OSLO AND AKERSHUS
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OF APPLIED SCIENCES

Project B: A culturally sensitive communication app for breastfeeding and infant feeding counselling

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GROUP B

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PROJECT REPORT

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ABSTRACT:

The project aims to increase the breastfeeding practice of the immigrant mothers by providing a medical application that will enhance the communication between the midwives and the immigrant mothers.

5 INDEX TERMS

Breastfeeding
Communication
Collaboration
Work as design
Iteration

Abstract

Enabling women to breastfeed and informing if it importance is a major concern in Norway. Although, medical tools have moved forward, providing better quality of care and improving access of medical services, the practice of breastfeeding is not always applied. A number of studies have highlighted the association of lower breastfeeding practices with immigrant background, which represents social health inequalities.

The project aims to develop a culturally sensitive communication app in order to improve the dialogue between the health personnel and women with a varied ethnic and socio-demographic background, regarding infant feeding counseling. The application was conceptualized using a collaborative process with the public health researchers. Therefore, the project was developed over several communications with nurses and midwives to establish the requirements and gather the feedbacks. The use of the Scrum methodology was important to develop effectively and in a flexible way the application.

Preface

This document reports the development of a medical application built during the spring of the European Project Semester (EPS) 2016 in Oslo and Akershus University College. The program EPS consists of working with different cultures and behavior to develop skills related to teamwork, both managing and team building skills. In the case of the project a culturally sensitive communication app for breastfeeding and infant feeding counseling, the group as to work with researchers in health and end users, including midwives and public health nurses.

The team would like to acknowledge:

- Weiqin Chen, professor in ICT, our technical supervisor for the user-interaction side.
- Liv Elin Torheim, a Professor in Public health Nutrition involved in the Health Promotion, our supervisor for the feedbacks provided for the project from the nutrition side.
- Anne Marie, who is a midwife and teaches in the master in midwifery and who was very much involved in the development of the SOMAH project.
- The staff members and teachers of our faculty HIOA related to the international department.

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1. Introduction

In Norway, all medical treatments for pregnancy and birth are free, and future parents have consultations on a regular basis appointment are set up with nurses in the centers from the start of the mother`s pregnancy and throughout his first months of the baby. The appointments are opportunities to talk about specific or personal subjects with doctors, to discuss about more generic topics and educate the parents if they are not familiar with this field. An example of those topics is infant feeding and the importance of breastfeeding. Therefore, breastfeeding rates are high in Norway, and enabling women to breastfeed is a public health priority (Norwegian Ministry of Health and Care Services, 2007).

However, the practice of breastfeeding is not always applied. A number of studies have shown a lower breastfeeding frequency and shorter duration are associated with low education and immigrant background (Kristiansen, A.L., 2010, and Grewal, N.K., 2016). Several researches has identified several barriers and challenges related to counseling immigrant parents on breastfeeding and infant feeding (Holmberg, B.F., 2016, Pettersen, K.S., 2015, Wandel, M., 2008).

To face the background barrier, new communication tools such as smartphone application are developed. 93% of healthcare professionals believe mobile apps can improve patient experience and outcomes (eClinicalWorks, 2013). The use of mobile devices by medical professionals has greatly impacted the healthcare field by providing from a single device the possibility to gather information quickly or communicate within the medical staff in the, in the blink of an eye. A large amount of application has been developed in order to support the medical needs of mobility tools: guidelines, disease diagnosis aids, electronic health and medical records and more. However, there are few communication tools for primary health care counseling on infant feeding practices in Norway, and a dearth of culturally sensitive communication tools (Holmberg, B.F., 2016). Mobile devices have made their proofs in the medical area the eClinicalWorks survey as shown that healthcare professionals have reacted positively and agreed that mobile devices can facilitate their daily work.

The project has been initiated by the creation of a first app called SOMAH 1. SOMAH is an acronym for Samtaler Om MAt på Helsestasjonen, which translates to “conversations about food at mother and child health clinics”. It was designed in collaboration with public health nurses and midwives in response to an increase in gestational diabetes and diabetes type 2 in

the Norwegian population as a whole, and in marginalized groups in particular (eQUITY, 2013). The app gives information to mother`s about infant feeding in overall. However, the situation has changed and the nurses at the Medical Center are not satisfied anymore by the app SOMAH1 which was old fashion, provides only photos and wasn't sustainable anymore. The app couldn't add new topics such as breastfeeding, which is an important area that the Medical Center currently faces.

For those reasons, the project SOMAH 2 has started. This tool aims to cover the topic of breastfeeding in addition to infant feeding, and will be built as designed to answer to the needs of the midwives. As the application has been developed for the Health Centers in Norway, the methodology to build the app was a feedback loop between developing and feedbacks. In other word, the design and the functionality of the application have been improved many times to reach the expectations of the midwives working in the Health Center.

This report covers a presentation of the project, the methodology that the project team has adopted, and the whole development of the project. To conclude, the report will present the result achieved and present the perspective of evolution of the project.

2. Objective

To be accepted by the midwives working in the Health Center, the prototype of the app must reach its specifications.

The app will:

- provide information related to infant feeding,
- cover multiple topics about breastfeeding, and infant feeding,
- provide tips for the immigrant mothers,
- support Android OS,
- have an user-friendly interface,
- work offline,
- be updatable thanks to an online database linked to the app.

3. Requirements

Compared to the previous app SOMAH1, what exactly will change in the current project SOMAH2?

First, to have a medical app that provides more detailed content alongside with more topics instead of just presenting a list of food images without any explanation. Plus, to have an app that covers a wider range of topic that will add tips and advices for the mother and will answer questions that always come on the table, for instance, “why is breastfeeding so important”.

Figure 1 : SOMAH1 app screenshots

Furthermore, the nurses at the Medical Center would like an app, besides the breastfeeding app, which is capable to adapt from a patient to another. In other words, the app should be multicultural and integrate the possibility to change the languages, but also easy to use, so that the interface will have to be very clear and simple.

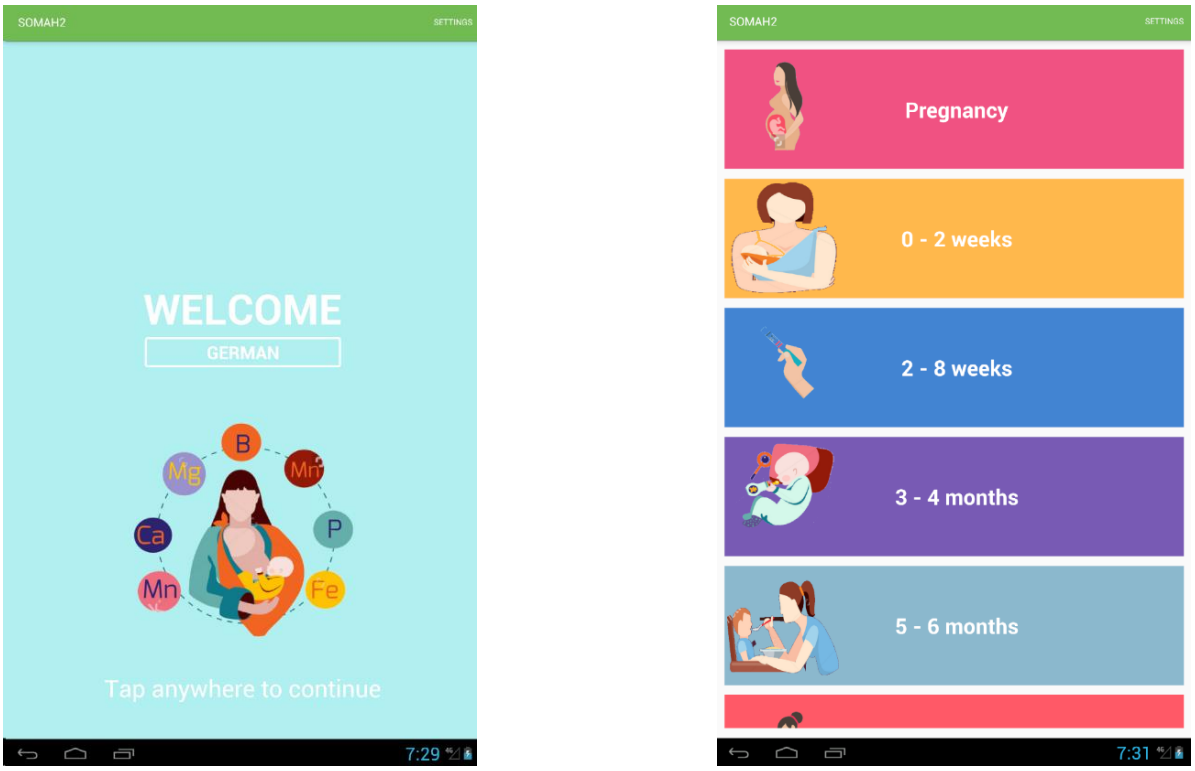


Figure 2: Screenshots of the SOMAH2 app

The project is also an opportunity to develop a new app for the nurses that will be available and free to anyone, free to maintain and free to download. Nowadays, more and more people tend to have a smartphone or tablet and it became more important for content providers to be mobile-friendly. Also, medical center cannot afford to hire a mobile developer full-time so the EPS is a way to make the app sustainable and easy to improve if needed.

Table 1: Requirements

Front-End	Android based application
	User-friendly
	Multilingualism
	Content Page
	Topics list Page
	Period Page
	Welcome Page
	Settings page (translating, update database)
	Acceptance of the nurses

	Provide breastfeeding information
	Provide infant feeding information
Back-End	MySQL online Database
	SQLite offline Database
	Translating function
	DB Connector
	ER Modell
	Interactivity
	Available database
	It is supposed to work offline
	Sustainable

4. Methodology

The application has many requirements, covering different areas, from a backend developer to a frontend developer. In addition, the project SOMAH2 requires the acceptance of the users, which are the nurses, the midwives and the immigrant mothers. As the needs of the users can change during the project, the developers have to adapt and adjust the functions of the app in order to implement the new needs.

This section covers the methods that the developers has adapted to face those dynamic tasks.

a) Agile

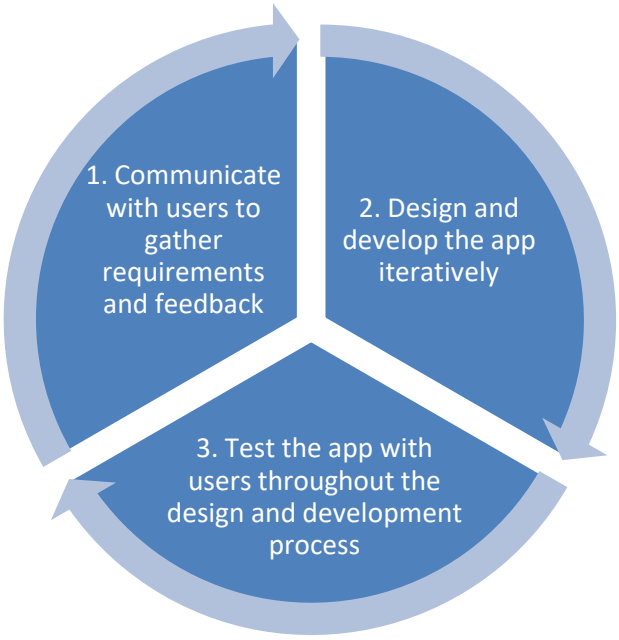
The agile software development consists of acquiring requirements and feedbacks of the users in order to improve iteratively the app. The method is a collaborative work where the requirements involve the effort of cross-functional teams both in Health care and in computer science. This method was adopted for the project because it advocates adaptive planning, evolutionary development, early delivery, and continuous improvement, and it encourages rapid and flexible response to change (Agile Alliance, 2013).

b) Scrum method

The scrum software development is an iterative and incremental agile software development framework for managing product development (Gunther, Verheyen, 2016). In order to implement the whole functions and a user-friendly design, working effectively has a team was essential. Therefore, improving step by step the app iteratively was necessary to achieve all the requirements, plus the new requirements added into the backlog during the project.

The 3 steps of this method are:

1. Communicate with users to gather requirements and feedback
2. Design and develop the app iteratively
3. Test the app with users throughout the design and development process



First, the project team works on analyzing and finding the needs of the users. The aim is to develop the app as design, several meetings with the members of the Faculty of Heath such as Liv Elin, a nurse, and Anne Marie, a midwife, where handle to determine the functionality that needs to be improved or done.

Afterwards, the programming and designing time, with the information gathered, the development team defines all the tasks, split the work, to adjust the app to the desired state to show the progress.

Finally, the testing phase permit to determine whether the functions and design implemented satisfied the users. This step is a collaborative work together with researchers in health, which are midwives and public health nurses.

5. Design and development

a) Tools

During the development of the app, the project team used a few tools to plan our work, designing the app, developing code and finally test our work on virtual Android devices.

I) Trello

Trello is a free project management tool based on tasks collaboration between members of a project. Each task is represented by a card and is assigned to one our several members of the project.

It is highly inspired by the Kanban paradigm and tasks are supposed to progress between different states: TODO when a task is planned to be done, DOING when the task is currently made by a member or DONE when the task is finished. This facilitates the collaboration and the development of the project.

II) Moqups

moqups.com/ is an online platform designed to create prototype and wireframe. It is very useful for web designers and developers as it is very fast and easy to make screen prototypes, images and demonstrations.

We used it to concretize our first design ideas and add some colors and links between screens. It was easier to share with the nurses to get feedbacks.

III) Android Studio

Android Studio is the official integrated development environment (IDE) for every Android platform: smartphone, tablet, smart watch, smart tv and more.

It provides among other things:

- a high level text editor (used to write Java code) with a lot of features: auto-completion, keyboard shortcuts…
- a tool to help designing screens by dragging and dropping elements
- a debugger and interpreter (called Gradle) to compile and build the code written to an apk file that can be installed after in an Android device (virtual or not).

c) Milestones

In project management, milestones are-intermediate goals and can be viewed as major progress points that must be reached for the final deliverable.

In our case, each of those steps has to be approved by the final users which are nurses and midwives. It is important to note that they are key stockholders and that their validations are the main factor before considering advancing to a further goal.

the project team identified four milestones in order to deliver a functional and user-friendly app:

1. design conceptualization
2. first app prototype (including design finalization)
3. advanced app prototype (iterations)
4. final app deliverable

In this process, going back to a previous step should not be an option. For example, changing the overall design of the application in the last stage the project might not only affect a big

part of the code but will cost major times as every previous step would have to be validated again.

I) Design conceptualization

The first milestone is the design conceptualization.

In the beginning of the project the project team discussed within the group about the important screens that had to be implemented and did some drafts on paper.

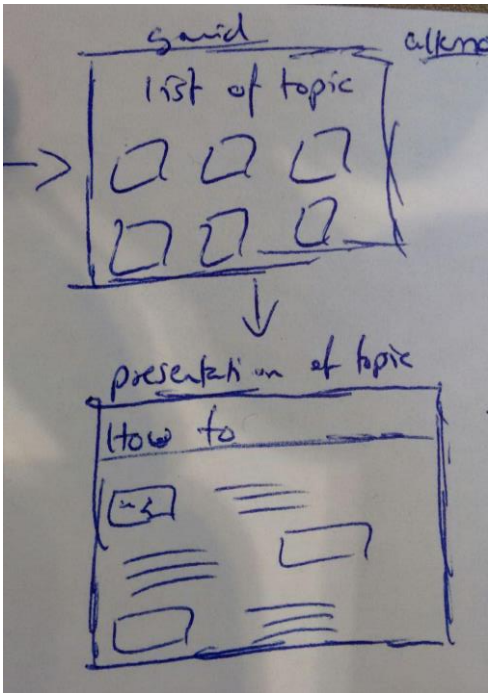


Figure 3: Draft of the screen "list of topics"

Once the first draft was done, the project team decided to follow a graphic chart based on two elements:

- The simple the better : the average user will probably not be very familiar with fancy design and the app has to be as easy as possible to use
- Colors matter: a health app should include light fresh colors and avoid warm aggressive colors.

The team finalized those ideas by making digital mockups of every screen, so that they can easily be sent to nurses to get quick feedback. The project team could also add some interactivity and see a concrete material closer to the final app.

Figure 4: Design conceptualization: from some colorless drafts on a paper to an interactive useful mockups

II) First app prototype

After installing all the necessary tools to make an Android application, we could start thinking about what our first prototype should include.

At this point of the project, the most important screens to implement were:

- a welcome screen including a logo and/or picture
- an adaptive screen which display available topics
- a screen that display fake content.

Finally, we had an important meeting with Anne-Marie in order to show her our progress and have a face to face meeting and feedbacks with a future user of the app. This meeting had an impact not only on the design part but also on the features we thought about and the first prototype of the app.

Norway has strict laws regarding collection and use of personal data, especially for a medical application. Thus, after a discussion with Anne-Marie, we had to review our position for

collecting profiles and medical situation of new born children. This also allows us to have an app accessible offline which was something important for Anne-Marie.

We also decided to have a weekly meeting with her on every Wednesday afternoon.

III) Iterations

After the first iteration with the demonstration of the first prototype, the project team has to develop the other and new functionality discussed during the meeting with the midwife.

The project team has to design and develops the app by keeping in mind the important features and must have of the app:

1. It has to be designed for tablet. Indeed we took a look at similar application on the market along with well-designed app for tablets. Those gave us inspiration to make a well-designed application.

2. Offline: once installed on an Android device, the app should be available without any internet access. Thus, the tablet can be brought anywhere on the center our outside. This has been a need brought by nurses on one of our weekly meetings.

3. Multi-language: the app aims to facilitate the communication between immigrant parents and medical center workers and should provide translation help in order to do so.

4. Personalized: users (nurses and midwifes) are also actors of the app development and provide to us feedbacks in order to improve their experience and make them satisfied once the app is finished.

Table 2: Iteration table

Iteration	Main functions	Feedback
Iteration 1	Mockups (Design of the Application)	We got good feedback and a validation for the design and can start to program it.
	Log-In	A Log-In function for personality is not necessary. The function is cancelled.
	Data Security	It is not supposed to have any personal information about the mothers, because it is very strict in Norway with personal data.
	Welcome Page	Satisfied about the screen page, but the picture on the screen page should be more user-friendly and should symbolize the subject.
	Overall feedback	Good feedback about the design, but not about the scenario, how the application is supposed to use it. Some functions are cancelled.
Iteration 2	Design of the application	The application needs samples of images for the buttons and content.
	Settings	Database update data is missing. Satisfaction about the function to change the language.
	Search function	Search function
	Link between scenario and application	The application supported and represented the scenario very well.
	Welcome page	The picture on the welcome screen page represents the subject and is very user-friendly now. Welcome page validated.
	Period page	Buttons are for chronological structure not satisfactory, because it has not enough overview about the time periods. The theme of the period page could be more user-friendly with some pictures on the buttons.
	Topic list page	Good theme for the topic list with different colors.
	Content page	It is supposed to have a slide function for splitting the text points or steps. It would be too much text on one screen.
	Interfaces between the screen pages	
	Overall feedback	The first prototype is suitable for the communication between the nurses and the

		mothers. But some functions were missing.
Iteration 3	Multilingualism	Good point to choose the language of the welcome screen page and through the button “settings”, if the user is already on a content page. Indeed the languages has to change and has to be in the database and available for translate.
	Chronologic structure	The feedback about the chronological structure for the periods is good. The splitting in time zones, where the subject becomes different topics is done as well.
	Interactivity	Not satisfactory, because an example is missing. It needs a database for a demonstration.
	Content Page	The content is good structured in steps or points. Validated!
	User-friendliness	User-friendliness is very good, because it is really simple to use the application. It needs fewer clicks to get the right content and the content page is structured to split the text in points or steps. Well done!
	Overall feedback	Not satisfactory about the second prototype. Many functions are spitted in two prototypes and not integrated in one prototype.
Iteration 4	Database (Android, SQLite)	The Content and Connection between the databases online and android is missing.
	Online Database (MySQL)	
	Settings (update database)	Surprised and pleased about the function “update”, which make it possible to update easily.
	Interactivity	Very satisfied about the function, that they are be able to use one topic for more periods.
Iteration 5	Database (Android, SQLite)	Good feedback for that, the application is being able to work offline with the database and is being able to update it from the online database.
	Online Database (MySQL)	
	Sustainability	Very satisfied that the application is sustainable without programming.
	Images	The sample images do not represent the periods. It needs to change. List of pictures each period validated, it must be updated.

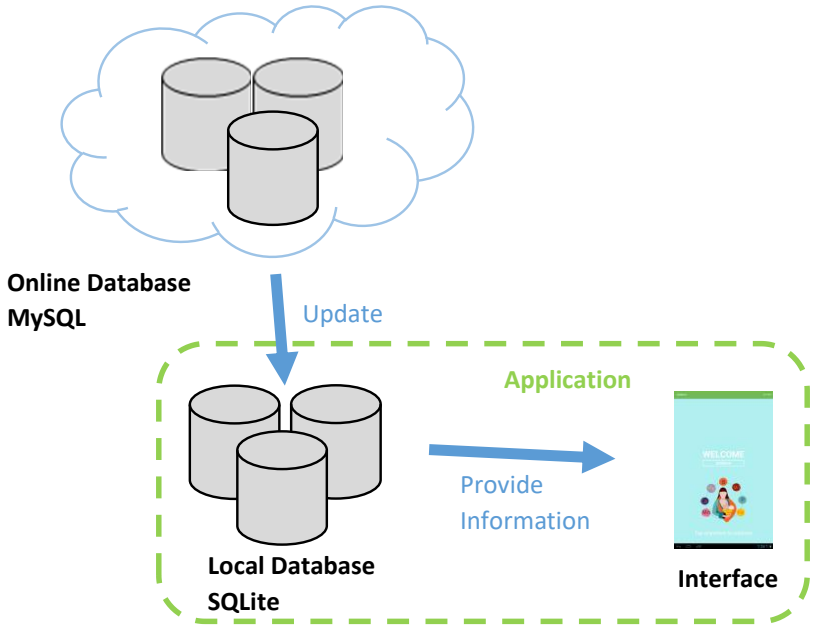


Figure 5: Components of the app

6. Final testing (Result)

The final testing aim to check the usability, the design and the functions implemented after all the iterations. The result is the satisfaction of the users. In the case of our project, the public health researchers are the stakeholder who will validate or not the final application.

For the final testing, an app has been provided to the project team in order to show the result and be able to actually use the app including:

- the animations of the app,
- the possibility to touch, swipe and zoom in the app,
- the accurate content inside the app,

At this stage, the nurses and midwives will not only be able to see how to use the app, but also use it with the appropriate material.

The final demonstration of the app with tablet was very useful to the users and has revealed that the app:

- was personalized, the app was built according to the specific need of the midwives,
- well organized, the content and information of the app was sorted appropriately,
- is easy to use, the navigation process was effective, the users select their situation, then select the topics wanted.
- look modern, the application's design was new and "fresh".

The project team has also a last feedback which was to develop a button "Home" to every page to be able to return back quickly to the welcome page.

Conclusion

The project SOMAH 2 was a collaborative work, from members of different background, including the developers and the users working in the public health. Therefore, identifying the needs of the users by organizing several meetings was an important part of the project. To reach the dynamic needs of the users, the process of iterations with the scrum methodology has permitted the development team to focus on the technical part of the project, meanwhile the researchers in health provide the content of the application.

By following the iteration step by step, from acquiring requirements and feedbacks, to the test of the app with the new design and development afforded, the team has achieved the specifications:

- provide information related to infant feeding,
- cover multiple topics about breastfeeding, and infant feeding,
- provide tips for the immigrant mothers,
- support Android OS,
- have an user-friendly interface,
- work offline,
- be updatable thanks to an online database linked to the app.

Most of the requirements (table 1: Requirements) has been achieved, yet the content of the app wasn't fully provided to the development team, and more topics and contents of the app can be implemented in the future.

To conclude, the app will improve the dialogue between the health personnel and women with a varied ethnic and socio-demographic background, regarding infant feeding counseling. But, has more and more information will be gathered by the researchers in health, improvement remain possible. As a perspective of evolution, the app will be in the future accessible by the researchers in health from a web page to implement new content (figure5: Perspective of evolution).

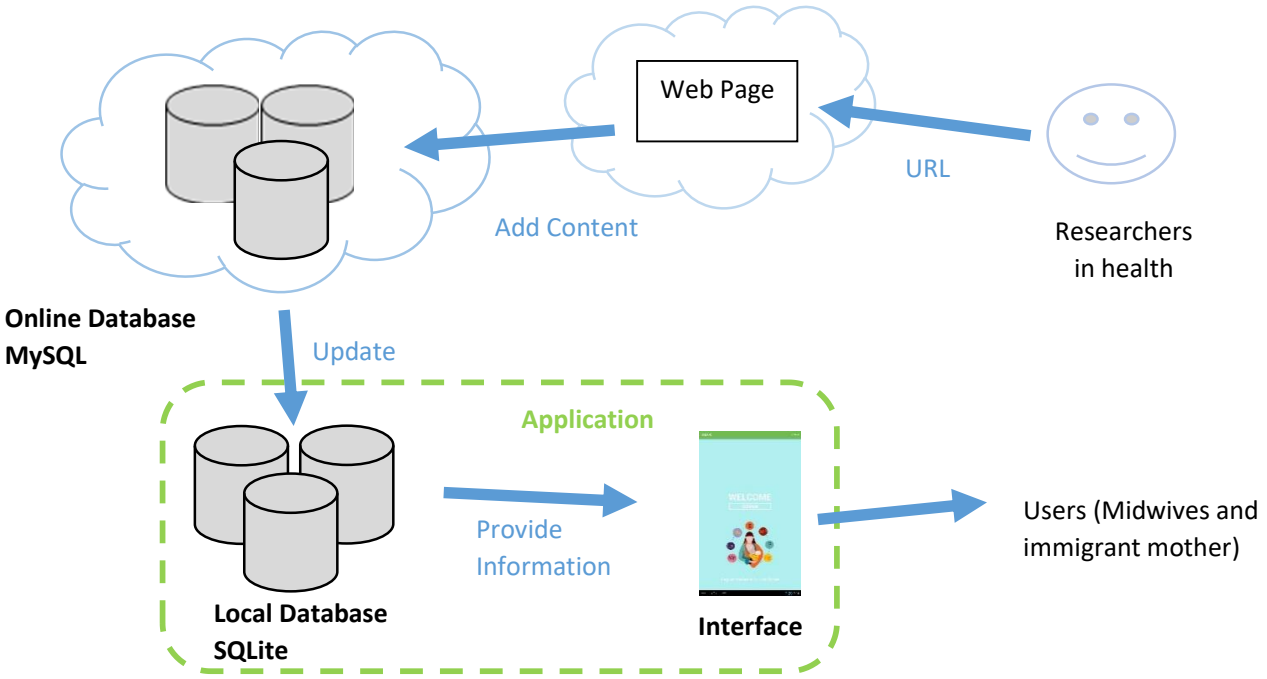


Figure 6: Perspective of evolution

7. References

Agile Alliance (2013), *"What is Agile Software Development?"*, retrieved 4 April 2015.

eClinicalWorks (2013), *eClinicalWorks Invests $25 Million in Patient Engagement*, from https://www.eclinicalworks.com

eQUITY Tools (2013), *Using m-leaning Objects in Healthcare "The SOMAH app"*.

Grewal, N.K. (2016), *Breast-feeding and complementary feeding practices in the first 6 months of life among Norwegian-Somali and Norwegian-Iraqi infants: the InnBaKost survey*, from Public Health Nutr.

Holmberg, B.F. (2016), *Counseling Immigrant Parents about Food and Feeding Practices: Public Health Nurses' Experiences*, from Public Health Nutr.

Kristiansen, A.L. (2010), *Factors associated with exclusive breast-feeding and breast-feeding in Norway*, from Public Health Nutr.

Norwegian Ministry of Health and Care Services (2007), *Recipe for a healthier diet. Norwegian Action Plan on Nutrition 2007-2011*, from Norwegian Ministry of Health and Care Services.

Pettersen, K.S. (2015), *Helsesøstres oppfatninger av mødres interaktive ernæringsfremmende allmenndannelse*, from Sykepleien Forskning.

Verheyen, Gunther (2016), "Scrum: Framework, not methodology".

Wandel, M. (2008), *Changes in food habits after migration among South Asians settled in Oslo: the effect of demographic, socio-economic and integration factors*, from Appetite.

8. Appendixes

a) Database