



Final Report

Regla File Storage System

Instructor

Birgir

Kristmannsson

Examiner

Björgvin Sigurðsson

Group members

Hulda Lilja Hannesdóttir
Jóhanna María Svövdóttir
Sigrún Tinna Gissurardóttir
Unnur Sól Ingimarsdóttir

Table of contents

About the project	3
Introduction	3
Regla file storage system	3
Fakta and Regla	3
Group members	4
Facilities	4
Project description	4
Objectives of the project	4
Detailed description	4
Methodology	5
Roles	5
Product owner	5
Scrum master	5
Team	5
Sprints	6
Artifacts	6
Product backlog	6
Sprint backlog	6
Burndown charts	6
Ceremonies	6
Sprint planning	6
Sprint review	7
Sprint retrospective	7
Daily scrum meeting	7
Work methods	7
Work schedule	7
Time registration	8
Analysis	8
Requirements	8
Product backlog	9
Risk analysis	12
Odds Impact Risk factor	13
The greatest risk factors	13
	1

Updates	15
Changes we made during the process	15
Usability testing	17
User groups	17
Participants	18
Preparation and execution	18
Results	18
First usability testing	18
Second usability testing	19
Third usability testing	19
Design	20
User Interface overview	20
Design process	20
Process overview	21
Task type breakdown	21
Sprint overview	21
Sprint 0 - Original planning	21
Sprint 1 - Requirement analysis and design	22
Sprint 2 - Primary design and environment setup	22
Sprint 3 - Usability testing and design	22
Sprint 4 - Web service connections and interface setup	22
Sprint 5 - Authentication, authorization and file uploading	22
Sprint 6 - Categorization and analysis on files	22
Sprint 7 - Taking photos and more information about files	22
Sprint 8 - Download, file representation, search and ordering	22
Sprint 9 - Testing, error handling, security	22
Working hours overview	23
Release burndown	23
Conclusion	24

About the project

Introduction

Various digital data and information that we work with are of such importance that we want to have access to it later. We want to categorize and represent them in a simple, elegant and efficient way. The user needs to be able to find the data he uploads effortlessly but in a modern society this is a common and vital requirement. This is the problem the group worked towards solving by implementing a file storage software solution.

Regla file storage system

Regla file storage system is a software solution that four students designed and created for Fakta for their final project towards their BSc degree in Computer Science at Reykjavík University.

The main goal for the project was to design and create a file storage and synchronization service for customers of Regla. The users of the system are individuals who wish to keep documents related to their activities and personal affairs to users of larger companies where authentication is needed.

Fakta and Regla

Fakta ehf. is a software company, established in 1986. The company emphasizes scanning and workflow systems, paperless archiving and automatic distribution of virtual documents as well as producing business systems for its associate company Regla.

Furthermore Fakta has generated several specialised products that are built on standard components, which the company has produced. There are examples of specialised products that keep millions of scanned images and documents in a secure database. Their purpose is to provide customers with robust products and facilitate efficient management of all types of documents that are generated in daily business activities, to achieve the paperless electronic office through document management.

Regla was established in 2008 and is an associate company partly owned by Fakta ehf. The company objective is to provide business solutions and services that utilize automation to facilitate management and reduce workload for small and intermediate companies. In addition to business solutions Regla offers dictation and secretary services. The dictation and secretary services are based on systems designed by Fakta and are in use at the University Hospital of Iceland and more.

Group members



Hulda Lilja



Jóhanna María



Sigrún Tinna



Unnur Sól

Facilities

The group got allocated a whole floor at Fakta for the project. The space consisted of a working area, where the group had their computers and the screens that Fakta provided, a small room that the group used for privacy and a kitchen equipped with a coffee machine and a cooler. The group got a whiteboard that they used for various purposes i.e. as a Kanban board.

Project description

Objectives of the project

The main goal of the project was to create a user-friendly system for file storage and organization for fast retrieval of these files later on.

Detailed description

For a system that stores files to be useful it has to be easily accessible at all times. To make that possible we decided to create a web version of the system that would be scaleable for smart devices. For the web development Angular 5 was used. After some research the group found that by using Ionic Cordova, a package that builds on top of Angular, it would be possible to compile the web app into a smart device application. It would also be possible to access native functionality. More about this decision can be seen in the report "Web or smart device application". Ionic Cordova supports IOS, Android and Windows. All group members have an Android device and to make the testing process easier for testing a focus was put on supporting Android devices. Therefore the system is available and well supported in browsers on all kind of devices as well as a native Android device (api level 19+).

Methodology

When deciding which methodology to follow, the choice was between Scrum¹ and Kanban². The product manager wanted the group to design and implement the system completely so it was clear from the beginning that the product development process needed to be flexible and iterative. Both Kanban and Scrum are well suited for this type of projects. The group members are very organized and more familiar with Scrum than Kanban. For these reasons the group decided to choose Scrum for work management. Although they originally decided to use Scrum they quickly became aware of the fact that they were using some Kanban tools, for example the Kanban board. The team decided to use Google Sheets, Trello and a physical Kanban board for project process overview.

Roles

The Scrum roles were decided as follows:

Product owner

Kjartan Ólafsson, kjartan@fakta.is. Kjartan defines what the system should do and accepts the prioritization of tasks.

Scrum master

The group decided that the role of scrum master would jump between group members, each member being a scrum master for two sprints. Therefore they would be responsible for efficient project managing, removing obstacles that might stand in the way of the team and communicating with the product owner.

Team

Hulda Lilja Hannesdóttir, Jóhanna María Svövdóttir, Sigrún Tinna Gissurardóttir, Unnur Sól Ingimarsdóttir. Their main priorities were to design and implement the system as well as programming a functionable system.

¹ [Scrum](#)

² [Kanban](#)

Sprints

The group decided to keep the length of the sprints two weeks in the twelve week part of the semester and then shorten it to one week when the three-week part of the semester started.

Artifacts

Product backlog

Contained all known requirements to the system. The requirements were represented as user stories i.e. *“As a <type of user> I want <some goal> so that <some reason>”* . The stories were prioritized in cooperation with the product owner using the letters “ABC” to represent the priority of a requirement. The letters were defined as the following:

- A. Absolutely essential
- B. Useful, but not essential
- C. Nice-to-have

In addition, each user story had story points that represented the estimated extent of the story. The story points were estimated by using the Planning poker³ technique.

Sprint backlog

The backlogs for each sprint were created in sprint planning meetings. The backlogs contained all stories for the given sprint were each story had been broken down to tasks, each task having estimated completion time.

Burndown charts

There were two types of burndown charts used, release burndown and sprint burndown. The sprint burndowns showed ideal TODO

Ceremonies

Sprint planning

Sprint planning meetings were held before every sprint. The product owner, scrum master and the team were present. During the meetings user stories were selected from the product backlog and broken down into tasks that were added to the sprint backlog. Each sprint got assigned a goal and a name that reflected that goal.

³ [Planning Poker](#)

Sprint review

The group met with the product owner after each sprint so he could give feedback on the progress and tell the group if he disliked something or wanted to change it.

Sprint retrospective

After each sprint the group held a sprint review meeting where the members wrote short text on: What went well? What could have gone better? What do they want to try? What puzzles them?⁴

Daily scrum meeting

The group held an informal daily stand-up scrum meeting where each member stood up and told the other members what they did yesterday, what they they would do that day and if anything was standing in their way. These meetings often turned out to be very useful since sometimes other members had faced a similar problem and could help, saving valuable time.

Work methods

Work schedule

The work schedule was added to the project to estimate how the group members' time would be distributed and so that group members would know when instructor would be abroad and vice

	Vika 2 15-21 jan	Vika 3 22-28 jan	Vika 4 29-4 feb	Vika 5 5-11 feb	Vika 6 12-18 feb	Vika 7 19-25 feb	Vika 8 26-4 mar	Vika 9 5-11 mar	Vika 10 12-18 mar	Vika 11 19-25 mar	Vika 12 26-1 apr	Vika 13 2-8 apr	Vika 14 9-15 apr	Vika 15 16-22 apr	Vika 16 23-29 apr	Vika 17 30-6 maj	Vika 18 7-13 maj	Samtals tími
Hulda	4.0 klst.	8.2 klst.	13.0 klst.	20.1 klst.	13.5 klst.	2.3 klst.	0.0 klst.	22.8 klst.	11.3 klst.	14.0 klst.	1.3 klst.	0.0 klst.	4.5 klst.	37.0 klst.	54.3 klst.	61.5 klst.	50.0 klst.	317.8 klst.
	24-27 jan próf í DK		23-28 feb Keppa á Spáni					22. mars Útgáfuparty Háskólablaðs					28 apríl-2. maí fjölskylduferð til Madrid					
Jóhanna	4.0 klst.	9.7 klst.	0.0 klst.	22.3 klst.	13.0 klst.	11.5 klst.	9.5 klst.	20.8 klst.	15.0 klst.	14.5 klst.	5.0 klst.	0.0 klst.	11.5 klst.	21.0 klst.	60.3 klst.	78.4 klst.	48.0 klst.	346.5 klst.
	1.-4. feb Gðansk			22. mars Útgáfuparty Háskólablaðs														
Sigrún	4.0 klst.	6.2 klst.	12.0 klst.	18.7 klst.	14.5 klst.	13.0 klst.	17.0 klst.	26.3 klst.	16.0 klst.	15.8 klst.	1.8 klst.	4.0 klst.	16.5 klst.	32.0 klst.	30.5 klst.	73.4 klst.	50.0 klst.	352 klst.
	26-28 jan Game Jam		22. mars Útgáfuparty Háskólablaðs												21-24 apríl - Belfast			
Unnur	4.0 klst.	6.7 klst.	13.0 klst.	20.3 klst.	14.5 klst.	12.0 klst.	12.0 klst.	22.0 klst.	14.3 klst.	8.0 klst.	3.3 klst.	4.0 klst.	18.3 klst.	29.3 klst.	47.3 klst.	70.7 klst.	50.0 klst.	349.7 klst.
	24-27 jan Chicago							17-21 mars 22. mars Út 5. apríl - Skilla skopmyndum (300stk)										
Birgir	Erlendis			Erlendis														

versa.

⁴ [Sprint retrospective](#)

Time registration

The group members kept track of their time using a spreadsheet that calculated overall time for each individual and broke time distribution even further down, telling the group how much time

TÍMASKILNING																										
Dagur	UNNVIÐIÐ					SÍÐUN TÍÐA					TÖLUNNA MÆTTA					RÉTTA TÍÐA					Heildartími dags					
	Byrjar	Endar	Fjöldi	Verk(n)	Hvað?	Byrjar	Endar	Fjöldi	Verk(n)	Hvað?	Byrjar	Endar	Fjöldi	Verk(n)	Hvað?	Byrjar	Endar	Fjöldi	Verk(n)	Hvað?						
S6 10 Apr	9:00	16:00	7.0	kist	4	Add a file	10:00	14:30	4.5	kist	4	Category				10:00	14:00	4.0	kist	7	Fa Circle til að bulk	15.5 kist	S6 Dagur 6			
S6 11 Apr	12:00	16:00	4.0	kist	4	Trying to get test	12:00	16:00	4.0	kist	4	Category	12:00	20:00	8.0	kist	4	Database connec				0.0	kist	16.0 kist	S6 Dagur 7	
S6 12 Apr	9:30	16:50	7.3	kist	4	Added models ar	9:30	17:30	8.0	kist	4	Finished Catego	9:00	16:00	7.0	kist	4	Database connec	14:00	14:30	0.5	kist	1	Fundur með Birgi	22.8 kist	S6 Dagur 8
S6 13 Apr			0.0	kist					0.0	kist					0.0	kist						0.0	kist	0.0 kist	S6 Dagur 9	
S6 14 Apr			0.0	kist					0.0	kist					0.0	kist						0.0	kist	0.0 kist	S6 Dagur 10	
S6 15 Apr			0.0	kist					0.0	kist					0.0	kist						0.0	kist	0.0 kist	S6 Dagur 11	
S6 16 Apr			0.0	kist					0.0	kist					0.0	kist			16:30	18:00	1.5	kist	2	Skoba verkefnum	1.5 kist	S6 Dagur 12
S6 17 Apr	9:00	15:15	6.3	kist	4	Fixed some error	9:00	18:00	9.0	kist	4	Unit tests for cat			0.0	kist			9:00	19:00	10.0	kist	7	Fa Circle til að bulk	25.3 kist	S6 Dagur 13
S6 18 Apr	9:00	16:30	7.5	kist	4	Added validation	9:00	16:30	7.5	kist	4	Alert to prompt u	9:00	16:00	7.0	kist	4	get categories og	9:00	19:00	10.0	kist	7	lonic buld brot, re	32.0 kist	S6 Dagur 14
S7 19 Apr	9:00	17:30	8.5	kist	4	File model and o	9:00	17:30	8.5	kist	4	Editable files, uni	9:00	16:00	7.0	kist	4	get categories	9:00	17:30	8.5	kist	7	Continuous Deploy	32.5 kist	S7 Dagur 1
S7 20 Apr	9:00	16:00	7.0	kist	4	Get categories a	9:00	16:00	7.0	kist	4	File download	9:00	16:00	7.0	kist	4	get categories	9:00	16:00	7.0	kist	8	Plönuðum allt sem	28.0 kist	S7 Dagur 2
S7 21 Apr			0.0	kist					0.0	kist					0.0	kist						0.0	kist	0.0 kist	S7 Dagur 3	
S7 22 Apr			0.0	kist					0.0	kist			17:45	23:59	6.2	kist	4	get categories	17:00	19:00	2.0	kist	2	Skoba betur Angul	8.2 kist	S7 Dagur 4
S7 23 Apr	9:00	18:00	9.0	kist	4	View category pe			0.0	kist			8:45	21:30	12.8	kist	4	get file	9:30	17:30	8.0	kist	9	Laga til i Backlog o	29.8 kist	S7 Dagur 5
S7 24 Apr	9:00	18:00	9.0	kist	4	Hermiticas stuff an			0.0	kist			9:00	22:20	13.3	kist	4	File operations, L	9:15	19:00	9.8	kist	4	Taka mynd með my	32.1 kist	S7 Dagur 6
S7 25 Apr	8:00	17:00	9.0	kist	4	Add the photo -	9:00	18:00	9.0	kist	3	Upload ui	11:30	18:30	7.0	kist	4	Velginsuáudd á	9:00	22:00	13.0	kist	4	Selja upp andarmýri	38.0 kist	S7 Dagur 7
S8 26 Apr	9:45	20:30	10.8	kist	4	Get files, cat info	9:00	19:00	10.0	kist	4	Sorting	9:40	22:07	12.5	kist	4	Search, order, de	9:00	20:00	11.0	kist	4	Sendu file og mynd	44.2 kist	S8 Dagur 1
S8 27 Apr	9:30	19:00	9.5	kist	4	File info and oth	8:30	20:00	11.5	kist	4	Seeing a photo v	11:30	20:00	8.5	kist	4	download search	9:30	20:00	10.5	kist	4	Filera eftir platform	40.0 kist	S8 Dagur 2
S8 28 Apr			0.0	kist					0.0	kist					0.0	kist						0.0	kist	0.0 kist	S8 Dagur 3	
S8 29 Apr	15:00	16:30	1.5	kist	4	View photo	17:40	18:50	1.2	kist	4	Finishing search	14:00	18:00	4.0	kist	4	breyta service eff	18:00	19:30	1.5	kist	2	Skoba breytingar á	8.2 kist	S8 Dagur 4
S8 30 Apr	8:00	22:30	14.5	kist	4	Edit file, view ph	9:15	21:30	12.3	kist	4	error handling in	8:50	23:35	14.8	kist	4	edit delete type c	12:00	19:00	7.0	kist	6	Rekstrahandbók	48.5 kist	S8 Dagur 5
S8 1 May	9:30	23:59	14.5	kist	4	Mucho aukavirkn	7:45	23:59	16.2	kist	4	9:15-01:30 routin	8:50	23:59	15.2	kist	4	pdf viewer, editor	10:00	17:00	7.0	kist	6	RekstrahandbókN	52.9 kist	S8 Dagur 6
S8 2 May	8:15	23:59	15.7	kist	6	9:45-01:30 Skyr	8:15	23:59	15.7	kist	6	9:45-01:30 Skyr	8:00	23:59	16.0	kist	4	Language, recor	9:30	22:00	12.5	kist	6	Skjrsla	60.0 kist	S8 Dagur 7
S9 3 May	9:30	16:00	6.5	kist	6	Kynnning og laga	9:30	19:00	9.5	kist	6	Kynnning + forritu	9:00	17:30	8.5	kist	4	Language, stöðu	9:00	18:00	9.0	kist	6	Kynnning	33.5 kist	S9 Dagur 1
S9 4 May	11:00	20:00	9.0	kist	4	Tægg pluggi, getc	10:00	19:30	9.5	kist	4	Fornun	9:30	18:00	8.5	kist	4	Editor, menu	9:00	22:00	13.0	kist	4	AddFile komið á sí	40.0 kist	S9 Dagur 2
S9 5 May	11:00	20:00	9.0	kist	4	Programming	12:00	21:00	9.0	kist	4	Fornun	10:30	22:00	11.5	kist	4	Unit testing, erro	10:30	22:00	11.5	kist	4	RecordingForm kor	41.0 kist	S9 Dagur 3
S9 6 May	14:00	22:00	8.0	kist	4	Var að vinnna frá			0.0	kist			16:00	23:59	8.0	kist	4	Unit testing, erro	12:00	22:00	10.0	kist	4	Download í síma, s	26.0 kist	S9 Dagur 4
S9 7 May	9:30	22:00	12.5	kist	4	Aðgangstýring á	9:00	21:00	12.0	kist	4	Annoying menu	9:00	23:00	14.0	kist	4	Unit testing, erro	9:30	21:00	11.5	kist	4	Laga Ionic View og t	50.0 kist	S9 Dagur 5
S9 8 May	12:00	23:59	12.0	kist	4	Miklar vangevæh	10:00	23:30	13.5	kist	4	Finishing annoy	13:00	23:59	11.0	kist	4	Unit testing, erro	9:30	23:00	13.5	kist	4	Toast, unit test og t	50.0 kist	S9 Dagur 6
S9 9 May	9:00	23:59	15.0	kist	4	Programming	10:30	29:59:00	19.5	kist	4	Fixing multiple th	9:00	23:59	15.0	kist	4	Unit testing, erro	8:30	23:59	15.5	kist	4	Translate, laga sim	64.9 kist	S9 Dagur 7

had been spent on each task type and how much time each member spent on each task type.

Analysis

All group members agreed that one of the most important aspects of the product was the analysis of the system and users of the system. The group wanted to focus on outstanding analysis to make the design and implementation spectacular.

Requirements

The group made the requirement list on their own since there was no existing formal description or backlog. This was quite time consuming and challenging. The group began writing down all the functionalities they could think of that might belong in the system. Then they made a product

backlog that consisted of user stories from the list of functionalities. This document frequently changed during the process

Product backlog

Product Backlog		Team Velocity:		20		
ID	Story	Priority	Status	Story Points	Sprint	Comment
			Total Done	Total A	Perc.	
63	As a developer I can view my categories so I can easily view the contents of the category	A	Done	3	S0	
45	As a developer I want to make an initial plan for the project so that the development team can start implementing	A	Done	5	S0	
37	As a developer I can clone the project from Github so that I can contribute to the project	A	Done	0.5	S1	
42	As a developer I can read risk analysis report so that I am aware of future risks	A	Done	1	S1	
44	As a developer I can read the product backlog so I can choose stories for sprints	A	Done	5	S1	
35	As a developer I can get access to Travis so that I can see my unit tests automatically run	A	Done	3	S2	
36	As a developer I want to see Codecov on the project Github page so that I can see the code coverage	A	Done	2	S2	
39	As a developer I can create a paper prototype for the system so that developers can have a better vision of the system	A	Done	5	S2	
30	As a developer I can push my code to the master branch and request a pull request so I other developers can review my code	A	Done	1	S3	
34	As a developer I can get access to Heroku so that my code will be automatically deployed	A	Done	3	S3	
61	As a developer I can make users test prototype of the system to verify how userfriendly it is	A	Done	5	S3	
41	As a developer I can create a flow chart so that developers can have the same understanding of the flow between different components	A	Done	3	S3	
56	As a developer I can view the presentation for first status meeting so that I can prepare	A	Done	5	S3	
22	As a user I can be sure that my personal content is protected by the system so unauthorized parties won't be able to access and/or distribute	A	Done	2	S4	
57	As a developer I can view the presentation for second status meeting so	A	Done	5	S4	

	that I can prepare					
21	As a user I can authenticate (login) myself so I can manage my content and keep some things private	A	Done	5	S5	
25	As a user I can use the system on Firefox, Chrome, Safari, Opera and Internet Explorer	A	Done	3	S5	
26	As a user I can use the system on Android	A	Done	3	S5	
4	As a user I can browse my documents and filter by category and types so it minimizes the time it takes to find the desired document	A	Done	3	S6	
51	As a user I can filter documents by type so that I can find documents faster	A	Done	3	S6	
5	As a user I can choose which category to mark my documents with so I or others with access can easily browse it later.	A	Done	3	S7	
7	As a user I can choose which type to mark my documents with so I or others with access can easily browse it later.	A	Done	5	S7	
10	As a user I can drag 'n' drop my documents from my computer to the system so I can easily upload documents to the system.	A	Done	2	S7	
62	As a developer I can use mock web service so that I can start implementing things without the web service being ready	A	Done	8	S7	
65	As a developer I can setup mutant testing so I can test the quality of my unit tests	A	Done	3	S7	
3	As a user I can upload any document so it can be accessed later by myself or others in the company	A	Done	13	S8	
11	As a user I can use the system to take a photo so I can easily upload new photos to the system	A	Done	13	S8	
16	As a user I can edit my types so I can adapt to changes	A	Done	3	S8	
19	As a user I can remove my documents so I don't have extra documents I don't need anymore	A	Done	3	S8	
29	As a user I can download documents so I can move them to my own device	A	Done	3	S8	
31	As a user I can view the photos that have been added to the system so I can see what photos have been added.	A	Done	8	S8	
69	As a user I can read user manual so that I can know how to use the system	A	Done	5	S8	
43	As a developer I can read project planning report so that I can work accordingly	A	Done	3	S8	
54	As a new developer I can view the operations manual so that I can start working on the product	A	Done	5	S8	
58	As a developer I can view the presentation for final status meeting so that I can prepare	A	Done	8	S8	

2	As a user I can upload a photo from smart device gallery so it can be accessed later by myself or others in the company	A	Done	8	S8	
18	As a user I can edit the name of my documents so I can make the name more describing	A	Done	3	S8	
68	As a user I can log out of the system so I can be sure that no one can access my content	A	Done	2	S8	
47	As a user I can order documents by the date they were added so that I can have a better overview	A	Done	2	S8	
48	As a user I can order documents by name so that I can find documents faster	A	Done	2	S8	
46	As a user I can add copies of the same document so that I can view different versions of it	B	Done	5	S8	
55	As a user I can view instructions on the site (question marks) so that I can learn how to use the system	B	Done	5	S9	
14	As a user I can see types suggestions based on chosen category so I can find the appropriate types as fast as possible	B	Done	8	S7	
67	As a user I can view my pdf files in the system so I don't have to download them for a quick look	B	Done	8	S8	
32	As a user I can view the most common formats of documents that have been added to the system so I can see what has been added.	B	Done	13	S8	
60	As a user I can add comment to public documents to tell other users what I am thinking	B	Done	5	S8	
64	As a user I can open my text documents in a file editor so I can easily make changes to it without having to download it and upload again	B	Done	13	S8	
66	As a user I can choose how to display my documents (for example 1 per line or sequence of files) so I can find files easily	B	Done	8	S8	
9	As a user I can choose to have some or all of my categories public so I can upload documents that is for everyone in my company to see.	C	Done	5	S8	
40	As a developer I can make users test the current version of the product to verify it's functionality	A	Done	3	S9	
27	As a user I can view the system efficiently in all common screen sizes so I can use different devices.	A	Done	5	S9	
49	As a user I can order documents by size so that I can find documents faster	B		2		
15	As a user I can change the language of the system so I can easily understand the system.	B	Done	8	S8	
33	As a user I can listen to recordings that have been added to the system so I can see what has been added.	B	Done	8	S8	
50	As a user I can order documents by doctype so that I can have a better overview	B		2		

53	As a user I want my documents to be cached locally for few hours so that my documents won't be lost in case of loss of connection	B	Re-removed	8		Not possible due to lack of support from web service
13	As a user I can see suggestions from the system so I can find the appropriate category as fast as possible	B		13		
28	As an admin I can remove content from others in public category so I can eliminate offensive content	B	Done	2	S7	
38	As a developer I can read a class diagram so that I can have the same understanding of the system	C	Re-removed	0		There is no use in making a class diagram for Angular projects
6	As a user I can create my own category to filter by so I can customize it for my own needs	C	Done	5	S9	
17	As a user I can edit the categorization of my documents so I can adapt to changes	C	Done	3	S8	
59	As a user I can see a list of all the documents I have access to so that I work on them	C		8		
20	As a user I can change the privacy of my categorization so I can make documents public or private.	C		3		
52	As a user I can see type suggestions for photos based on the photo's content so that I can choose appropriate type easily	C	Re-removed	0		Product owner didn't want this functionality
8	As an admin I can choose to have some or all of my categories private so I can upload documents that I don't want others in my company to see.	C	Done	5	S8	
1	As a user I can record a sound recording so it can be accessed later by myself or others in the company	C	Done	13	S8	
12	As a user I can give a department access to a category I have created so that users of that department can view the category content	C	Done	8	S9	Updated from departments to group departments are not supported in FDSS
23	As a user I can trust that the transactions/operations I perform will take no more than 100 milliseconds	C	Re-removed	0		Backend problem
24	As a user I can trust that the system has a three nine uptime so I won't get frustrated and skip the categorizations	C	Re-removed	0		Group not responsible for database/web service

Risk analysis

When developing software many risks can affect the project. To evaluate risks, group members sat down and brainstormed about what could possibly go wrong. The results were moved to a

table⁵ and the group members rated each event from 0 to 15 based on two factors, a) The probability of the event occurring, and b) How much impact will the event have in case it occurs. The product of the multiplication of the two factors was used to determine how great the risk was. The scale from 0 to 15 was chosen because the group felt that risk scale from 0-5 would not show the difference in risk factor well enough. The risks were then allocated between the team members and they were given responsibility for watching over and trying to avoid them.

Odds of an event happening the risk		Impact of the event in case it happens		Risk factor that describes	
0 - 5	Unlikely	0 - 5	Small impact	0 - 75	Little risk or no risk
6 - 10	Neither likely or unlikely	6 - 10	Medium impact	76 - 150	Medium risk
11 - 15	Likely	11 - 15	Large impact	151 - 225	Great risk

The greatest risk factors

Risk	Odds	Impact	Risk factor	Possible prevention	Reaction	Guarantor	Updates
Fakta does not provide the students a REST web service in time	10	15	150	Students will make sure that there's always time to make a mock service in time	The guarantor of the risk will start creating mock service immediately	Hulda	13.03.2018 Before: 15 15 225 Reason: Part of the web service has already been provided
Workload of other courses that the students are enrolled in takes more time than expected	0	10	0	The students organize their time very carefully at the beginning of the semester and re-evaluate the schedule regularly	I, the student, see that the workload from other courses is preventing them to contribute enough to the project they will drop a course	Jóhanna	17.04.2018 Before: 15 10 150 Reason: Other courses are finished

⁵ [Risk analysis report](#)

Not validating process with product owner frequently	10	10	100	Have shorter but more frequent meetings with the product owner to validate that our ideas match the expectations and that they realistically match the backend	Adapt to the changes as fast as possible, trying to reuse as much of work that has already been done.	Hulda	11.03.2018 Added since we needed to make changes to our design after realizing it did not match the backend
Lack of knowledge on how to connect the front end to Fakta's backend	15	5	75	The students will do research on the matter early in the process	Have a meeting with Víðir to see an example if there is a problem	Unnur	
Underestimation of story points in a sprint	15	3	45	Students will have a meeting after each sprint where the backlog and story points are evaluated	Remaining story points after each sprint will be moved to the next sprint	Hulda	
Lack of knowledge on how to use video and audio in HTML5	15	3	45	Students will start educating themselves about the markup language in sprint 1	Focus on doing other things better and upload audio and video via normal file upload	Sigrún	
Fakta's database is down	6	5	30	The students will design their system so all parts are independent of each other (single responsibility principle)	Students will contact the technical team at Fakta and focus on other things while the system is down	Unnur	

Updates

11. March 2018

A new risk was added to the risk table, *“Not validating process with product owner frequently”*. A lot of time has been used designing parts of the system that didn't match the backend structure and therefore was need for redesigning those parts. This would not have happened if validation with the product owner had happened more frequently.

13. March 2018

A risk level was changed, *“Fakta does not provide the students a REST web service in time”*. The odds of the risk decreased from 15 to 10. The reason for the change was that a part of the web service had already been provided.

17. April 2018

A risk level was changed, *“Workload of other courses that the students are enrolled in takes more time than expected”*. The odds of the risk decreased from 15 to 0 because all the other courses were finished.

Changes we made during the process

Date	Change	Where	Reason	Impact
01/02/18	Private organization's repository instead of private student's repository	Environment	All members in the team needed equal advantages for example deliver code to Heroku.	The company needed to create a paid organization for the team that took couple of days.
22/02/18	Ionic instead of pure Angular	Environment	It makes it much easier developing a website and an app on the same time. Prototyping and user testing gets easier too.	There is no huge impact because we haven't started programming yet. But there is a little learning curve understanding Ionic.
27/02/18	Circle CI instead of Travis	Environment	Travis is more expensive than Circle CI but they are equally	We had to connect Circle CI

			useful for our project.	with our project after we already connected Travis.
01/03/18	Organize files in the system by using categories and types instead of using categories and tags.	Backlog	We were asked to make the backlog from scratch and decide how the categorization was supposed to be. When we presented prototypes to the product owner we were told that the backend didn't support using tags.	We had to think about categorization differently and that changed many stories on the backlog.

Usability testing

Feedback from users is an incredibly important and often underestimated part of software development. The group unanimously agreed on performing extensive and high quality user testing. The results from the testing would provide valuable information that would be beneficial for the design of the system⁶.

User groups

User group	Background	Use of the system	Environment	Main goals
<p>Current customers of Regla</p> <p>Importance: The most important group along with the new customers group</p>	<p>Age: over 20 Gender: All genders Education: High school or more Abilities/disabilities: Nothing specific Computer skills: Varies, mostly good</p>	<p>Usage: All year Training: Very little, since the system will have similar functionalities as Regla. Attitude: Users are generally positive and excited about the system Number of users: 5000</p>	<p>Technical environment: Varies greatly since users come from various directions Real environment: Mostly at work Other environment: Nothing specific</p>	<p>Fast, usable and efficient way to store, search for and get files</p>
<p>New customers</p> <p>Importance: The most important group along with the current customers group</p>	<p>Age: over 20 Gender: All genders Education: High school or more Abilities/disabilities: Nothing specific Computer skills: Varies, mostly good</p>	<p>Usage: All year Training: Some, but not much since the system will be very simple. Attitude: Users are generally positive about the system Number of users: 3000</p>	<p>Technical environment: Varies greatly since users come from various directions Real environment: Mostly at work Other environment: Nothing specific</p>	<p>Fast, usable and efficient way to store, search for and get files</p>
<p>Employees of Regla and Fakta</p> <p>Importance: The third most important group after the customer groups</p>	<p>Age: over 20 Gender: All genders Education: Bachelor degree or higher Abilities/disabilities: Nothing specific Computer skills: Very good</p>	<p>Usage: All year Training: Very little, since the system will have similar functionalities as Regla. Attitude: Users are generally positive and excited about the system Number of users: <50</p>	<p>Technical environment: Computers owned by Fakta Real environment: Mostly at work Other environment: Nothing specific</p>	<p>Customer satisfaction</p>

⁶ [Usability testing report](#)

<p>Administrators</p> <p>Importance: The least important group</p>	<p>Age: over 20 Gender: All genders Education: Bachelor degree or higher Abilities/disabilities: Nothing specific Computer skills: Excellent</p>	<p>Usage: All year Training: Very little, since the system will have similar functionalities as Regla. Attitude: Users are generally positive and excited about the system Number of users: <10</p>	<p>Technical environment: Computers owned by Fakta Real environment: Mostly at work Other environment: Nothing specific</p>	<p>Support and customer satisfaction</p>
--	---	--	--	--

Participants

Originally, the group decided to test at least three users from each group. The product owner was opposed to testing customers so the group had to make the best of testing only employees and possible future customers.

Preparation and execution

The group made a list with eight tasks that they asked users perform. The tasks were manifold and covered all the main functionalities of the system. The test setup was traditional, the testers introduced the process to the testees and read the tasks to the testees one at a time. The testees answered questions about their background before the test and after they had finished the test they were asked to answer an anonymous questionnaire online. The testers decided to have the questionnaire anonymous to get more honest answers.

For each task, the testers wrote a usability goal for efficiency, effectiveness and usability problems. For each goal, best, average and worst cases were defined. They were measured as the time it took a user to finish a task, whether or not the user could finish the task and how many and how big usability problems came up.

Results

First usability testing

In spite of that the result from the testing were incredibly extensive and informative. The testing revealed some major flaws in the design. Most users had a hard time finding the image they were asked to search for. Many users were confused when asked to change the name of an image since there was no save button and it wasn't obvious that the name was clickable (editable). Some users weren't sure which page was the front page and some users weren't sure how to delete an image

since the trash icon wasn't immediately noticeable. Many users did not notice the plus sign when asked to add an image. Most users were confused about adding an image since they didn't realize the button "finna skjal" was actually for adding an image. One user said that he thought the button's purpose was to search for a document. The testing resulted in the following changes:

1. The search was changed so the system would shift its focus to the search bar when pressed and the image would be very visible on the bottom.
2. The pencil icon was added after each attribute of a file (i.e. name, description, etc.) so it would be clear that it was editable by pressing the pencil.
3. A save button was added to the view/edit page that will only be shown when something is edited
4. The Regla logo on the frontpage was increased in size and moved to make it clearer that the user is on the frontpage
5. The trash can icon was increased in size and made black instead of grey so it would be more obvious
6. The plus sign icon was increased in size, made orange instead of blue and moved to make it more obvious

Second usability testing

The second usability testing was performed exactly like the first one but on fewer participants and updated prototypes. Unlike the first usability testing, the result from the second were only positive. The participants were satisfied with the test and did not encounter any problems. The group built the final version of the system on the prototypes tested in this testing.

Third usability testing

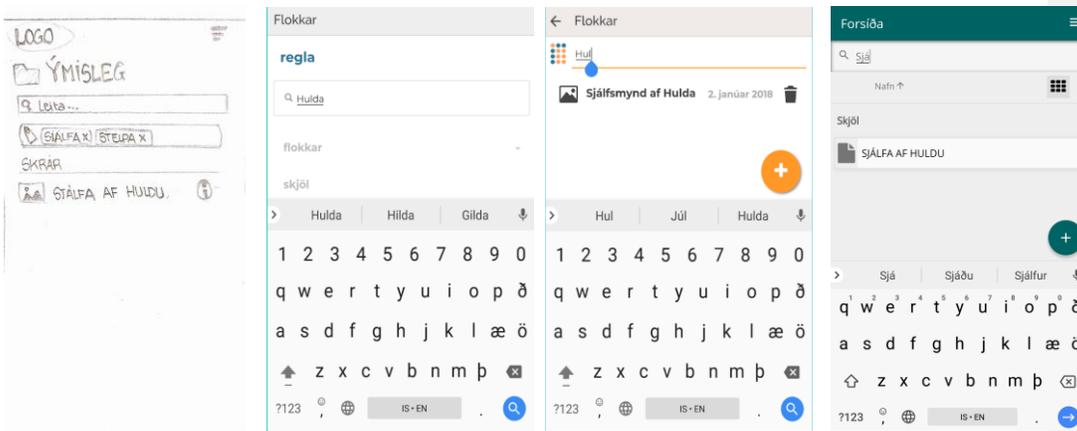
After the final status meeting the group asked five users to perform the tasks used in the first two usability tests on the product itself. After that the group asked the users to try everything that came to their minds, especially something that might make the system behave in an incorrect manner. This testing revealed some flaws i.e. that the audio player keeps playing after leaving a file, missing or not good enough error handling in some functions and that input length restriction was missing in the comment input.

Design

User Interface overview

Design process

From the paper prototype to the final product.



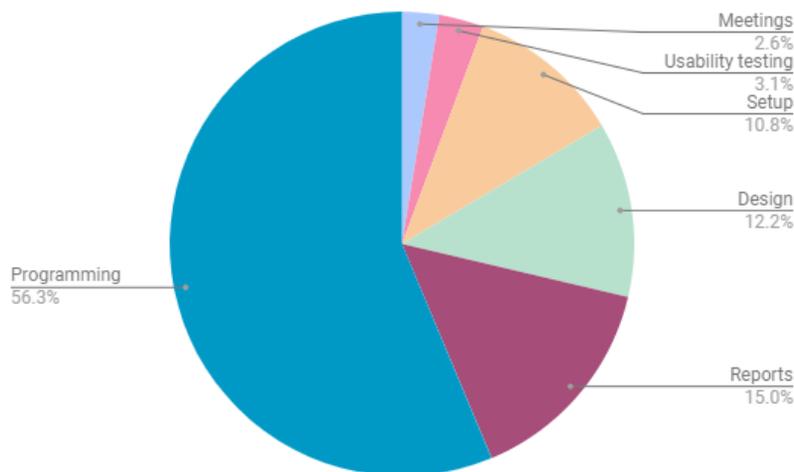
Process overview

This chapter will show the process overview of the project, Regla file storage system. The chapter contains information about each one of the nine sprints that were completed over the course of eighteen weeks. The sprint overview, work overview and the release burndown were all stored within a Google Spreadsheet document on Google Drive and filled continuously.

Each sprint will contain its sprint backlog, working hours and burndown chart. The first sprint will not contain a burndown chart since the group had not finalised their decisions regarding methodology.

Task type breakdown

When all group members had registered their last work on the project in the timesheet (excluding time registration for final presentation) a pie chart was made, showing how much time was spent on each task type.



Sprint overview

Sprint 0 - Original planning

Initial planning and start to setup the environment.

Sprint 1 - Requirement analysis and design

Designing the main requirements. Analysing functionalities needed and priorities

Sprint 2 - Primary design and environment setup

Making paper types and finishing setting up the development environment.

Sprint 3 - Usability testing and design

User testing on prototypes and analysing results.

Sprint 4 - Web service connections and interface setup

Connecting to Fakta web service and exploring the database.

Sprint 5 - Authentication, authorization and file uploading

All user authentication and authorization. Starting

Sprint 6 - Categorization and analysis on files

Creating, viewing and editing categories. Filtering files by categories.

Sprint 7 - Taking photos and more information about files

Making functions on smart devices. Storing and accessing informations about files.

Sprint 8 - Download, file representation, search and ordering

Detailed sprint overview can be found in Work planning report.

Sprint 9 - Testing, error handling, security

Final bug fixes and final touch on UI

More information can be found in the Work planning report.

Working hours overview

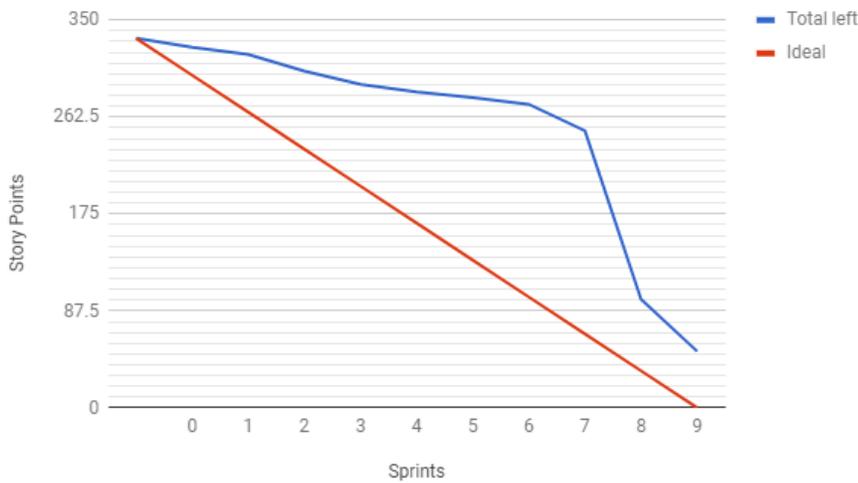
TOTAL TIME	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	
Unnur Sól	347.0 h.	8.7 h.	16.7 h.	36.2 h.	15.5 h.	32.8 h.	11.3 h.	36.1 h.	42.5 h.	66.5 h.	72.0 h.
Sigrún Tinna	346.7 h.	8.7 h.	16.2 h.	43.5 h.	32.8 h.	34.8 h.	17.7 h.	37.0 h.	24.5 h.	66.9 h.	73.0 h.
Jóhanna María	347.8 h.	8.7 h.	9.6 h.	42.2 h.	17.8 h.	35.8 h.	19.5 h.	22.0 h.	53.3 h.	70.8 h.	76.5 h.
Hulda Lilja	318.0 h.	8.7 h.	18.2 h.	34.2 h.	11.8 h.	30.5 h.	15.3 h.	26.0 h.	48.3 h.	49.5 h.	84.0 h.
Total:	1359.5 h.	34.7 h.	60.6 h.	156.0 h.	77.8 h.	133.8 h.	63.7 h.	121.1 h.	168.6 h.	253.7 h.	305.4 h.

Table: Working hours for each sprint.

Release burndown

Release burndown for all requirements the group gave themselves.

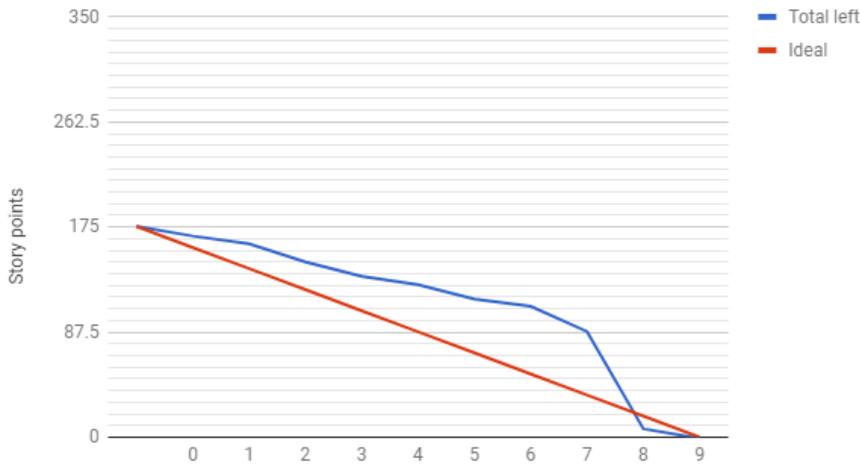
Release Burndown



Release burndown for A requirements only. This was made since the group had planned on finishing all A requirements in the beginning of the assignment, in sprint 0.

Every A requirement was met, and in sprint 8 the group was ahead of the plan.

Ideal A requirement release burndown



Conclusion

Overall, the group is very pleased with the project and the whole process. Inevitably, there were some difficulties along the way, which were mostly technical in nature. The main obstacle the team faced were communication difficulties with the employees of Fakta. The team mainly communicated with one employee in particular who was in charge of the web service and worked remotely from home and most of the times at night. It was very challenging to communicate through email especially when something was wrong or needed explaining, since sometimes the reply didn't arrive until the next day.

Also, the product manager was very keen on the group completely designing and implementing the system themselves. This caused the group to design a structure that later turned out to be impossible to have due to incompatibilities with the underlying database of the web service API, which was a black box for the team.

Despite these obstacles the product has exceeded the groups expectations in many ways. The group managed to make the best out of what they had, even though they had to deal with a badly documented, legacy web service and infrequent feedback and replies from the web service manager.

Commented [1]: Almenn regla að hafa lokaorð á nýrri bls. page break lagar.

All group members agree that working as a software developer for a company has been very educating and has given them experience that will benefit them on the labour market.