

Applab | Remote Monitoring App

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A CANON COMPANY



Explanation



Underlined terms are explained in the glossary.

[A-1] indicates that there is a appendix entry for further explanation.

Parts of this report (employee names, confidential information) have been removed for the reason of keeping this information confidential.

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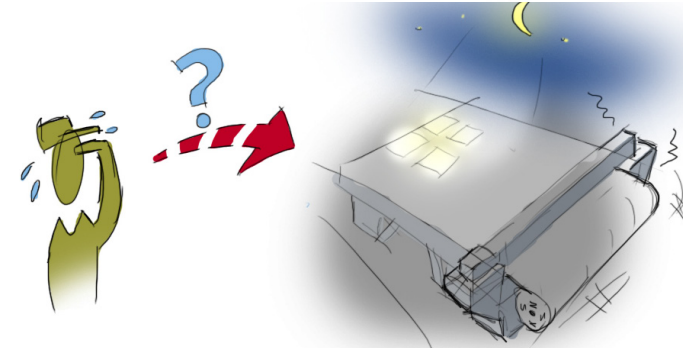
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Introduction



Océ Technologies B.V.

The internship company, Océ Technologies B.V., is a research branch of the company Océ N.V. It is situated in Venlo, the Netherlands. Océ is a large technology company. It develops and produces products for increasing efficiency with exchanging information, with a focus on the printing market worldwide. Being in the last phase of the integration process with Canon, Océ will become part of the Canon Group. Their products include hardware solutions, as well as software solutions. The internship will focus on a software solution.

The problem owner of the project is [REDACTED], Lead Technologist at the Software Engineering department. The internship took place at both Software Engineering and PPP Design (called Océ Design before the integration with Canon).

The company coach is [REDACTED], an interaction designer at PPP Design. The disciplines of PPP Design are: interaction design, usability design, product design, visual design and model design.

About the Océ AppLab

The Océ AppLab is a continuously running project of Océ to explore the world of mobile devices and apps. The development of apps is a team effort and it requires a lot of multi-disciplinary knowledge. This project is aimed at gathering information and knowledge on developing apps in the world of mobile devices. The assignments from AppLab take place within the realistic context of Océ. Actual goals from Océ are used as (design) problems for the assignments. This assignment is executed in a team of two, and is aimed at remote monitoring of printers.

The assignment: remote monitoring

The assignment is to create an app for remotely monitoring printers in the **Graphic Arts** sector, with a focus on wide-format printers like **Arizona** and **Colorwave**. These printers print from paper rolls that either get cut into right format after printing, or will be rolled up again for compact and continuous printing (**roll-to-roll**). An **operator** has to make sure that the printers keep running. They have to interact with multiple screens to find information, apply settings and preview the results, which makes it harder to keep an eye on the printer.

The print shops in the Graphic Arts sector work 24 hours per day. Though that these printers need quite some maintenance and error-handling, the operator is not always present. In the current situation, there is no possibility to remotely monitor the printers. Both in the print shop and at home.

The operators need to be able to monitor the printers' printing progress. The operator will have insight in the whereabouts of the print shop, and can return to solve problems when necessary.

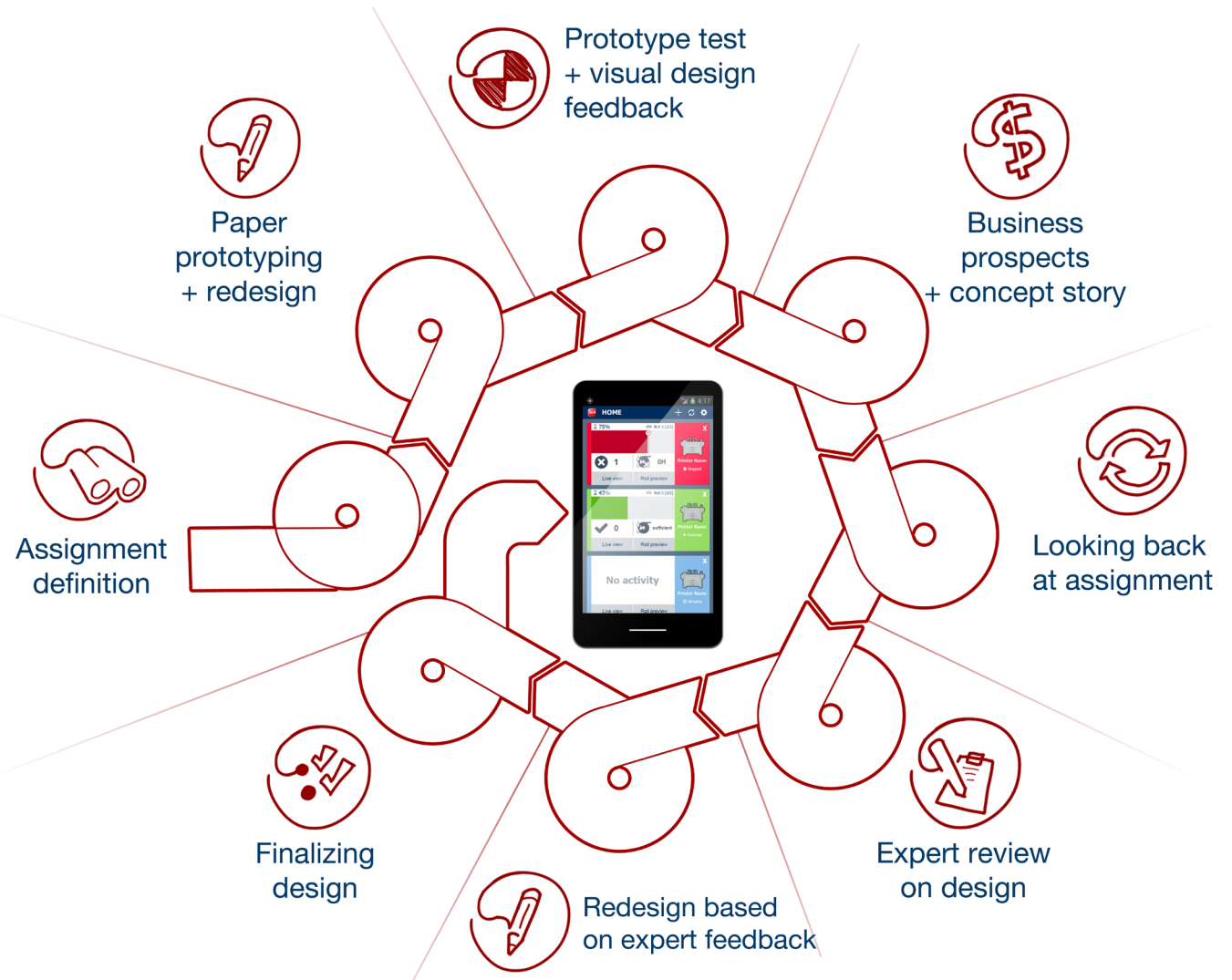


Description of the process

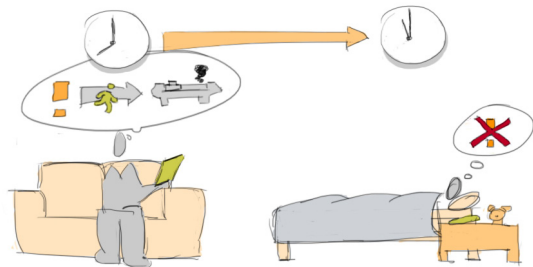
Throughout the project, an iterative process was taken. The app was designed visually, validated with a surrogate user group and discussed with experts within each of the cycles. It was not allowed to test with actual users or expose information to the outside world due to the NDA-contract.

The cycles start with the user validation sessions, of which the results were used for redesigning the app. The beforelast cycle was aimed at getting back to the essence of the assignment. In addition, there was a cycle about defining the business prospect for our app, to find out how this app could be a distinctive one, and how it could be profitable for Océ. Throughout these cycles, experts were involved for feedback. This shows just how it works at Océ, where the open learning environment is not just created for students.

A team consisting of a software engineering student and an industrial design student worked on the project. This reflects how multidisciplinary teams are formed at Océ for projects in “real life”. These multidisciplinary teams have benefits as well as some challenges from an industrial design point of view. The software engineering student had quite a different perspective on the project, working more on a schedule throughout the development of the app, and reviewing the designs in terms of feasibility. At first, this was slightly limiting the ideation, but later on it sparked creativity, as the input from the software engineer was used as inspiration. This influenced the design in such a way that it became more feasible and down to the essence.



Context research

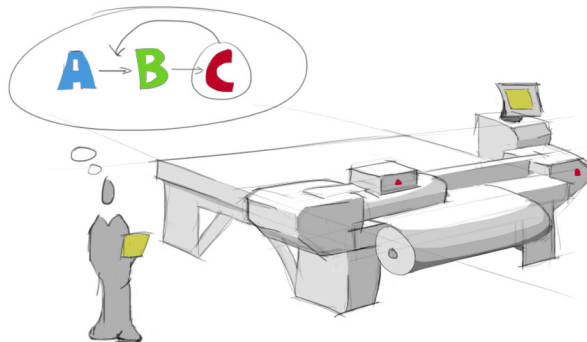


Interpretation of the assignment

The interpretation of the assignment was that the operator (the user of the app) wants to monitor the printers that are active, both while being present and not being present at the print shop.

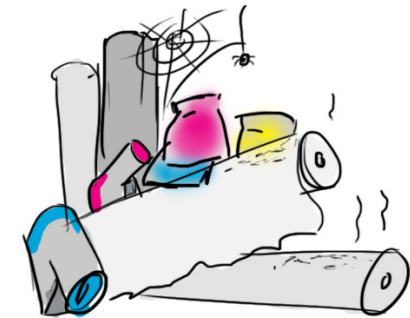
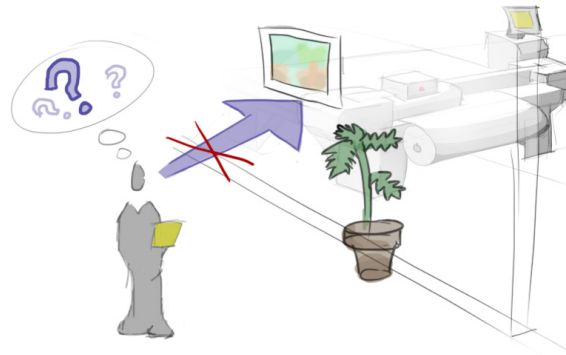
Referring to a documented customer visit for contextual inquiry that was within this thematic, the printers actually run 24/7, so there has to be made a distinction between when the operator is willing to return to the shop and when the operator will not return to the shop.

The app has to give a clear overview on what is going on in the print shop, and has to give more information, where needed. The information has to support monitoring when **printing unattended**.



Related issues

The operator is confronted with some issues when it comes to unattended printing.

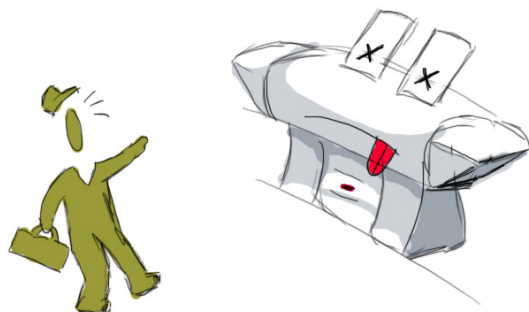


1. The operator is not aware of the status of the printer when not being present at the print shop (moreover, even when not being in the same room as the printer).
2. Some maintenance will be delayed too much, which results in loss of time and resources or severe delay of jobs to be finished.
3. Because it is not clear if the printer is going to make it with the currently loaded resources, new ink cartridges as well as new paper rolls will be loaded before commencing unattended printing. This results in some waste (half-full ink cartridges and halfway consumed paper rolls) that has to be taken care of.
4. The next day, the jobs that have been printed unattended will have to be reviewed and finished. Currently it takes effort to keep track of where specific jobs come from, who owns them and how they have to be finished.



Key values, functionalities of the app

The app will have some key values and functionalities, in order to tackle the problems that have been mentioned in the interpretation of the assignment.



1. The app should create a clear overview of the print shop. Issues should be communicated in a clear manner, and it should be clear which printers need maintenance.
2. The app should facilitate more detailed information when needed, in order to get more insight into the context of an issue. This includes textual information as well as visual information.

Operator

Thinks:

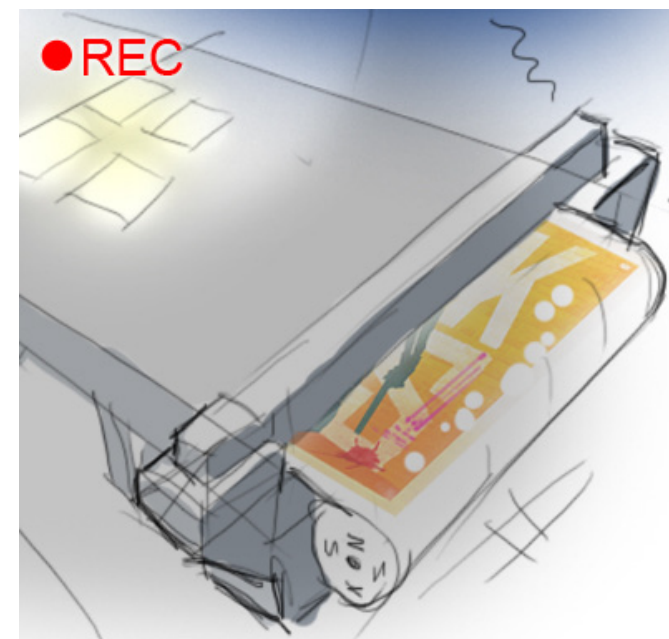
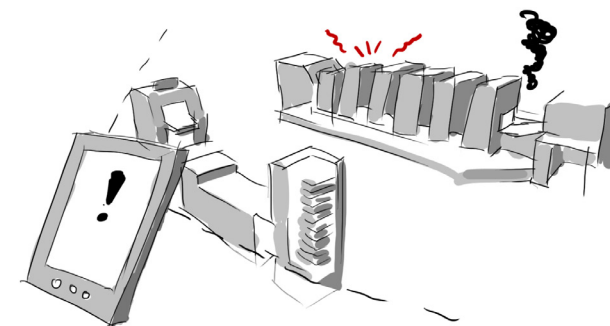
- What do I need to fix?
- When do I need to fix it?
- What does it take to fix it?

Wants to see:

- fast overview of printers
 - Printer 1: error
 - Printer 2: running
 - Printer 3: error
- what is needed for the fix
 - Printer 1: cyan empty
 - Printer 2: running
 - Printer 3: roll 1 + key empty

Furthermore, the key functionalities of the app are as follows.

3. An overview of the print shop. This includes basic information about the printer. The order of printers in the overview is based on urgency: errors > warnings > idle > running. Furthermore, information about the progress of a printer is included when it is occupied with jobs.
4. Detailed information layer categorized into resources, errors and jobs. This information is included into the app for giving insight into the context of a printer.
5. A live view for viewing the printer in real-time. Some issues can't be covered with the information schemes that are mentioned above. Besides, the "senses of a printer" are not always able to notice if there is something wrong.
6. A preview-and-review functionality is included for reviewing the progress and for getting a visual image of the jobs planned on the roll. Besides, this functionality adds value for reviewing the roll the next day. More details on a job can be found by clicking the specific job on the roll preview (in the latter situation more of a roll review).



Design process: first iteration

Assignment definition + first visual iteration

The design process was an iterative process, typically starting with user testing, after which the app was redesigned based on the input. Already early in the process the surrogate user group was confronted with the app. The choice of platform and operating system was made in the early stages as well. Android was OS of choice, as app development was the easiest, combined with the largest user base. Mobile devices had priority due to mobility of the solution.

The first cycle of the project was a visual cycle. To get an image of what the app's main structure would be like, there were several visual iterations. The vision behind these iterations is as follows.

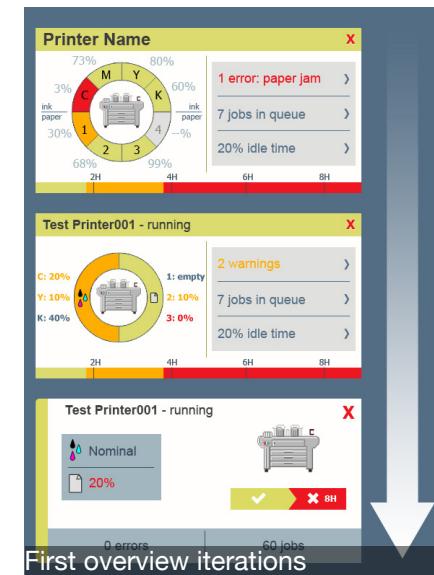
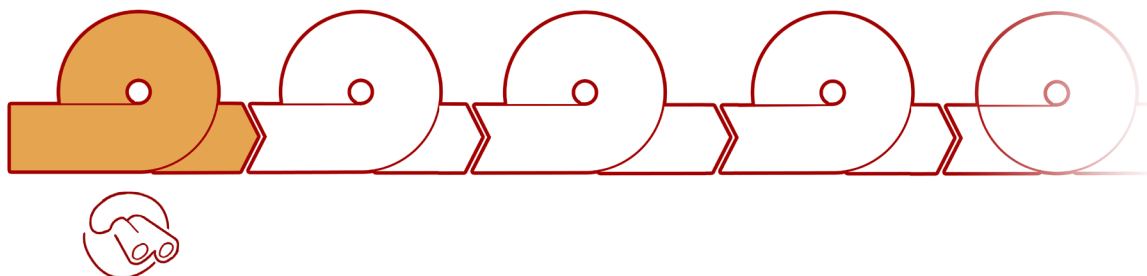
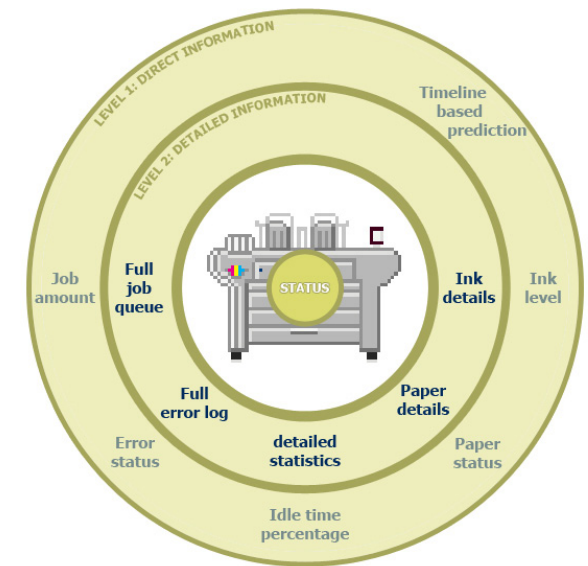
Design concept

There are two information layers: an overview, complemented by detailed information. The overview should be brief yet complete. The included information is resource information in a diagram, job information, error information and statistics. Furthermore, the status information (running, idle, stopped) is included as well

as a timeline for forecasting when an error occurs.

This information was soon regarded too much, due to the limited space. Resource information was displayed per category instead (ink, paper). However, the circular diagram was still too large for a mobile screen. So instead, the resource information was displayed in a textual manner. The timeline forecast was updated as well. Instead of stretching over the full width, it became a smaller visualization of when an error occurs. The style of the earlier iterations was too colorful, so the last visual iteration of this cycle was designed with less alert status colors. In this stage, the app was focused on displaying textual information.

The second layer of information was designed as a tabbed structure, to easily switch from one section to another. Within the first cycle, the job list was subject to structural change. Ordering jobs per roll was not technically feasible, and less efficient. A different way of ordering was chosen: ordering by status: pending or finished. This creates more of an unambiguous means of communicating jobs in the queues of a printer.





Planning concept validation sessions

For validation of the design, but also for gaining insight into the context, some user-centered approaches were taken after this cycle. These approaches form a series, and were an integral part of the iterative process. The first user centered approach to be taken was a paper prototyping session. An usability designer, [REDACTED], helped with setting up these sessions, as well as with defining what to test. Paper prototyping is best for early testing, as the results are not biased by the design's aesthetics. A follow-up approach was a prototype test, with a mockup of the actual app. The third approach was an expert review. Each approach is part of a separate iteration in the process, as the design is reconsidered after every process.

These tests have been conducted with Océ employees, as a surrogate user panel. They have experience in relevant fields, such as hardware testing or software engineering of wide-format printers and interaction design. As explained earlier, testing with an actual user group was not possible, as working at R&D means that projects deal with sensitive information and new ideas that should not be exposed to the outside world.

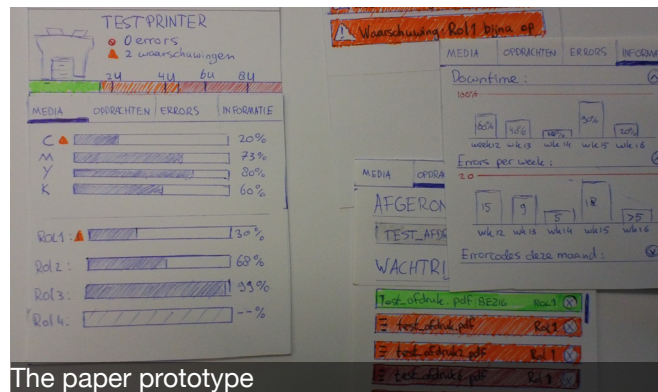
Testing in a dedicated “usability lab“ was a new experience. It required collaborating with the team member, [REDACTED] as recordings could be made afterwards was very useful for drawing conclusions.

First session: Paper Prototyping

The goal of this session was to validate the information

layout as well as the interaction with several pieces of information. This was done by creating a basic mockup out of paper. The participants of the paper prototyping session would perform several tasks, which would indicate whether or not the information layout was clear and if the interactions with the information were indeed happening. Because the participants have experience with the target group in their discipline, they can think about what the actual user would think of the app or certain interactions.

A pilot was conducted to fine-tune the session itself, with the same usability designer. Based on that, the setup of the session changed. In order to feel more natural, there has to be a causal relationship between the tasks. It results in better feedback, but also a better observability and less “hiccups” during the session.



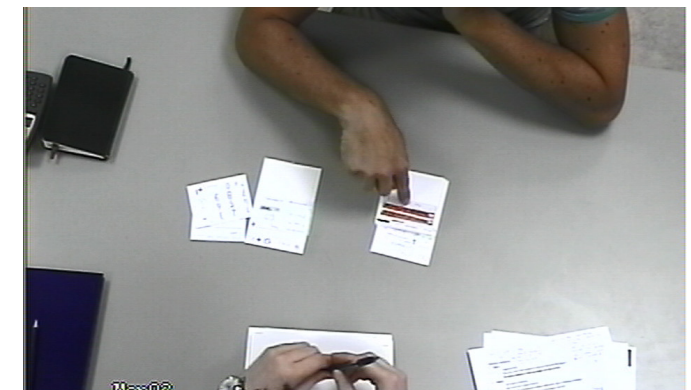
The paper prototype

Paper prototyping conclusions

Feedback from the pilot session suggested placing statistics outside the tabbed structure of the information, combining it with the error log instead. The actual paper prototyping session yielded the following

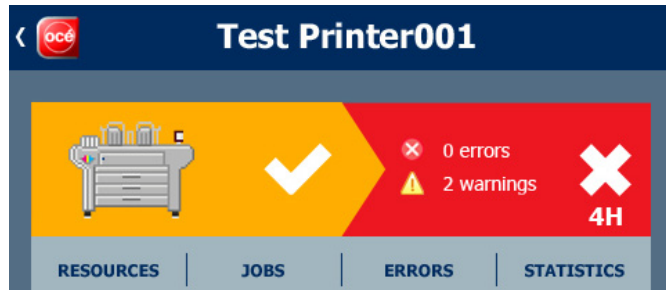
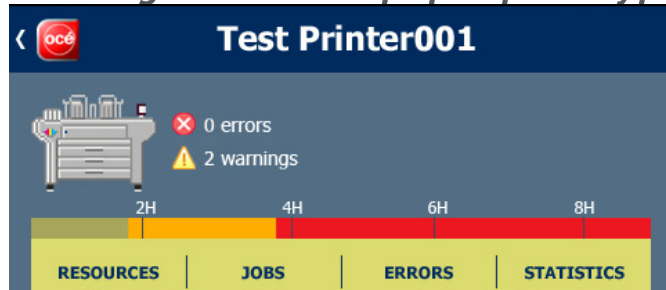
feedback and conclusions:

- The textual information can't cover all the potential errors. There should be different representations of information. Besides, there is interest in alternative means of monitoring from the market.
- The process of adding a printer should be easier than searching for IP addresses. This could be improved by enabling printer name for input.
- The information on the resources was too brief, or at least did not capture the essence. There should be a different way of communicating their status.
- Statistics does not belong at the error log after all. From the percentage of downtime, it is not clear what the cause of the downtime is.
- The settings icon was unclear, the standard Android icon with sliders were not recognized as settings.
- The detail screen and the overview screen have a different look and feel; it seems as if they do not belong together.



Design process: second iteration

Redesign based on paper prototyping session



Detail information layer aesthetics

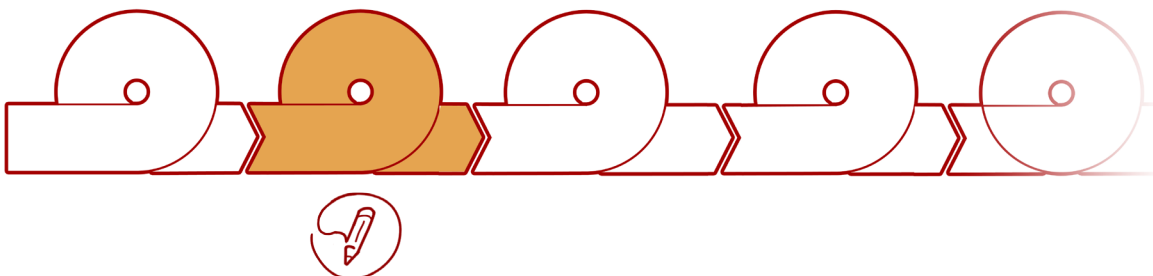
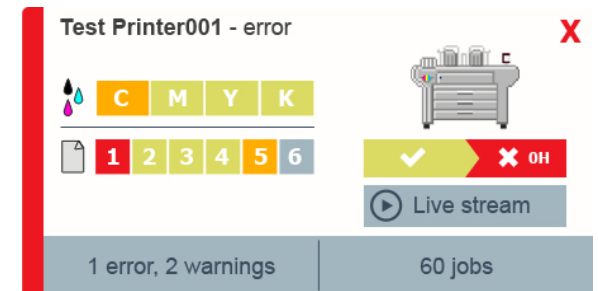
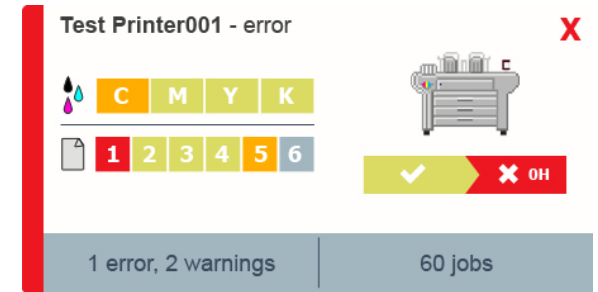
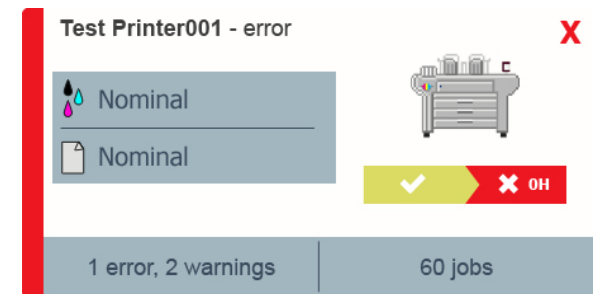
The results from the test were taken into account while redesigning of the app. First of all, statistics was added in the tabbed structure, and removed from the errors-tab. Besides that, the top information was redesigned to resemble the style of the overview. The settings icon was replaced with a gear icon for better recognition.

Information card redesign

The information card in the overview was redesigned as well. Where it used to display only summarized information about the status of the resources, it displayed the status color for each of the resources. This would give direct insight into the status of each resource, instead of showing shallow information that does not communicate the right essence. In addition, the live stream was added to the overview screen.

The live stream is considered to be an interesting added feature. There has been experience with clients that place a webcam close to the printers in order to monitor them in real-time. This shows that the market is interested in a feature for enabling live streams of their printers. How the webcam will be connected or purchased is yet to be determined.

Furthermore, the design has to be somewhat compatible with the **OCEAN** design language, that is used at Océ. This would make the app compatible with other Océ products, and would enable further development.





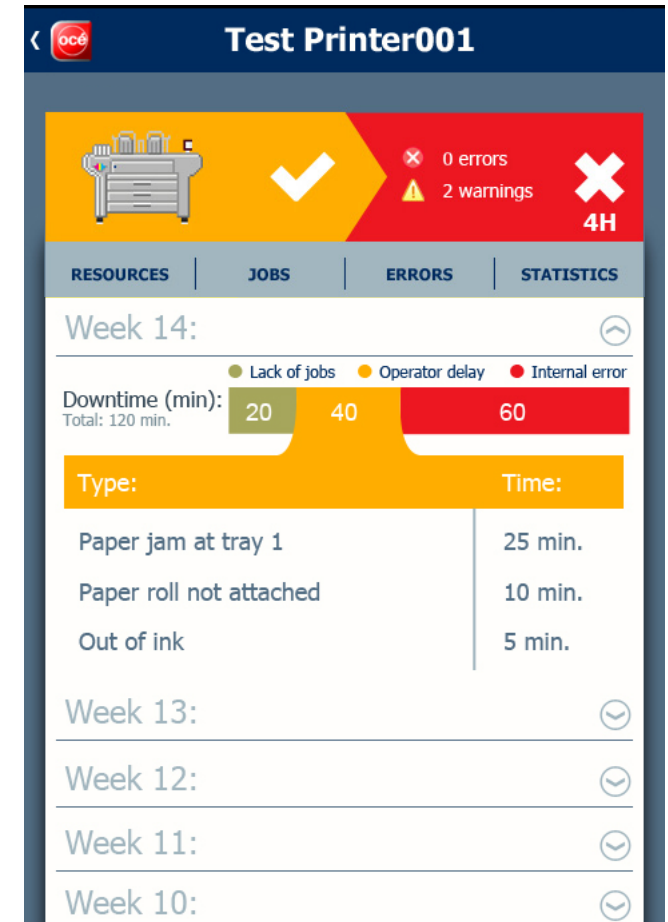
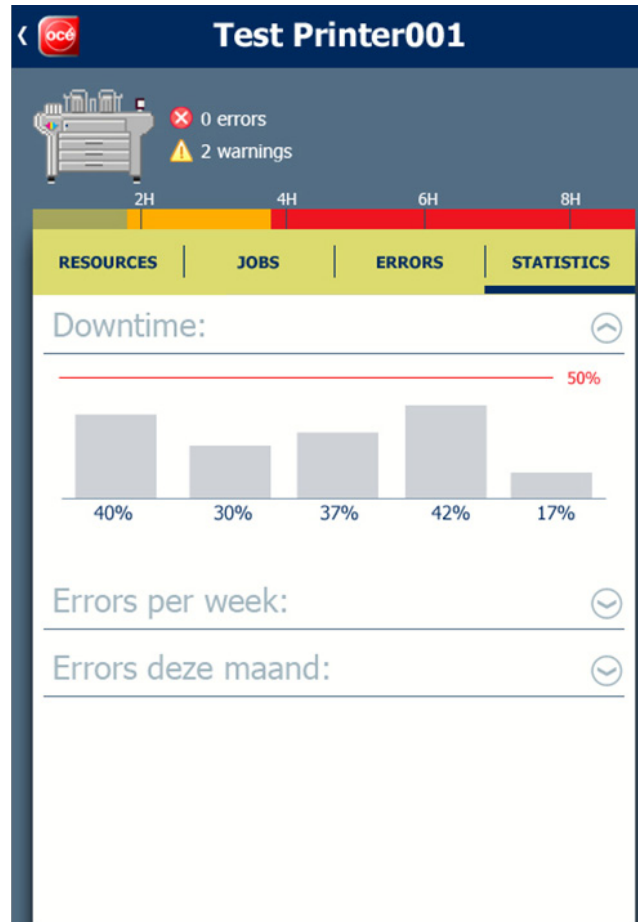
Statistics redesign

The statistics were subject to a redesign as well. The downtime is displayed in a percentage right now, with no clarity on what the cause is. In fact, there are many factors that cause downtime. Think of internal error, lack of operator help or lack of jobs on the printer queue. This should be visualized in a different way than it is visualized now. The visualization should create more clarity about what causes the downtime. The new design communicates the statistics per week instead of per aspect, which resembles a weekly report of the printer's statistics.

An iteration we did by ourselves is about sorting statistics per week. These statistics comprise:

- The percentage of downtime together with the amount of minutes/hours downtime
- A graph showing how much each cause of downtime contributed to the total downtime.
- A table of most occurring errors. This list sorts on amount, in a descending order. A row will be composed of error name and the amount of occurrences.

These iterations changed the app drastically. A second user testing session was organized in order to validate these changes. This time, a prototype session was conducted, as these visual iterations now have to be validated as they are, instead of the principle they are based on. In addition, a prototype test would create an opportunity for observing the intended interactions.



Design process: third iteration

Prototype test + feedback visual designer

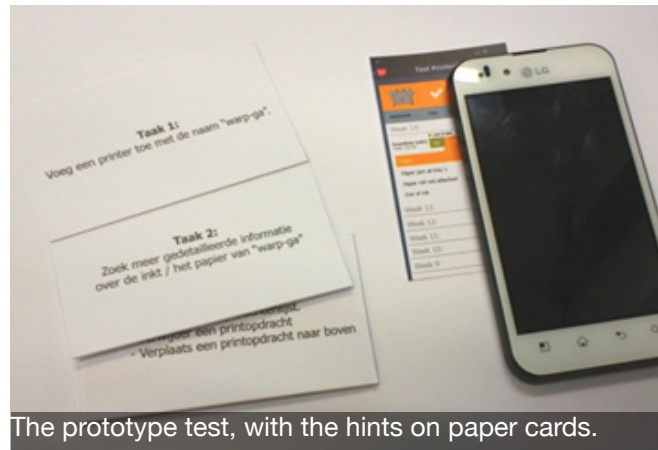


The setup of the prototype test

This cycle started with a prototype test, to validate the last visual and conceptual iterations. It was the first test with an operational prototype. The prototype already had the right form-factor, which would make the results more relevant for the the entire concept. The test was validated with a pilot. The phone-sized testing device has proven to be a pain to operate. The pilot was chaotic, so the tasks to hand out should be more specific. Next to that, the app was not fully functional. Some sections were left blank. Ideally, the participant will be steered in some direction, to prevent confusion.

The setup was changed, to solve the aforementioned issues. Instead of using the (barely usable) phone, a tablet was used. A pro is that the prototype was operational without any hiccups. The downside was its size: the app was designed for a small phone screen.

Furthermore, the tasks were printed on cards, which makes it easier to hand them out. Moreover, it puts emphasis on the task instead of giving freedom for exploring the app. A “think-aloud” protocol was used for keeping track of the choices that the participants would make, before they would actually take action. This created room for correction when a participant wanted to go to a section which was not intended for testing at that time.



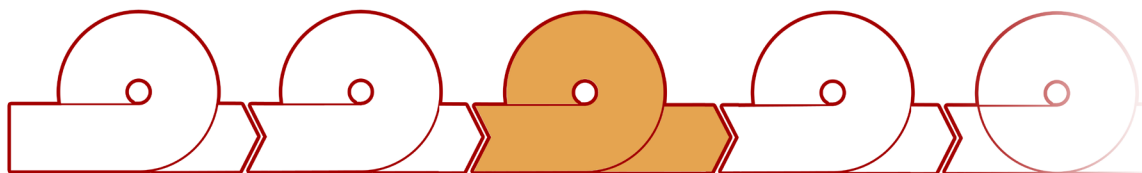
The prototype test, with the hints on paper cards.



The results from the prototype test

The prototype test yielded the following results.

- Practicality issues like a missing return-button at settings, inconsistent ink color sorting (no CMYK) and being able to delete a printer too easily. Solving these issues makes the app more logical to operate.
- The information density of the overview items is too high. It is confusing to find the information, as the layout (combined with the colors) is too chaotic.
- An “X” for indicating an upcoming error gives a wrong impression. It looks like a delete icon. Besides, the timeline representation on the detail screen has a false impression of being continuously in error status.
- The statistics are irrelevant for the target group. They do not want information that is (either directly or indirectly) linked to their efficiency at work.
- One participant asked whether the support of printers would go beyond Océ or not, which was worth considering. This could be included into the business case.



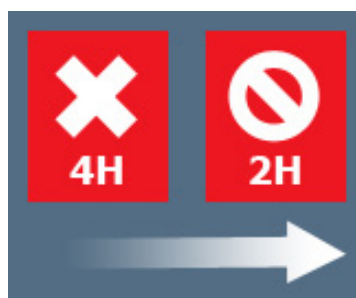


Redesign steps based on the test results

The practicality issues had to be solved. After that, the redesign of the overview items had the highest priority. The current design was discussed with a visual designer. This meeting resulted in some conclusions. The overall information layout was indeed too cluttered. There was simply too much information to show to the user in an overview. The colors that were used to indicate the status of the printer should be calmer when there is nothing going on.

This time, the design was entirely aimed at viewing the status of several elements: resources and errors. Resources were divided into ink and paper, displayed next to errors. The live view and the job queue became buttons at the bottom of the card. Statistics were linked to in a separate place. A second iteration on this design suited more to the OCEAN design language and created a calmer look when there is no error. In addition, the engine icons were redesigned for a more contemporary look.

The icon used for visualizing errors throughout the app changed as well. As it was a cross before, a different icon was considered in this iteration: a diagonally struck-through circle. The aim was to prevent confusion with the delete icon.



Conclusion for the next iteration

In the next cycle, the possibilities in a business perspective were explored. Besides, the question arose how this app could be a killer-app. Until this cycle, it is an app for displaying information, which does not have that much of a distinct identity. Next to that, the statistics section is not filled in during this cycle. These questions can be approached in a brainstorm. This is part of one of the next cycles as well. The third user-centered approach will be conducted in one of the following cycles as well. The app has been redesigned since the prototype test session, which could use some input from different disciplines. That is why the third user-centered approach will be an expert review. This means the participants now have to look at the app from their own role at Océ.

Design process: fourth iteration



Business considerations + reconsidering concept story

This cycle started with questions about the business prospects of the app. The goal was to find out about how to make this app a distinctive one, with powerful functionalities. Another goal was to define a better concept story.

Market relevance

First of all, the business possibilities were discussed with [REDACTED] a Graphic Arts market analyst. Some scenarios and possible directions were discussed. First of all, a market pilot can be done for determining the impact of the app on the market. It could be conducted with a small selection of customers for more qualitative feedback, but also with a large group of customers for more reliable, yet less qualitative, results.

The results of this test will influence what business approach will be taken. On these results can be anticipated, if some scenarios are defined.

A. The client has a considerable efficiency boost, and considers the app to be worth paying for. This will be the easiest scenario.

B. The client does not necessarily have an efficiency boost, and does not want to pay for it. This scenario has some opportunities, but requires a different approach.

C. There is a variety in efficiency boosts, and a variety in opinions about paying for the app. This scenario has the opportunity to create a “freemium” model.

Market approaches

The selection of a business case depends on the impact that the app has on the market. If the market feels like paying for the service, there are different possibilities than when the market doesn't feel like doing so.

A. The app can be purchased from the app stores, which could be accompanied with a list of supported webcams that the users can buy themselves. Another possibility is to offer a supported webcam as a separate deal / discount deal when having purchased the app. **[A-1]**

B. When it is not desirable to pay for the app as a separate service, this service can either be extended or this service can be connected to the products that it supports. **[A-2, A-3]**

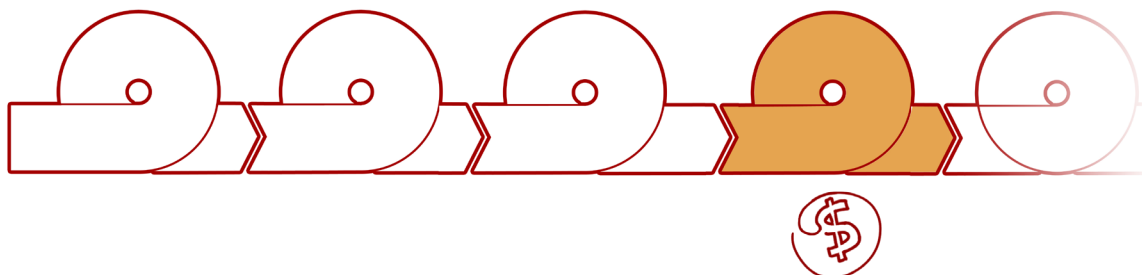
1. When it comes with the products it supports, the app is an added value for selling this product.

2. When extending the service, there can be gained revenue in a different way. Think of extra service for owners who downloaded the app. Maybe the media can be ordered via Océ with a special discount.

C. When there is a variety in efficiency boosts and opinions about paying for the service (e.g. when beta testing), a freemium model can be applied. This means that the app will be free to download with a limited functionality, whereas the app can be purchased with full functionality. There are some ideas about how to limit the app for free download. **[A-4]**

1. Some extended functionalities that are desirable can be limited or taken out.

2. Some of the functionalities can be time-bound or limited by usage rate. Think of a more limited forecast or permission to add only a limited amount of printers.





Defining the concept story

These business models are displaying the possibilities well, but considering the business prospects is not complete yet. What is left to do, is defining a product story. This will show the added value for the customers. At the mid-term concept presentation, some questions arose. This motivated us to look back to the original concept, as well as to take a second look at the user's situation. The goal was to answer some of the following questions:

- When does the user want to be bothered by the app (when printing unattended)?
- To what extent does the user want to receive or search for information when printing unattended?
- How relevant are the functionalities of the app when it comes to printing unattended?

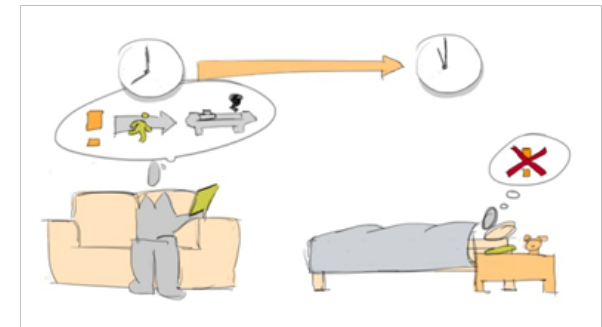
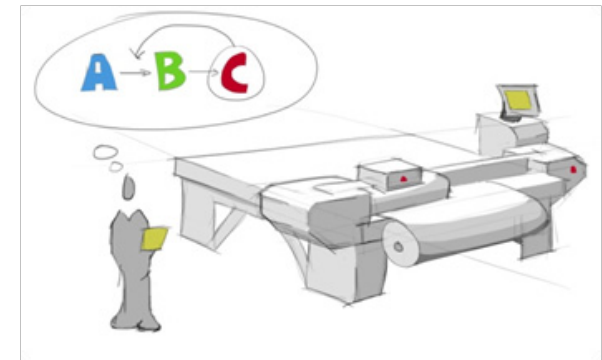
Thinking of what the background story of an operator is, what the actual context is that the operator works within, we formulated some points that are important for our concept story.

- When the operator is planning to go home, the printers are still running (in an unattended printing situation). The resources are checked before leaving, to see whether or not they are sufficient for the upcoming unattended session.

- At home, the operator does not want to look at information that is not required. Besides, it is most desirable to be notified if something goes wrong. You should not have to open the app every once in a while. This situation is split into two scenarios:
 1. Early on the evening, the operator would still be willing to return to the print shop for resolving problems with the printers. Notifications are appreciated.
 2. Later on the evening (going to bed), the operator will not be willing to return to the print shop: problems will be resolved the next day. Notifications should not be sent.
- The next day, the operator wants to be able to see the results and find more information on what happened. This might help in planning the next day.

The business scenario that is most valuable is the added value scenario, as it is most likely that the user will use it if it comes with the printer.

The goal of defining the concept story was to gain a better insight into what information an operator would want when monitoring, as well as to what extent the operator wants information. As a conclusion, the operator does want to monitor, but does not want to be bothered about issues in the print shop at mid-night. Being able to find more details on what happened might help planning the next day.

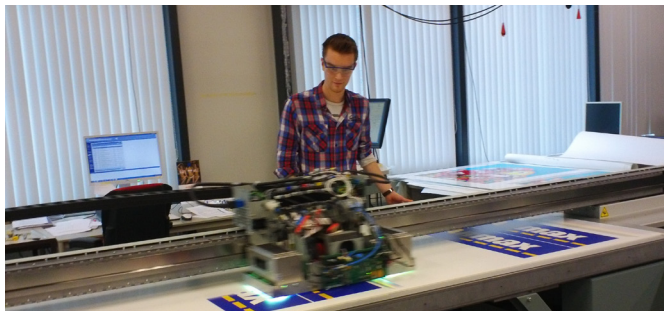


Design process: fifth iteration



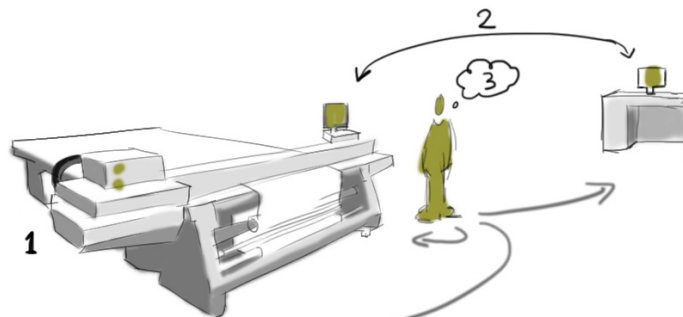
Concept adjustments through helicopter view

Redefining the concept story sparked some questions. The statistics are really meant for a long-term view on what has been going on with the printers: how is this relevant for the operator, or at least the context of the app? How can this section be improved to be more relevant? What are the possibilities for enhancing the app's functionalities? What could distinct this app from the other information apps? To answer these questions, the essence of the assignment was revisited and some brainstorming was conducted. Next to that, an endurance test of an Arizona prototype was attended. The test was a good opportunity to have a hands-on experience with the context of the assignment.



Arizona endurance test

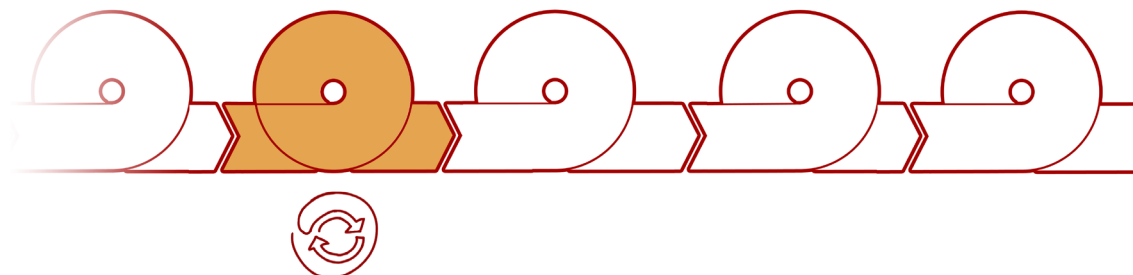
The endurance test showed some problems within the current context. These problems showed the relevance of the app, as some of these are tackled by the app's functionalities. The context was experienced in real-life (although in a testing situation).



In the context, the operator has to interact with multiple screens.

1. First of all, the (wide-format) printers require a lot of maintenance and manual adjustment. The app enables the operator to walk away from the printer, and still be aware of its status. The work of the operator can thus be spread over more printers than without the app.
2. Secondly, the original interface consists of two screens, with which the operator is required to interact. The app combines the information of both the screens, in a portable way. It bridges the gap between the interface and the maintenance. The screens are placed closely together in the testing situation, but these can be (and are most likely to be) placed in separate rooms in a real print shop.
3. Thirdly, being at one screen does not necessarily mean that the print shop operator has all information at hand. Being required to remember large chunks of information that is not present at the "**local user interface**" of the printer is far from ideal. Instead, the app could be complementary with the printer **LUI**, by providing the information that this interface lacks.

Though that this is in-shop activity, it also shows the relevance of these features when printing unattended. Being able to monitor the printer still is relevant. When an error occurs, one might want to take a look into detailed information about the error, just to see what is going on. A live view might give more clarification as well.





Brainstorms: revisiting the essence of the assignment

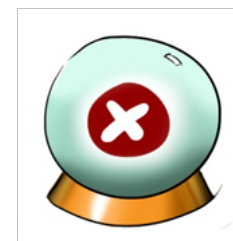
Within this cycle, some brainstorms were conducted. Initially, they were conducted to find a use for statistics, and to find bigger potential for the app in terms of functionality.

Later on, as it turned out, the use of the brainstorms reached beyond that. It verified (either in favor or against) the current functionalities of the app. It also sparked a new functionality and explored the context of the assignment once again. It resulted in revisiting the essence of the assignment.

The first two sessions showed that it is hard to imagine the relevance of the statistics section within the app. One could say it filtered functionalities and forced looking at the problem from a different perspective. Despite the difficulty, this brainstorm yielded some results that were taken into consideration. The setup can be found in the appendices. **[B-1]**

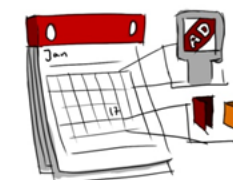
First of all, error report and prediction on likelihood of error occurrence.

Being already considered, this idea showed to be more relevant for a print shop manager. It could lead to wrong conclusions about the work of the operator, next to the fact that it could be a useful efficiency feature.



Secondly, job prediction based on calendar and patterns throughout a year.

This potentially is a useful feature, which could create awareness on the work load and could be an assistive tool in planning the job queue as well as purchasing supplies. Though, the print shops will already know what the upcoming demands are at certain seasons. An automated prediction tool might be redundant from that perspective.



Thirdly, media consumption. This is a promising idea. It fits into the relevant information for an operator. It would, however, be too closely related to the resources section for being integrated in the statistics section. It would make more sense to implement it in the resources section itself.





Brainstorm follow-up sessions

The third brainstorm took a slightly different approach. This time the goal was to generate ideas around more elaborate themes, such as remotely monitoring a job queue on a roll, remotely planning jobs on a roll and required overview information from a whole printer fleet. On the contrary to the other sessions, some ideas were picked and elaborated on through a 'brainwritingpool'. This resulted in multiple views on a collection of ideas. These ideas were gathered and picked for relevance. After that, the selection was considered for the project, like last time. A selection of these ideas is included here, a full list of the ideas and their considerations can be found in the appendices, as well as the setup of the brainstorm. **[B-2] [removed;confidential]**

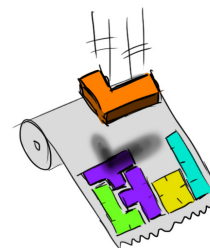
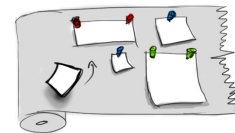


Bulletin board job (re-)ordering. This idea, based on a physical equivalent that enables re-ordering, is about a drag-and-drop interaction job ordering system. The drag-and-drop interaction can be both interesting and intuitive for the user. This idea was considered a good extension for the roll preview section.

Job tetris. A playful equivalent of the previously mentioned idea. Based upon the same principles, it has a different approach: a print job only fits if it does not use too many resources. This gives a destination for re-ordering jobs as well as a perspective for implementing it into the roll preview idea.

Lifecycle monitoring and predicting. This idea is focused on predicting the life cycle of a printer, either the life cycle of parts or the life cycle of the entire engine. Though that this is a very interesting feature, it is not very relevant to the operator's context. He does not really need to know a predicted lifecycle of a printer, at least not within the remote monitoring context.

When taking a step back, looking at the various approaches, points of improvement and results, some conclusions can be drawn. Where the first brainstorms generated more ideas about the existing situation (the functionalities that have been built in already), the third brainstorm generated more ideas about features that were yet to be defined further. The aim of the



third brainstorm was closer to the goal of generating ideas about new functionalities than the first and second brainstorm. Besides, the first two brainstorms lacked the elaboration on ideas. The time was not managed well enough, there were too many topics selected for brainstorming. The third brainstorm included some elaboration on ideas, in the shape of 'brainwritingpools'. These 'pools' define some generated ideas further, but they also created a variety of views on the idea, with alternatives incorporated.

The improved definition of the concept story solidified the foundation of the concept. Together with the brainstorm ideas, it is food for iterating on the existing functionalities and for exploring new functionalities. Up next is to conduct expert meetings around the latest iterations: the overview items, the detail screen and the roll preview. Due to the results of the brainstorm, statistics was found to be a feature of which the function is not entirely clear or relevant for the user. This means that the statistics section needs to be reconsidered or removed from the app.

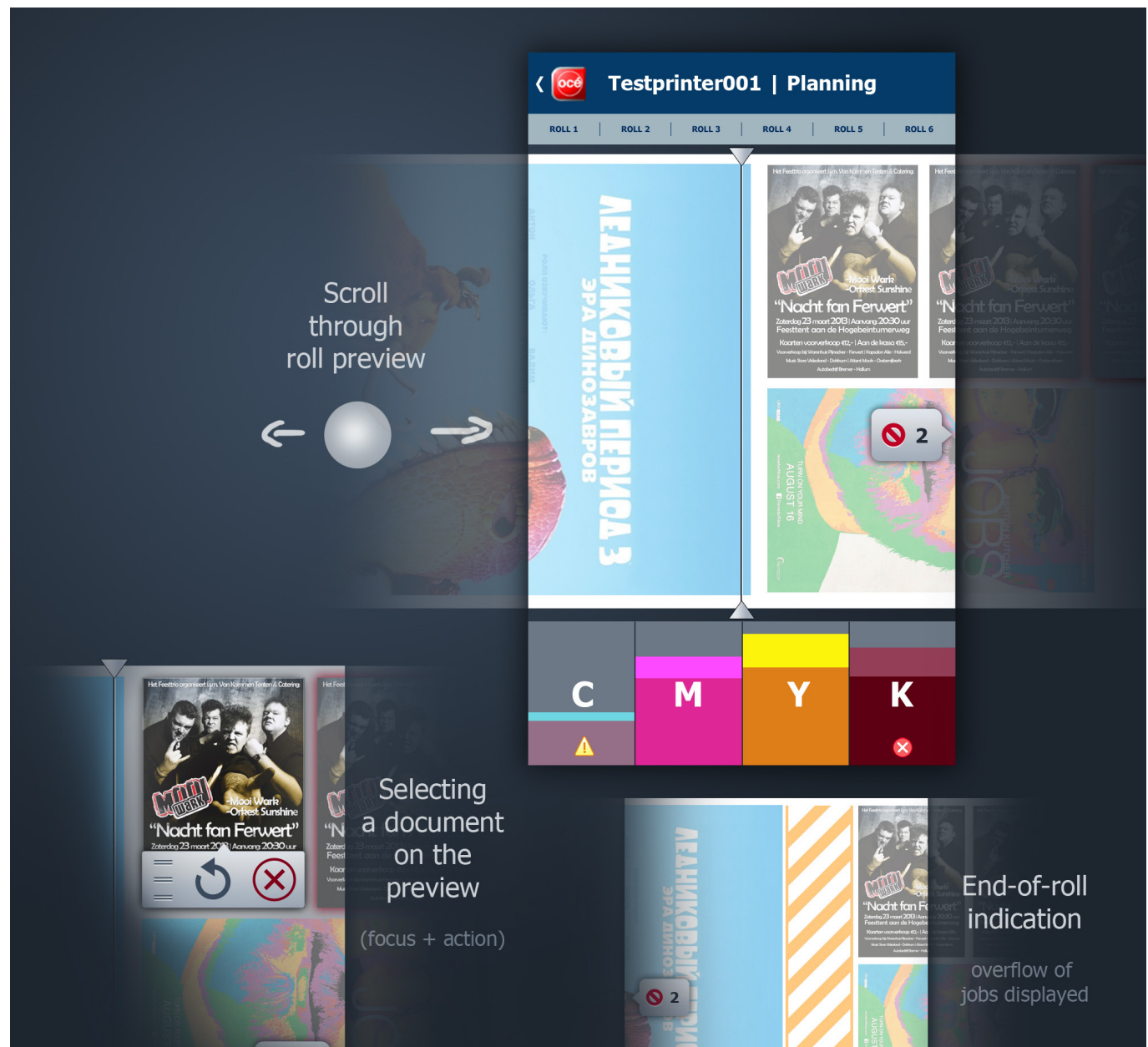


The Roll Preview concept

In between of the second and the third brainstorm, an idea for a roll preview was generated. This idea was based on the fact that the app currently lacked a visual representation of the jobs on a roll. It is relevant, as a visual representation might help in keeping track of which jobs belong to which client. A first visual was made for making this idea tangible. The following list summarizes what had to be included into the roll preview:

- Visual representation of the roll
- Planning opportunity (replacing jobs in the queue by drag-n-drop on the roll)
- Visual representation of the available ink as well as the forecasted consumption
- Extended options per job: reprint, delete, soft-proofing of settings
- Visual representation of available media and how it fits on the roll

The media consumption was implemented as a separate diagram. If it was projected along the roll, it would be less convenient to use: finding out about media consumption required scrolling. Soon enough, the media consumption visualization showed to be not clear enough. The consumption forecast is highlighted in red did not communicate well, especially on magenta, which becomes confusing to read. Some other way of communicating the consumption was considered, though within the same visualization.



Design process: sixth iteration



Expert review + redesign app

The sixth cycle is about reviewing the app and its functionalities with experts. The same panel of “users” was asked to participate, this time in their “natural role”. They would now look at the app from their own perspective, instead of the users’ perspective.

The app prototype with the latest design was reviewed during these sessions, as well as a visual impression of the roll preview. The feedback that got implemented later on in the process is listed here.

Feedback on the app’s structure

The original app structure (overview-detail information) got some feedback for improvement.

- Statistics do not seem to be relevant in the design; it does not connect to the story of remotely monitoring a print shop. As a result, the statistics are removed from the app.

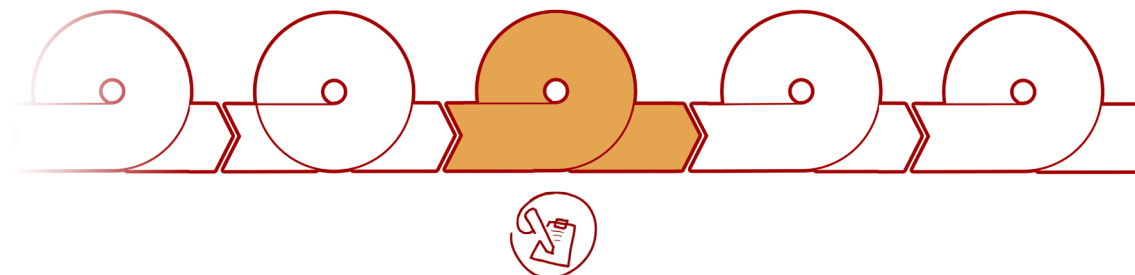
- The overview screen should be redesigned: there should be a more unambiguous visualization of the status of resources as well as the errors. Next to that, the focus of the overview could be changed to more positive information, instead of error statuses. In more common situations, error status is less relevant, as errors do not always occur. The focus of the overview was changed to printing progress, which stays relevant in all situations (except when the printer is idle).
- There is no distinction between “running” and “idle” status. However that these statuses are highly related in terms of the “error-or-not-to-error”-concept, a redesign would give the opportunity to distinct between these status codes as well. With the new focus of information on the overview, there should be a distinction between “running” and “idle”.

Feedback on the Roll Preview

The roll preview got some feedback, based on the visual impression that was discussed.

- **A monitoring app does not necessarily need a planning functionality.** Besides, the optimal job planning is most likely to be determined beforehand done by a planner. This means additional planning with the roll preview is sometimes even undesirable. The feedback sparked some consideration, and as a conclusion, the planning is removed from the roll preview.
- **The job progress is not always clearly visualized.** The moving cursor for current progress is a recognizable feature. However, once it is scrolled out of the screen, it is easy to lose track of the printing progress. This should be improved. To have a constant view on the progress, printing progress should have a separate representation besides the roll preview, instead of being projected on the preview itself.

The feedback on both the elements is mostly food for iteration, but implicitly, the feedback sketched an image of the operator’s context. This means it also contributes to defining the concept story further. Up next is redesigning the overview and the roll preview, as well as redefining the concept story based on the feedback from the expert reviews.



Design process: seventh iteration

Redesign of overview section

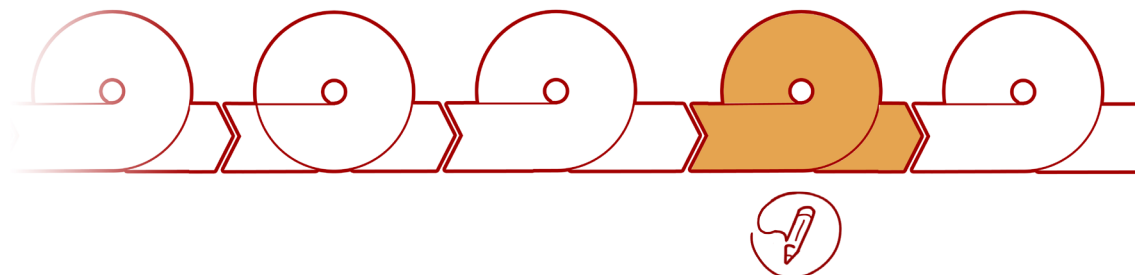
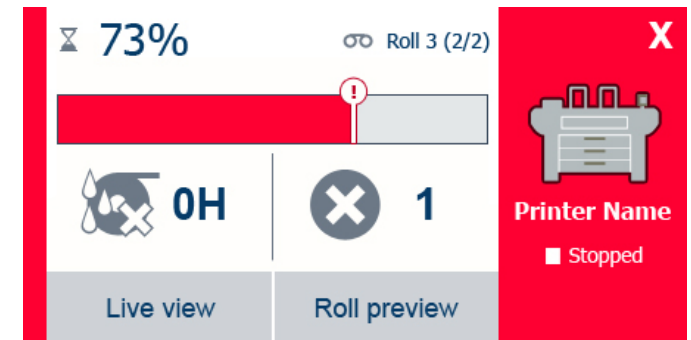
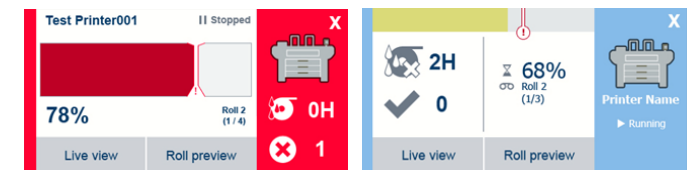
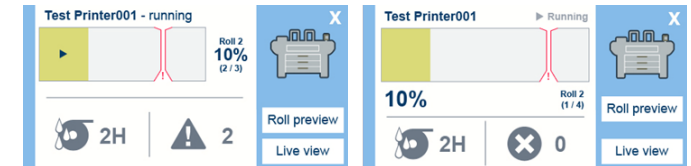
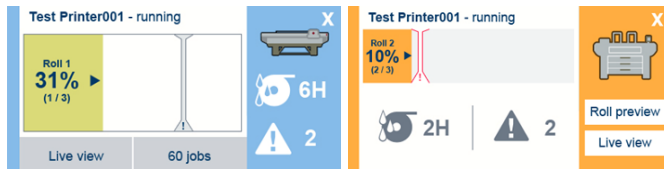
Overview: shifting the focus to printing progress

This cycle was about redesigning the overview as well as the roll preview, based on the feedback from the expert review. Printing progress should be the main focus, as it is relevant for a more substantial part of the time when monitoring. It replaces the focus on errors, which was only relevant when an actual error occurs.

The first iteration was focused on displaying the progress as a main feature. The other elements were “pushed away” in different sections of the overview item. This setup was changed in the second iteration, where the timeline decreased in size, and the resource prediction together with the error counter were included in the “main area”.

In the third iteration, the textual information on printing progress changed position. It was placed outside the timeline, as the progress bar would make the text less readable at a certain point. The fourth iteration divided this information over different places in the overview item, to enable the timeline to extend to the full width of the “main area”.

The next iteration replaced the resource/error information with function buttons, but after reconsidering this setup, the information and the buttons were both placed underneath the timeline. Finally, the progress information and the error/resource information were separated visually by placing the timeline in between these items.





Feedback from a visual designer on the overview screen iterations

The latest overview item designs were discussed with a visual designer. The iterations with the most important information placed into the “main area” were regarded the best iterations. Though, the progress bar should have enough emphasis, being the main feature. Next to that, the “positive state” of a printer (running) was visualized with an olive-colored green. This color carries a less positive emotion. In addition, the hours-before-failure visualization could as well be an actual timestamp, instead of the hour format.

The design that resulted from the feedback is as follows: the last iteration was chosen as the best one to continue with, and the progress bar was increased in size. Currently, the “running-out” time for resources is displayed with an actual timestamp. The purpose of that was to visualize how that would look like. After reconsideration, this type of displaying “running-out-time” is too accurate, as these predictions are mostly not as accurate or dynamic. Displaying it with a timestamp gives more of a definite feeling to it than it should. As this type of predictions is dynamic, it should feel less definite. An hours-before-running-out type of prediction suits this situation better.

The next planned step is to iterate on the roll preview. Next to that, the design will be discussed with a colleague that runs another project with the same target group.



Design process: eighth iteration

Redesign of roll preview + final touches



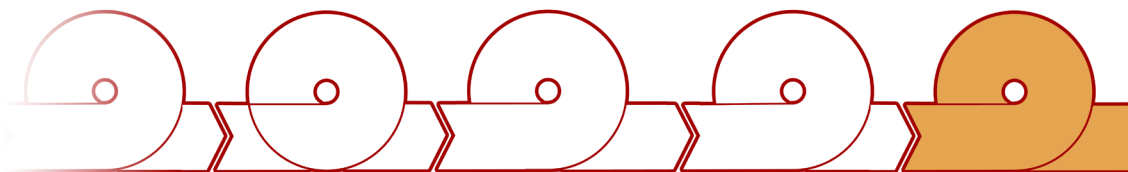
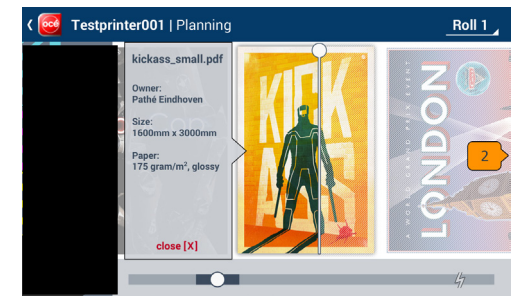
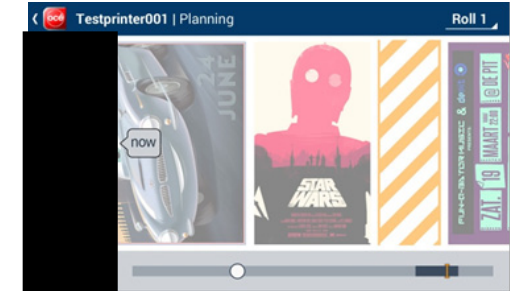
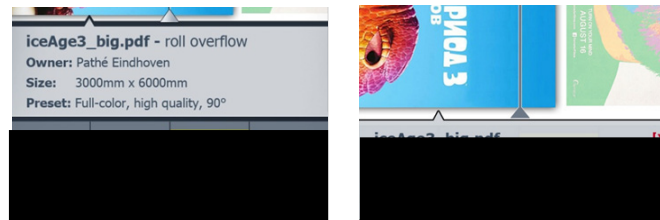
The roll preview was iterated on as well. First of all, there should be a way to visualize the progress of the roll, as well as the viewing position on the roll. A “scroll timeline”-indication seemed to be the best option for displaying the current view with respect to the entire roll. While scrolling, there will be a better overview of the printing progress (with respect to both the current view and the entire roll). The current progress is visualized as a dot on the “scroll timeline”. The dark area on the timeline is the current view, and scrolls along with the view on the roll. Next to that, there is also an indication of when the paper runs out (jobs beyond this point will not be printed).



A problem with this way of visualizing is that there is no direct link to the actual preview. It gives no impression which jobs you can find on a specific part of that timeline. This could be solved in some ways.

In addition, the information pane in the original design is taking up too much space. As it only shows information on demand (when a job is selected), the space should not be occupied all the time. Instead of having a fixed position, it could overlay other information, which leaves the space that was initially reserved for the information pane open for implementing other design elements.

As the design was also considered in landscape mode, this orientation was discussed as well. It felt more relevant as video players landscape orientated as well. It also enabled the operator to see more of the roll at one glance. Both the orientations were taken into consideration later on in the cycle.





Discussion with colleague on similar project

This design has been discussed with a colleague that runs a project aimed at the same target group as ours. He explained the context from quite a different perspective; a perspective in which the roll preview is highly irrelevant, and the notifications would be the part with the biggest focus. He imagined a situation in which the operator has to return to the print shop after the printing is done, whereas we envisioned a situation of a printer running all night, without having to get back when everything is done. We did implement notifications, but our focus lays more on the information supply for actual monitoring of a print fleet. He thought of unattended printing with an explicit focus on being alerted when something is going wrong. Our concept story was not clear to him, which showed how the concept story could be defined further, in order to display the context that is designed for.

Second feedback session on the roll preview

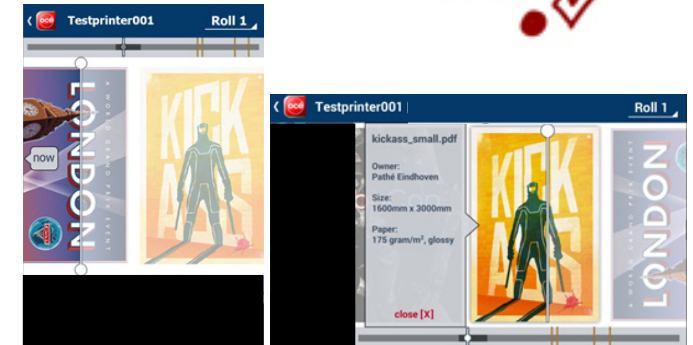
This design was discussed with a visual designer as well as an interaction designer. The visual designer had some remarks on the consistency of the elements that indicate events in time. Next to that there was a redesign in landscape orientation, which was discussed as well. It seemed more logical than the portrait orientation. Furthermore, the responsiveness of the design was discussed: maybe the app would display other information in different orientations.

This feedback was considered in the next designs. The consistency was improved, and initially the landscape orientation was chosen. After this iteration, the design was discussed with [REDACTED], an interaction designer. She advised to reconsider the fact that landscape orientation was chosen, as well as the way to maintain a good overview. This was attempted by implementing a scrollbar/timeline overview into the design. Another way to get an overview is to zoom out for getting a bird's eye view on the roll.

This feedback was taken in consideration as well. First the scrollbar/timeline overview element was reconsidered: should it appear in the app after all? At first, it seemed redundant to a zoom-out function, but with the zoom-out function, one can't get a full overview without reducing the roll to an illegibly small size. In order to get a full overview, the scrollbar/timeline overview is after all a good element for maintaining the overview. This should not mean that the zoom-out function is not implemented after all. This function is useful as well, and could help in getting regional overview. A possibility to zoom and pan is better than a possibility to pan only. It gives more control to the user.

Redesign steps based on the feedback

The orientation was reconsidered. Choosing for one (static) orientation means that the user has to rotate his/her phone, whereas the app rotates to the preferred orientation in other sections. It causes confusion, and

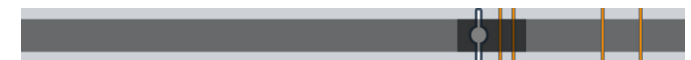


the app should remain consistent after all. Either no dynamic orientation at all, or a dynamic orientation in all sections. Currently, only the portrait orientation is built in. This orientation has priority, due to the preference to hold a mobile phone in portrait orientation. But this orientation should be alternated with landscape mode, although that is not yet implemented.



The progress timeline was another point of struggle. It was to be implemented after all, although that it was not yet clear how. The earlier iterations have a chaotic impression. The choice was to use a representation that does resemble the first iteration, as it was the least chaotic iteration.

In the end, the timeline scrollbar is bigger, with the projected error-points sticking out of the timeline.



Final concept

Prospects and recommendations

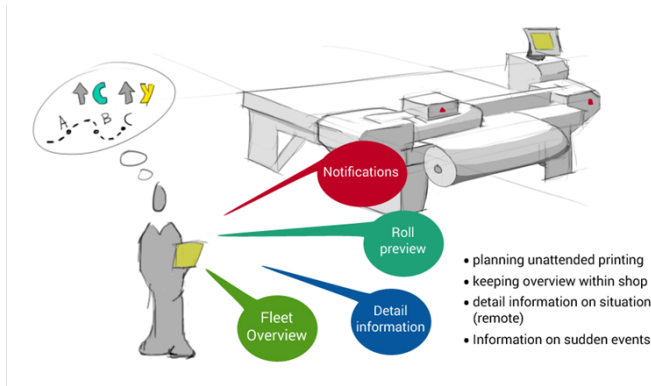


The final concept is a remote monitoring app with several features. These features are applicable in two situations that the user is in. The app runs on a smartphone, of which the current focus is on Android devices. The app has the following information structure: overview information layer with an underlying detail information layer. This structure is chosen due to the variety and amount of information that the user requires in this use case. Next to these elements, there is also a roll preview and a live view possibility within the app. These are information sections that display the information in a different way, from a different perspective and with a different goal.

The use case of a print shop operator is too diverse to focus on a single use after all. It means that the app has a variety of functionalities aimed at various usage situations. First, the use case will be discussed. Later on, these functionalities will be elaborated on in terms of what they are about.

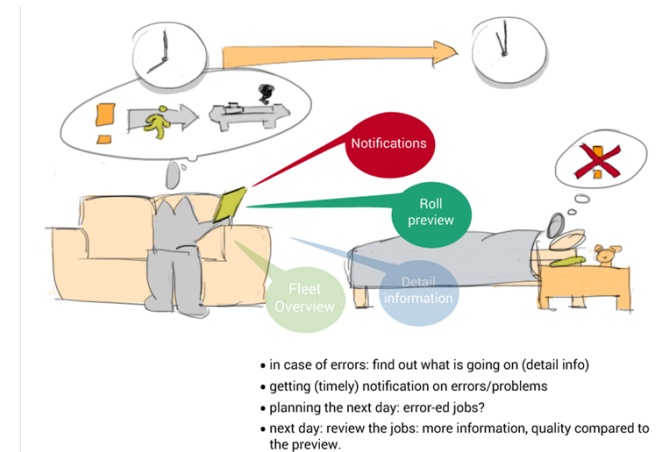
The use case

The use case of the print shop operator is that remote monitoring of the print shop should be facilitated. However, there are two types of remote monitoring: in-shop monitoring and monitoring away from the print shop. The second situation can also be called unattended printing.



First situation: in-shop activities

In the first situation, the operator checks the mobile device for planning and monitoring purposes. Big print jobs are left to proceed without supervision of the operator as they take too much time for an operator to remain standby. This means that the operator does not always see errors coming up. The app will be used for “keeping up with” the status as well as the printing progress of the printer. Here, contextual information like resource levels, job queue and error log are relevant for getting insight into the context of a (potential or current) problem with a printer.



Second situation: unattended printing

The second situation, unattended printing, is different. Within this situation, the app will be used as a notification center. Early in the evening, a print shop operator is probably willing to return to the print shop for solving errors. Later on in the evening, however, this operator probably would not want to return to the print shop, or to even be bothered by the app at all. This means the app will be used as little as possible. Only notifications would spark any usage of the app. The printing jobs could last the entire night, and the operator is likely not staying up for the queue to finish the entire night. This means that when he or she is going to bed, the operator would not want to be bothered by the app at all.



Final concept: the screens

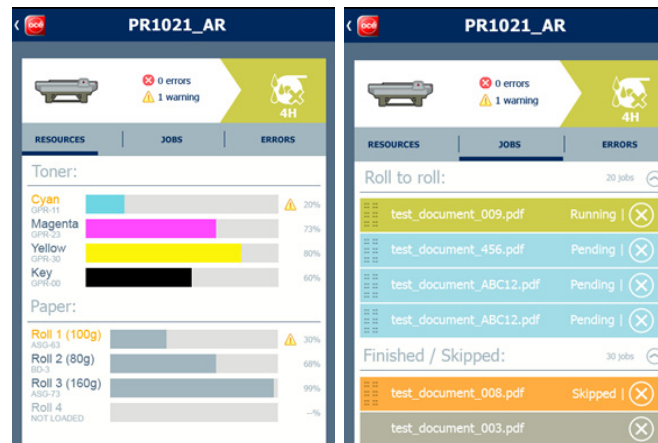
The final concept consists of several information layers, all of these have a different focus. However, the main goal is to serve as a monitoring tool for the print shop operator. The variety of screens will be explained here.



Overview screen

This is the first visible screen. It shows general information about each printer of the fleet. It is intended for getting a direct overview from the entire fleet of printers. The overview screen shows a printer's progress, amount of errors and a prediction of the time before it runs out of resources.

This information should be the information an operator needs at a first glance. He or she can easily get an overview of what is going on with the printer fleet.

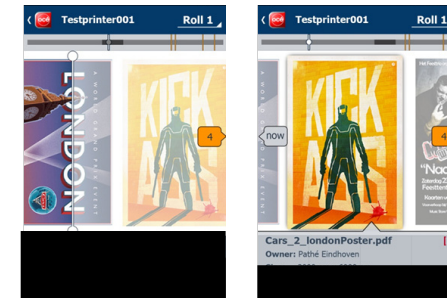


Detail information screen

This information layer provides more in-depth information. It is intended for getting more insight into the context of the problem: what is going on and what are the "symptoms" of the situation? This screen displays information about the resources, the job list and the error log. The combination of this information covers all the symptoms of an error or (potential) problem that can be communicated by the printer.

Live View

The live view is a section of the app that covers contextual information of a printer that can't be communicated by the printer itself. Think of potential water damage, ink leakage or visual printing errors on the roll. In addition, the live view functions as a "fourth dimension" of getting contextual information when an error occurs. So it extends the function of the detail information screen.



Roll Preview

The roll preview is a visual preview of the progress of the printing queue. It displays the jobs that are planned on a roll. Furthermore, it projects (potential) errors on the visual representation of the job queue, to give a different means of relating to the context of the printer, its status and its printing progress. Besides, it is a means of intuitively predicting the "future" of the printer; when is an error likely to occur? Do all the jobs fit on the roll?



The roll preview will be available in landscape, as well as portrait orientation. It should be in the correct orientation, regardless the device' orientation. If not, the user is forced to use the app in a certain orientation. Chances are that the user needs to rotate the device to use the app at all. Being forced to rotate the app is less convenient than an app that completely adapts to the users' preferred orientation.



Prospects of the app

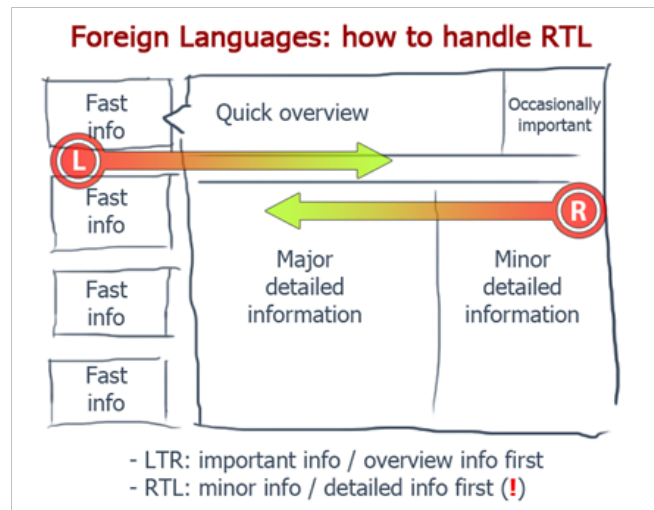
Supporting multiple languages

The app has reached a proof-of-concept state. The design has been translated to a functioning app, even though not all functionalities could be implemented as entirely functional. There still remains some work to do when it comes to finalizing the app, as well as building in all of the functionalities.

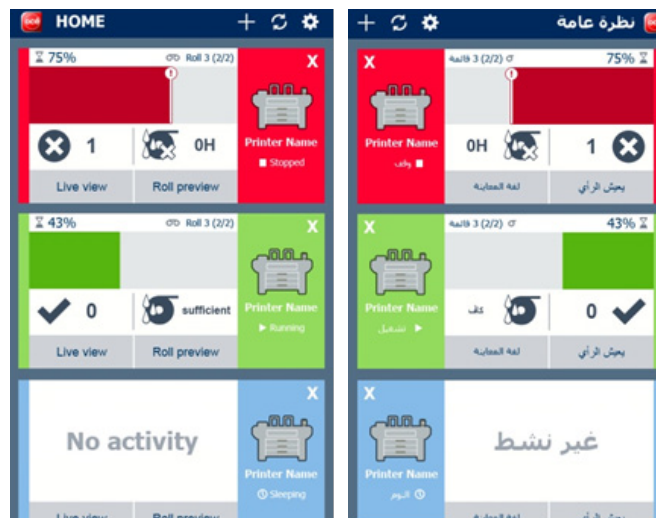
In addition, the design of the app does not take other languages into account. With foreign languages, there can be made a distinction between the already implemented left-to-right reading direction and the right-to-left reading direction. Considering the right-to-left reading direction, the text direction can be inverted.

Though, a person reading right-to-left (**RTL**) has a different “initial focus”. Reading left-to-right (**LTR**), the initial focus lies on the top-left corner. One reads down to the bottom, left to right. Reading right-to-left, the initial focus lies on the top-right corner. Having an inverted cognitive focus, so to say, makes a layout dedicated to left-to-right reading look inverted. That is why the interface should be designed as if it is mirrored.

Websites like Facebook and Twitter invert the layout to make it work for a right-to-left reading direction. The most important information is placed closest to the initial focus, whereas the least important information (or not directly useful information) is placed the furthest from the initial focus.



On the smart phone, it translates into a mirrored reading direction (in relation to left-to-right reading direction). Because the app's layout is single-column, the most significant change is the order of appearance of icons and layout elements.



However that reading direction is the only significantly changing variable in the phone's layout, the tablet layout has to be redesigned to a bigger extent. The side-by-side information is ordered from left to right, which would be confusing for right-to-left readers. The tablet design layout should be totally redesigned to prevent a confusing experience for right-to-left readers.





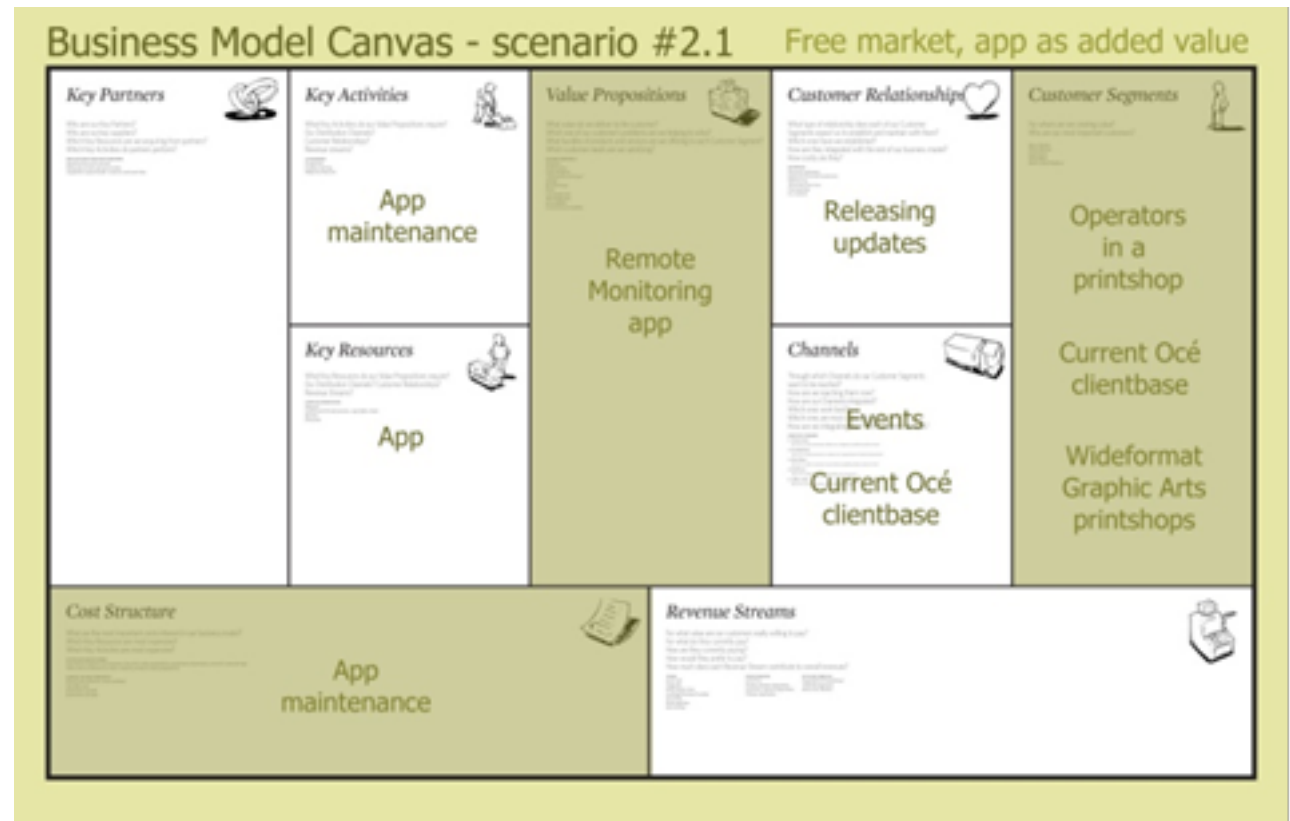
Business prospects

Free service, added value

The remote monitoring app tackles problems within the context of current market's client base. In addition, it is suitable for an added value, as its features are unique. The business prospect of this app is quite various, as it has potential in multiple ways.

After considering multiple business scenarios, the most suitable scenario is launching the app as an added value for customers that buy Océ printers. Following the explanation of one of the scenarios as described in one of the project cycles, the app will work for Océ printers, with currently only support for Colorwave and Arizona printers. But this support could (and should) extend to other wide-format printers from Océ, or even the small-format printers. Besides, to step ahead of the competition within this market, printers from the competing companies could be supported in the future.

Shipping the app (or a license of it) with the printers could mean extra added value over the competition. Whether or not dividing the app's service into free and paid service has yet to be determined with, for example, a market pilot for finding out the market's expectations, needs and preferences.



Conclusion



The original assignment was to design and develop a remote monitoring app. The initial focus laid on monitoring at home, when the print shop continued printing overnight. This extended to in-shop as well post-overnight printing. Extending this focus contributed in a more universally usable app as well as a bigger added value for the context.

Coming from Industrial Design at TU/e, there were some new experiences for me when I worked in a big company. Though that I was able to apply a very big deal of the knowledge I gained in my studies, I found out about working in a very specific area, namely interaction design in the design department of Océ. Working in a big company has its benefits as well as its downsides compared to the individual or small-scale work I did so far at Industrial Design. First of all, the open environment enabled me to walk around and ask for help. However, this also meant that I was required to take more initiative.

I experienced my time as interaction designer at Océ as very positive and it taught me a lot about this profession. Because I had quite a lot of chances to iterate on different aspects of the design process like user-centered design and visual design, I had a good time with a lot of opportunities to grow as a designer. Being fascinated by a different branch of design before, I figured interaction design is another design branch I would like to work in the future. It is this branch that I discovered to suit me very well.

I would like to thank the experts that I talked to for helping me in the project with specific problems and questions. Furthermore, I would like to thank all the Océ employees that participated in the user tests, as well as the coaches and the problem owner of this project. Meeting on a weekly basis with both the coaches and the problem owner helped for making the right choices as well as for helping to find experts for the project.

I learned that at Océ there is a vast amount of expertise from a wide variety of disciplines. This means there is a lot of knowledge related to this project as well as a lot of opinions about it. I as a designer needed to sense of it and make choices on what information to use or not.

I would like to thank [REDACTED], with whom I worked throughout the project. He made the visual design even more tangible by building a prototype, and he gave valuable insights from a different perspective.

Last of all, I would like to thank [REDACTED], my company coach. Coming from the same studies, Industrial Design, she understood very well what my learning goals were. She taught me to adapt my attitude for working at Océ, getting the most out of my time there. This internship truly helped me to develop myself to become more of a multi-disciplinary designer. If it wasn't for the available expertise at Océ as well as the devotion of [REDACTED] I would not have experienced such a substantial growth as a designer. Neither would I have had such a great experience during this internship.



This internship has been a great experience in many ways. I can look back at it as a great moment in my career as a designer.

Many thanks to all!

- Jeroen Rood

Glossary



Arizona

A so-called “flatbed” printer. It prints on a 2m by 2m sized table. This printer is intended for specialized 2D printing on a wide variety of materials. Because the printer head can move up and down as well, it can print on media that are not flat, like doors or bench seats. For printing over-night, Arizona can also print on paper rolls that can be attached to this printer.

Colorwave

A plotter-style printer. Initially, it was intended for architect drawings: large format with black-and-white lines. Later on, this printer was fine-tuned to also support full-color prints like advertisement posters. Printing on a roll, poster could be printed on wide formats.

Flatbed printing

This method of printing characterizes by the way the media is fed to the printer. The media is attached to a “printing table”, and the print head will move over the media. Other methods characterize by the exact opposite, the print head stays in one place, and the media is moving underneath the print head. The Arizona printer is a flatbed printer, on which the media is fed manually.

LUI

A general abbreviation for “Local User Interface”. As it is referred to in this report, it means the interface that runs on the printers’ own displays for selecting jobs, changing settings, displaying errors etcetera.

OCEAN

The design language and guidelines for designing graphical user interfaces. This is implemented in computer applications, web applications, LUI screens and mobile applications.

Print shop operator

An operator makes sure a printshop keeps running, and therefore performs maintenance on printers. Depending on the size of the print shop, the operator is responsible for resolving errors and refilling paper and ink, or even planning the job order and finishing the printed jobs. The print shop operator, in a nutshell, is the “handyman” of the print shop.

Print shop / Graphic Arts sector

A print shop prints jobs on a wide variety of media on demand of customers. Depending on the niche they are operating, they will make posters, postcards, books or really any printed media.

The Graphic Arts sector is a niche that aims at printing advertisements, flyers and mostly prints wide-format colorful jobs. The project described in this report is aimed at this very niche. The most relevant printers for the Graphic Arts sector are Arizona and Colorwave, due to their ability to print full-color on wide formats.

Roll-to-roll printing

As the name suggests, it is a principle of printing on media, not only by feeding the paper from a roll, but to also put it back on a roll for compact storage and continuous printing.

RTL-LTR

An abbreviation for right-to-left (RTL) and left-to-right (LTR). In the context of this project, it means the reading direction. Because the app will have to support multiple languages, it will have to deal with a RTL reading direction as well. To visualize (and to describe) the design iterations, the aforementioned abbreviations were used.

Small-format, Wide-format

These terms describe the typical sizes that are printed. Small-format printers mostly print A4-sized printwork, whereas wide-format printers print up to A0, and is typically printer from a roll. The focus of the project laid on wide-format.

Unattended printing

Although that the term could be self-explanatory, some explanation could be needed. This term refers to the situation in which the printers are printing, without the supervision of the operator.

Wide-format printers

These printers are, as the name suggests, intended for printing on wide format media. The paper is fed in rolls, mostly supporting up to A0 paper format.

References [removed: confidential]



Names of Océ employees have been removed for reasons of confidentiality.

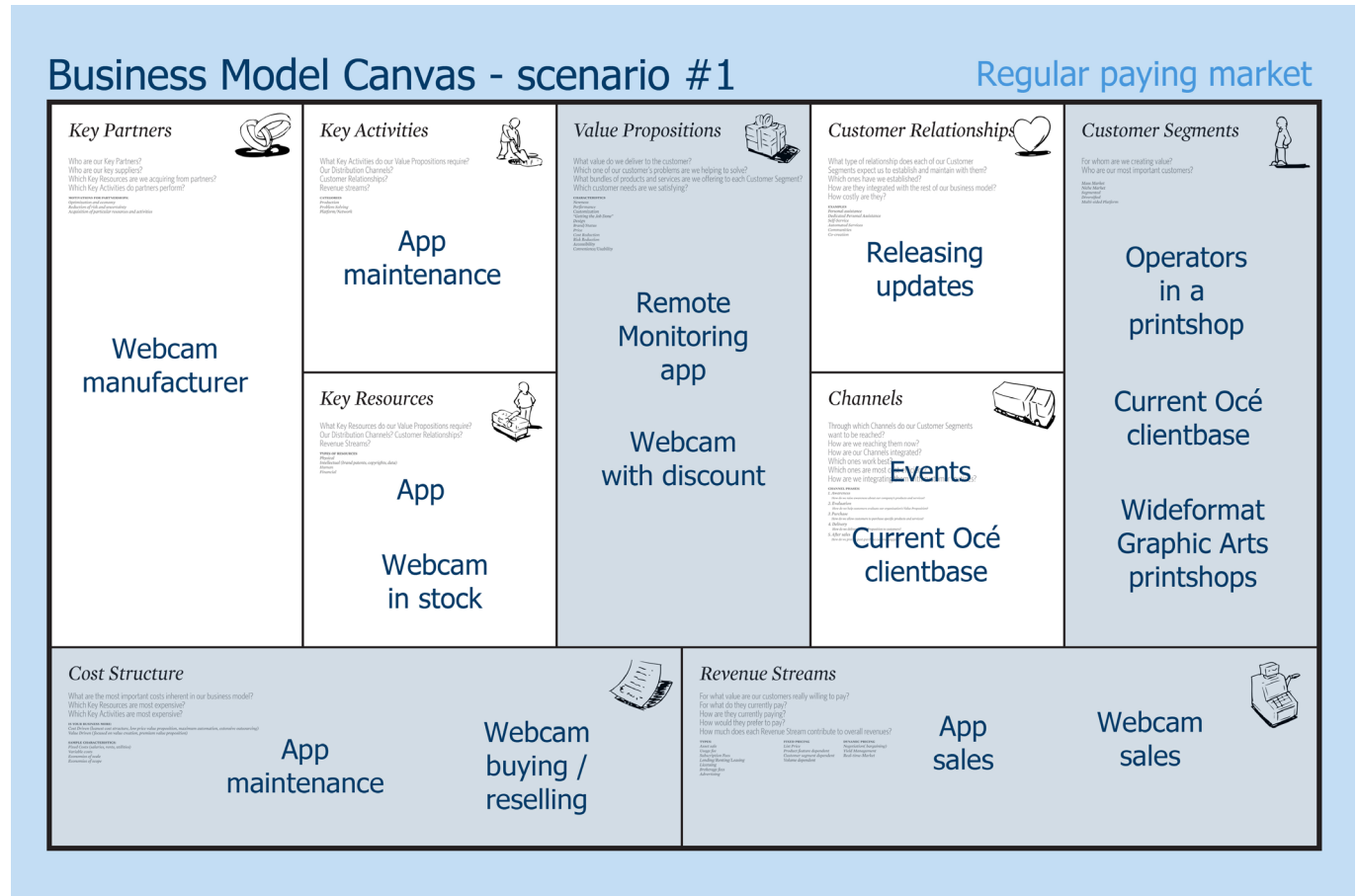
Appendix A



Appendix [A-1]

This appendice shows the business models for different scenarios, as described in the 4th iteration (p.13).

Displayed on this page: the regular paying scenario.



Appendix A



Appendix [A-2]

This appendice shows the business models for different scenarios, as described in the 4th iteration (p.13).

Displayed on this page: a free app scenario. The app is used as an added value for purchasing Océ printers.

Business Model Canvas - scenario #2.1 Free market, app as added value



Appendix A



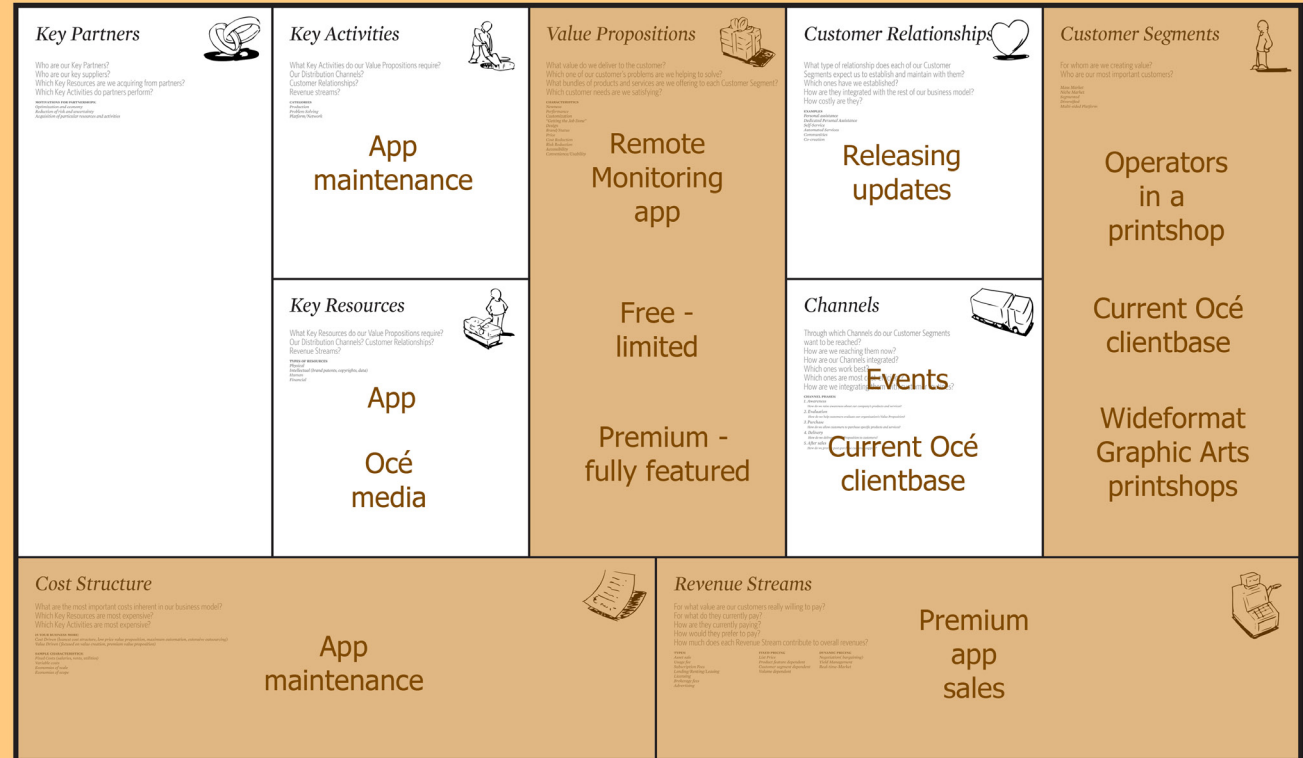
Appendix [A-4]

This appendice shows the business models for different scenarios, as described in the 4th iteration (p.13).

Displayed on this page: the freemium app model. Two versions of the app can be launched: a free version and a paid version. The app's functionality can be limited for the free version, while the paid version gets full functionality.

Business Model Canvas - scenario #3

"Freemium" - free and premium



Appendix B



Appendix [B-1]: brainstorm session 1

Goal

The goal is to find inspiration for several aspects in the current state of the design process. This includes generating ideas about a feature to increase the efficiency of the operator work in a novel way, as well as defining possibilities for providing service from Océ with this app.

Requirements

Ideally, a room must be reserved for this session, a big table, and some brainstorming material like big sheets of paper, markers, and A4-sized sheets of paper for elaborating on ideas. The big sheets of paper can be retrieved from 3F, supposedly.

Participants

The group of participants preferably is small, but various. Think of 6 people from various disciplines.

Tuesday 29-10	Wednesday 30-10
<ul style="list-style-type: none">•••	<ul style="list-style-type: none">•••

Approach

This brainstorm session will take approximately 2 hours, if not less. There will be several steps throughout the session.

- **A warming up (1-3 min per person, 5-15 min total).**

This part is typically about getting to meet the group, or awakening the creativity. A possible warming-up is about presenting your favorite app, and why it is so good. 1 to 3 minutes per person.

- **A brainstorm session (max. 10 min per statement, max. 30 min total).**

The brainstorm session is about generating as much ideas as possible. Here it is important that the sessions do not take too long. Each statement has its own session and should have enough time and inspiration for generating ideas. The statements are as follows.

1. Think of ways to retrieve information about the printer
2. Think of ways to notify the operator about errors or happenings
3. Think of ways to look into or to forecast the future of the printer
4. Think of ways to make the work of an operator more efficient / what makes the work of an operator inefficient?
5. Think of ways for Océ to provide more service through the app / what does an operator miss in his current situation?

- **Sidenote of brainstorm session:**

Each of the questions mentioned above could have a fallback-method: add a verb for more “ridiculous” situations. Besides, the last two items are a bit harder to actually imagine. So instead, approaching the problem before starting imagining solutions can be better.

- **Brainwritingpool (1 min. per elaboration, 5 min. per cycle, 3 cycles. 15 min. total)**

After that, these generated ideas can be elaborated on in a second session, where each participant gets to choose an idea and work it out on a piece of paper. If the pieces of paper have passed by every participant, new ideas will be selected. The rotation happens fast, one minute for an idea-iteration, a full cycle might take 5 minutes. Repeat this as far as it is possible to repeat. Possibly, 3 cycles can be done, which means a total of 15 minutes.

- **A roundup: find the best idea.**

As a sort of roundup, everyone can look through the ideas and choose one they like the best. This will determine a winner idea. (?)

Appendix B



Appendix [B-2]: brainstorm session 2

Goal

The goal is to find inspiration for several aspects in the current state of the design process. This includes generating ideas about monitoring jobs on a roll, planning the jobs on a roll and what information an operator would like to have concerning an overview of a whole fleet.

Requirements

Ideally, a room must be reserved for this session, a big table, and some brainstorming material like big sheets of paper, markers, and A4-sized sheets of paper for elaborating on ideas.

Participants

The group of participants preferably is small, but various. Think of 5 to 6 people from various disciplines.



Approach

This brainstorm session will take approximately 2 hours. There will be several steps throughout the session.

- **A warming-up brainstorm (max. 20 min).**

This brainstorm will be a simpler subject. This subject is about how to monitor print jobs on a roll (remotely).

- **Brainstorm sessions (max. 20 min per statement, max. 40 min total).**

The brainstorm session is about generating as much ideas as possible. Here it is important that the sessions do not take too long. Each statement has its own session and should have enough time and inspiration for generating ideas. The statements are as follows.

1. Think of ways to plan the jobs on a roll (remotely)
2. What information does an operator want to see in an overview of the whole fleet?

- **Brainwritingpool (max. 2 min per elaboration, 12 min per cycle, 2 cycles. 24 min total)**

After that, these generated ideas can be elaborated on in a second session, where each participant gets to choose an idea and work it out on a piece of paper. If the pieces of paper have passed by every participant, new ideas will be selected. The rotation happens fast, one minute for an idea-iteration, a full cycle might take 12 minutes. Repeat this as far as it is possible to repeat. Possibly, 2 cycles can be done, which means a total of 24 minutes.

- **A roundup: find the best idea.**

As a sort of roundup, everyone can look through the ideas and choose one they like the best. This will determine a winner idea.