolidation is process of strengthening the different views of users into one streamline.

The challenge is to segment the markets by difference in practice. For example, if one administrative software system is useful for one home-based business then it will also cover the needs of other small businesses. Actually, users segment the market according to the tools they use. On the other hand, without recognizing the actual work practice, it’s also difficult for the vendors to address a market precisely. To overcome this, vendors of commercial products rely on the Contextual Design that provides the tools to address a market strategically. By using these tools, vendor can produce much-focused products that support a market.

Work models

Work models can provide vendors the rational ways to segment the market. In this way market is segmented by work practice. If work practice is the same it can be represented in single sets of consolidated models. These work models of customer population are displayed on the wall and designers can use it like a map. Moreover, by using these work models, vendors can show the strength of product and weaknesses of their competitors.

People from different departments think that their work is quite unique compared to others. For example, the department of research and development in an organization do not want to realize that their work is really structured just like any other old-fashioned department of the organization. But if they observe the structure of their work in an external model, they realize that they are so similar and the same system might actually be able to work for both departments and through this, they can make rational decisions. For seeing the consistency across departments, an enterprise model is another approach that emphasizes mostly on shared data.

Contextual Design

The external representation is very important. Without such representation, users only rely on their own proposed designs. Designers also play a very important role. If the designer is skillful then the system will be small and work practice will be simple. The designers
maintain the different views of work in their mind but when the data is large, they need to write down their understanding. Contextual Design helps the designer take out the data and put it on the wall as a model. After using the Contextual Design, the role of designer will be as an external entity and more focused on the customer data. At the end, structuring up a sense market instance by instance works against a real shift in perspective.

**Affinity diagram**

Affinity diagram is a diagram that represents the scope of the problem. The structure of the affinity diagram is so easy that after reading it, designer only learns the data that is involved to recognize each issue in the work. Affinity diagram not only shows the scope but also focus on performance, hardware support and so on. Affinity is based on bottom up.

**Consolidating flow model**

Consolidating the flow models explain who the customers are, how and what they do. The flow model describes the whole structure of the application by using roles. Roles are responsibilities that are accomplished by different people. Generally, when people start a job they divide it into many roles. For example, one who writes the report and the one who reviews it have different skill sets. But checking for references is also a very crucial task and for this too, much more skill is needed. Therefore, dividing it into many roles does not make any sense. The actual job of consolidating the flow model is to recognize the roles of individuals which proceeds in a step-by-step process. Consolidation is required when one and same role is performed by many people.

**Consolidating sequence model**

The structure of the task can be represented by the consolidated model. It brings together different instances of different people that are performing the same task. It reveals the importance and priority of different roles. It gives the idea to the designer of the work they need to support by showing different intents. It also represents the overall structure of the task. The initial step in consolidating the sequence model is the trigger that initiates it. Designers can structure their design to reflect the task. Here it is important that structure is also inherent to the task. If system does not support the task then consolidated sequence is not used.

**Consolidate artifact model**

Consolidating artifact models presents the organization and structure, and shows how users manage it. It also shows the organizing themes and concepts that people use to
pattern their work. For example, people do some planning to perform a task, and create roles to break it up for different people, the ideas become concrete when they relate to the artifacts they create and use.

In consolidating the artifact model, the first step is to group the artifacts in terms of intent or usage. After collecting the similar artifacts, the common parts and their relationship are identified, because they are the primary distinctions created by the artifact. Within the same parts, the structure, intent and its usage can be identified. Second step after identifying the parts is to draw the consolidated model.

**Consolidating cultural model**

Consolidating the cultural model reveals the common factors of culture in terms of customer’s point of view. It could be crucial to choose the direction a design should take. Different organizations have different culture – rules, regulations and different policies. The cultural model is good when the system is designed for internal organization. It represents how people backup up each other during the work. Characterizing the market is always critical. It is not a good approach to use this model if most work is individual.

**Consolidating physical model**

Consolidating the physical model shows the physical environment. Each physical model represents the workplace and site for each user interviewed. It begins by separating the models into different types of spaces. It focuses on the whole structure and this provides information that how people think. Physical model is important when work is done on several places. So if the task includes work between groups, the physical model is also interesting to see how the people collaborate with each other. It reveals how people think.

After focusing on several kinds of consolidation, it is necessary to develop same kind of thinking process. Theses consolidated models gives detail about required work to inform system design. From the customer’s point of view, the intent is most critical implication to get from the models. A sequence model is more focused on client and describes how client can think and how he goes for that. Artifact and physical model also goes for the extra intent but affinity shows intents directly and cultural model tells the reasons for that these are so important for the customer. For achievement of their intents, customer use different strategies and all work models play a unique role in making any strategy. For example, flow model defines strategies by breaking up the work into organized units across people. Affinity reveals strategies by collecting these strategies and showing how they correlate with other work issues. Alternate strategies can make through sequence model.
Communication

Customer data is useless if it is not to be used for design of the system. System cannot be developed, unless every one from the team understand the job and for this purpose, communication plays an important role. There are different groups who are working on a project at the same time. These include the design team, the engineers who code the project and the managers who are keeping track of the work being done. Also the customers have to be communicated and convinced that the new system will improve their lives. One of the way to make communication among all these groups is to make a cross functional team. A cross functional team includes members from all the groups involved in a project. Although a cross functional team is useful in incorporating a groups view on the design of a project, it does not give the feedback back to the group. So the group has a sense that it does not influence the project much. Therefore, it is important that communicating back to each group is carried out by the whole project.

Communication techniques

There are different communication techniques that people can adopt to communicate effectively on a project. One of the ways is to get in customer data properly is to use it and get engaged with it. If people just hear or write the data, they will not be able to give suggestions or criticize the data. So the best way is to use it and give immediate feedback on it. The more the feedback on data, the more new ideas can be found and less errors will be committed.

Walking the affinity diagram

An affinity diagram can explain the whole scope of the customer data to the project team. It presents the customer issues and concerns coherently. The project team can “walk” the affinity to review all these issues and then respond by building a coherent design solution.

Walking through consolidated model

Another communication technique similar to walking the affinity is walking the consolidated models where people work in pairs and read and talk through the work models. The best way to use this model or the affinity model is to have a design room. A design room can have a wall where people from a team can write or draw their ideas. So a design room becomes the public memory of the whole team.

The project team is responsible to communicate to different project groups in a language, which is understandable to them. The marketing team in a project is responsible for seeing which customers make up the market and who are willing to spend money. One of the
ways to communicate to marketing team is to explain them with scenarios e.g. a scenario on a particular customer type on who they are, what they do and how they work.

**Communicating to internal customers**

Communicating to internal customers is the job of design team. One way to do this is to include some of them in the design team. Customers can also benefit from walking the affinity but other type of participation is also important.

**Communicating to engineers**

Engineers also need to be communicated and they mostly get directions from marketing. The job of the engineers is to make sure that all the features of a system can be combined in a form that is acceptable to the customer. The affinity and work models give a very clear picture to the engineers on what they need to build. It gives them the ground to design the system.

**Communicating to management**

The management's main responsibility is to make sure that things run smoothly and the project gets completed with all the features. Management does not have much control over the project. They rely on others to design and code the project. The best way to communicate customer requirements to the management is through a slide show. Management does not need to know the minor technical details. They just want the overall themes and primary insight into the project. A slide show serves this purpose very well.

**Time estimation**

The whole process of consolidating different model may take one week and after walking on affinity diagram and consolidating models, one more week is expected to be spent on communication to the different groups of the project.
Step 4:
Work redesign

Innovation isn't about putting a great mind in a sealed room and wait for it to produce an idea that will change the world. Working with the customer is one of the most important things when inventing a new product. It's about being out in the field and actually see and realize what is missing and what you can make with your and your teams knowledge.

Consolidated models

Each different consolidated model puts a specific dimension of work into focus for the design team; each model reveals problems and issues related to that dimension of work. Going through model by model in quick succession will give us a synthesis of the issues each model reveals. Discussing each model in turn begins a dialog about the data and what it means to the team.

Finding issues

The consolidated flow model

The flow models reveals communication patterns and problems. Every role needs to be studied. The system need to support consistent interface for different roles to make role switching easier. One person should not have so many roles that he or she gets overwhelmed by work. If that happens you need to move responsibilities or roles to other people. You need to be careful not to separate roles to much because that raises another problem, lack of communication between roles.

The consolidated sequence model

The sequence model shows how tasks are broken into activities, the intents that people are trying to accomplish in doing the task, the different strategies people use, and the individual steps that make up the task. Sequences helps us structure a system to match and extend the way people approach a task. Every consolidated sequence has a primary intent; the reason why the task was worth doing in the first place. No individual sequence step matters in the end.
The consolidated artifact model

It can be a good idea to put artifacts online. You need to be sure what the artifact is used for and how it is used. Maintain the structure of the artifact and don't disable any means of communication through the artifact (e.g. side notes).

The consolidated cultural model

The consolidated cultural model reveals values, standards, constraints and emotional relations between people and groups, and how they conflict and support each other. Find out what's creating the friction and redesign to reduce the interpersonal friction. If you think the friction is caused by role isolation for example, try to increase communication. Look for positive values also and try to maintain and support them.

The cultural model tells what the customer really cares about. It reveals the key issues that should be the focus of the teams efforts.

The consolidated physical model

The physical environment can be adapted to suit the needs of the work. Design the system to deal with the physical constraints the environment might cause. If it's possible to get rid of all paper work, do it! If for some reason there is a need to have papers, make sure you can synchronize with the online system.

Designing from data received from models

Now when we have all the data from the customer, it's time to design. Customer data never say exactly what to design and all the facts and data we got may be interpreted in multiple ways. Team members tend to pull in different directions and see different issues and ideas.

The first step in the design is for the team to immerse into the data by reading the affinity from end to end. Doing this before the visioning ensures that the issues at hand are fresh in the designers minds.

Brainstorm two lists, one with available technology and one with 'starting points'; design ideas that have captured the imagination of the team members.

The visioning process is a brainstorm that is based on and driven by the customers work practice. A visioning session gives the team a chance to pick a starting point and spin it out to a new work practice transformed by technology. The vision is a drawing showing what the work practice would be like. It shows people in the roles they play, the system they use, how they communicate and how the systems are structured. Elaborate on the idea for about half an hour and then move to another starting point and do it all over again. Create three or four alternative visions.
Evaluate the visions. Start with writing a list of all the positive points of that vision. Then list the negative points, why it would be bad for the customers work practice.

The vision defines what is expected of any software and hardware components of the system. Engineers can start investigating technological possibilities.

**Time estimation**

Collecting the data from the customer using all the consolidated models will take one week. To analyze the customer data and create a design will take another week.
Step 5: User Environment Design

This step is mainly focused on structuring the system to support the new work practice. The new system must have the appropriate function and structure to support a natural work flow. Just as architects draw floor plans to see the structure and flow of a house, designers need to see the "floor plan" of the new standard administration system — hidden behind user interface drawings, implemented by an object model, and responding to the customer work. This "floor plan" is typically not made explicit in other design processes. The User Environment Design captures the floor plan of the new system. It shows each part of the system, how it supports the user’s work, exactly what function is available in that part, and how the user gets to and from other parts of the system — without tying this structure to any particular user interface. With an explicit User Environment Design, a team can make sure the structure is right for the user, plan how to roll out new features in a series of releases, and manage the work of the project across engineering teams. Using a diagram keeps the system coherent for the user, counter-balancing the other forces that may sacrifice coherence for ease of implementation or delivery.

The goal of the User Environment Design is to present structural issues, making the key considerations salient for keeping the user’s work coherent. Designing the UED to the administration system will make the whole system coherent. Team members can see the basic functionality in the structure and make the modification and new features adding easier. Additionally, a good structure suggests and supports unforeseen ways of working and makes the UI design and system implementation much easier later on.

Time estimation

In this part, it takes approximately two weeks to make the UED. The first week will create the draft of UED. Then in the second week the draft will be revised to see whether all parts in the structure are connected and if there are some features to be modified or to be added in this structure. Namely, one week is needed to perfect this UED to drive the design and implementation carried out later.
Step 6:
Prototyping

Prototyping is a customer-centered process. This is the stage when the design team extend and iterate their design with customer feedback. Iterating with the prototypes is a tool to ensure that the team builds the right system, that the structure fits the users work and that the user interface is usable and reveals the structure clearly. It is a basic part of a customer-centered process that the end user have the final saying about what works and what doesn't. But giving this level of feedback is hard for the customer. Most customers only have an unarticulated knowledge of their own work and cannot check a proposed design against their own experience without help. To do this, the customer needs a process which allows them to 'live out' their work in the new system and articulate the issues that they identify.

The designers want to co-design the system with the customer, so they need to turn them into good co-designers. The design needs to be tested by customers who haven't been members of the team. The design process needs to create a way of interacting that helps the user to be concrete about design changes. When a customer is testing the prototype, he can only respond to it from his point of view. They also don't know the range of possibilities that technology could support.

You need to start with an initial design concept. It will be easier to refine and extend the prototype if the starting point is close to what you want.

Prototypes act like a language for communication between user and designer. A prototype enables the customer to interact with the proposed system as they would with any system and respond in a language that is relevant to them.

The first prototypes are always paper. It is very practical and it makes it possible to express the structure of the system and makes it hard to focus on the user interface details. It becomes clear to the customer that the interface details is not important at this stage. A paper prototype is easy to change directly if there is a missing function.

User Interface

The UED is used to drive the user interface, it is the UI designers specification. It tells the designer how to organize the interface, what functions should be available and where to put the functions. It does not say how the interface should work, the interaction style and the appearance. The UED defines the structure and function to implement. It's up to the UI
designer to make creative use of the technology to get the UI out of the way so that the user can focus on work.

**Time estimation**

This takes place no more than a month after the beginning of consolidation. For this small project it may be sufficient with three or maybe even two weeks.
Conclusion

After the detailed introduction of user-centered design which used in our project – administrative software – you may have gotten an overview of the Contextual Design process. The project is driven by user-centered design with the focus on customers who are using administrative software now and in the future. The design steps are divided into contextual inquiry, work modeling, consolidation, work redesign, user environment design, prototyping and user interface design. The customer will be involved from the interview in the beginning to the prototype testing in the end. We believe that this kind of administrative software, which is customer driven, will meet the requirements of market in the future. More and more real-estate companies will use this kind of administrative software to deal with the work they meet. This software is considering their work in the whole process and people can use it smoothly just as they were working in the real place.