Final Report INF4060/2260

Nutrition-Aware Meals (NAM)

Sunnaas Nutrition and Reconvalescense: Project 1

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1 Introduction

This is the final report of the *Nutrition-Aware Meals* (NAM) project in the course *Interaction design* INF2260/4060 at the Institute of informatics, University of Oslo, 2014. Two student groups were involved in the Sunnaas *Nutrition and Reconvalescence* project. NAM places focus on the feedback to the patient's aspect of the project. This report describes the project process in detail.

Stakeholder	**Name**	**Responsibilities performed**	**Contact information**
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Student, UiO	Ina Vangen (B.Sc.)	Frontend design, visual content and illustrations, Sunnaas coordination, Conceptual development, prototyping and usability testing (planning and execution). Following sections of report: 3, 4.2-5, 6, 7.	ivvangen@uio.no
Student, UiO	Bente Halvorsen (M.Sc.)	Frontend development, coding HTML5 & CSS3, conceptual development, prototyping, report structure, milestones overview, Gantt, meeting overview, usability testing and observation, 1, 2.1, 2.4, 4.3-5, 5, 6, 7	benthal@ifi.uio.no
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Table 1 Stakeholders and roles.

1.1 Objectives and research questions

The goal was to develop a high-fidelity prototype using user-centred design principles which purpose was to aid patients in understanding relevant personal nutritional goals, and motivate better eating habits through gamification models and techniques. The high-fidelity prototype will also provide the hospital staff with relevant cumulative data to be used for analysis of patient eating habits. It was a special request from Sunnaas that the prototype was sustainable in terms of further development. We set up the following research question to help support our research, design and data collection methods:

How can users with acquired cognitive impairments be empowered to take a participatory role in a relation to their own diets, and how should feedback on their decisions be presented?

1.2 The client and target groups

Sunnaas hospital is the largest hospital in Norway specialising in physical medicine and rehabilitation. They are developing strategies to make nutrition screening more integrated into the patient's routines and are investigating how to make this more motivational through gamification. Currently, there are no system in place that handles, logs or systemise nutritional goals or recommendations.

The target user group is the patients at Sunnaas that has sustained brain injury and are currently recovering under treatment at the hospital (see chapter *Acquired Cognitive Impairment (ACI)*).

1.3 Project plan

We used a Gantt chart for project administration, and broke the project process into the milestones described in *figure 1*:

✓	initial meeting, Sunnaas	1d	100%	10/09/2014	10/09/2014
✓	plan milestones	1d	100%	12/09/2014	12/09/2014
	divide responsibilities	2d?	90%	15/09/2014	16/09/2014
✓	Project brief delivery	5d	100%	11/09/2014	17/09/2014
✓	research cognitive impairments	13d?	100%	08/09/2014	24/09/2014
✓	decide name and logo design	6d?	100%	15/09/2014	22/09/2014
✓	research framework	5d?	100%	15/09/2014	19/09/2014
✓	conceptualisation and design	5d?	100%	16/09/2014	22/09/2014
✓	start development of application	11d?	100%	23/09/2014	07/10/2014
	tweaking code and programming	38d?	70%	01/10/2014	21/11/2014
✓	test application - build and fix as necessary	2d?	100%	08/10/2014	09/10/2014
✓	mid-term presentation	1d?	100%	10/10/2014	10/10/2014
✓	sort legal permissions	11d?	100%	17/10/2014	31/10/2014
✓	usability testing 1	1d?	100%	03/11/2014	03/11/2014
✓	alteration based on usability test	8d?	100%	04/11/2014	13/11/2014
✓	usability testing 2	1d?	100%	17/11/2014	17/11/2014
	finish final report	52d?	60%	15/09/2014	25/11/2014
	report delivery	1d?	0%	26/11/2014	26/11/2014
	presentation	1d?	0%	26/11/2014	26/11/2014
	oral exams	1d?	0%	02/12/2014	02/12/2014

Figure 1

2 Theoretical frameworks

This chapter summarises the literature review completed during the project. We needed to acquire knowledge in how to design our application as an interactive prototype for the cognitively impaired, gamification principles and visual representations of data in addition to the course curriculum.

2.1 Acquired Cognitive Impairment (ACI)

The two most critical types of cognitive impairment the group we were asked to consider, were aphasia and hemispatial neglect. The group was provided a psychologist from Sunnaas to assist with general guidelines that should be applied in the interface and experience design.

Cognition describes the thought processes involved in communication, memory, learning, understanding, and attention. After brain injuries, patients can suffer from multiple cognitive impairments. Cognitive impairment brought on by brain injury is often characterised by the fact that long-term memory is unaffected, but short-term memory is severely impaired (*Faktaark: Kognitive problemer etter hjerneslag* [no date] p. 3; Rispoli et al. 2014 p. 32). Research suggests that metaphors and abstractions can be a challenge and that the user group will find it difficult to connect an abstract image with meaning as they will interpret the image literally (ibid. p. 35). This was confirmed by the staff at Sunnaas (Bergersen, October 16, 2014[meeting]). The patients also experience an inability to filter out irrelevant information, and this often results in getting easily distracted, experiencing “information overload” and this again results in exhaustion, irritability, further memory impairment and concentration problems (*Faktaark: Kognitive problemer etter hjerneslag.* [no date] p. 2).

Aphasia is classified as a “language disorder”, with “language” defined in its broadest sense: *“Talking, finding the right words, understanding, reading, writing, and making gestures are part of our language use. If as a result of brain damage one or more parts of language use stop functioning properly, this is called aphasia”* (What Is Aphasia? [no date] para. 2). Aphasia is the result of haemorrhaging in the brain often brought on by head trauma. Most sufferers of aphasia have their mental capacity intact, it is the communication mechanisms that are damaged. Often, there are some spontaneous, but rarely a complete, recovery (ibid. para. 3).

As the name implies, **hemispatial neglect** happens when one hemisphere of the brain has sustained injuries and the result is that the patient lacks awareness of one side of his/her body. Practical results of this is that the patient might only eat half his/her dinner, only be able to read half sentences, collide with objects, only draw half of an object (Baheux 2004, p. 4908).

Nutrition recommendations for people with cognitive impairment put the main focus on avoiding malnutrition (*Kosthåndboken – veileder i ernæringsarbeid i helse- og omsorgstjenesten* 2012). Meals and food that patients like can act as a motivational factors, especially since mastering the meals themselves might be difficult or challenging. Not only such patients can forget what they ate, but they also might forget how to use the utensils or how to put food in the mouth in the middle of the eating process and in severe cases they forget certain types of food completely (ibid. p. 201).

2.2 Universal design

During the second meeting with Sunnaas, we received some general guidelines from our assigned psychologist (Bergersen, October 16, 2014 [meeting]) in regards to what to consider when designing the application for users with acquired cognitive impairment:

- The application should neither have unpredictable elements such as pop-up windows nor unnecessary effects and animations.
- Information should be divided into small units.
- The interface should be operable with one hand.
- Colours in general are fine, but other elements such as typography, images and audio must be carefully chosen to ensure it is as little noise as possible.
- The condition may cause users to interpret graphics very literally (e.g. an image of an apple will be interpreted as that *exact* apple, not an arbitrary apple).
- The application had to be designed to be fully working even though the user does not use it every day.
- UI elements should be aligned in a vertical manner when possible to better accommodate patients suffering from hemispatial neglect.
- General principles of *universal design* should be followed.

Universal design is defined as *“The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design”* (Connell et al. 1997). The principles of universal design are *“equitable use, flexibility in use, simple and intuitive use perceptible information, tolerance for error, low physical effort, and size and space for approach and use”* (ibid.). These principles were followed in conjunction with the guidelines provided when developing for ACI whilst designing and developing the application. For web applications, the universal design principles translate into accessibility as defined by the W3C (Henry & McGee, 2013). For more on this, see chapter *NAM as an accessible web application*.

2.3 Gamification

Gamification is defined by Zichermann & Cunningham (2011 p. xiv) as *“The process of game-thinking and game mechanics to engage users and solve problems”*. Gamification as a concept is about how human behaviour can be influenced by introducing game-related thinking in a non-gaming application. Such concept implies involvement of techniques that attempt to utilise people’s natural desire for socialising, learning, innate requirement for feelings of mastery and achievement (Bandura 1986, p. 21-2, 301). Therefore, by changing experience into a game with a reward for a special behaviour, behavioural change could be achieved.

The wisdom from the last lecture of HCI professor Randy Pausch: *“Never, ever underestimate the importance of having fun.”* (Wilson 2008). The root of gamification lies in a simple vision that everything has a potential to be fun. There are three central components in a game - fun/pleasure, rewards and time. Player drives the outcome, therefore player’s motivation is a key aspect of a successful gamification (Zichermann & Cunningham 2011).

After the first meeting with Sunnaas we could define possible objectives for game design for patients to be: becoming healthy, becoming knowledgeable about nutrition, being able to manage the diet and to stay motivated. Based on those objectives the individual motivators for Sunnaas patients would be to master nutrition, to de-stress and to have fun. Due to the nature of our user group the scale of progression to mastery is not obligated or expected in fast tempo, thus a user can stop at comfortable level of informational output and just have enjoy their own journey of learning.

According to the *“Mechanics-Dynamics-Aesthetics”* (MDA) framework coined by Hunicke, Zubek and LeBlank (2004), distinct game components like rules, system and fun can be represented by their design counterparts such as mechanics, dynamics and aesthetics. *Mechanics* are actual game components like algorithms and data. *Dynamics* accordingly are player interactions with mechanics, whereas *aesthetic* are desirable user emotional outcome. MDA framework is based on idea that games are more artefacts than media, so games behaviour is the actual content not the media itself (Hunicke, Zubek, and LeBlank 2004).

Gamified application mechanics and dynamics in depth:

A point system adopts composite metrics as a score: e.g. daily intake as a sequence of numbers that allows users to follow the evolution of their nutrition (Zichermann & Cunningham 2011, p. 38).

Progression to difficulty (levelling) is represented by progression from simple feedback represented by thumbs up/down to higher level charts and statistics. This way *"on-boarding[1]"* is simple, and there is no option to fail during the feedback process. Users are not obligated to see charts or statistics, they can simply use the application at a basic level. Generally levels are logical, flexible and refinable where positive user reinforcement and slow complexity introduction are the key concepts.

A progress bar in the graph is using percentage measurement to show the users how close they are to fulfil recommended daily intake. The bar itself is part of a levelling system serving as percentage based progress guide (Zichermann & Cunningham 2011. p. 48).

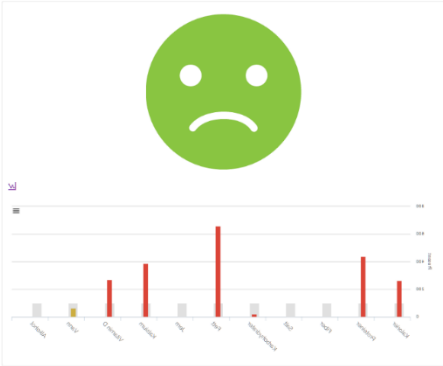

Figure 2 Simple feedback presented as a smiley.

A social engagement loop is about designing for user to be motivated to re-engage with the application, which leads to *"a social call for action"* and then *"visible reward / progress"* that loops back to *"motivating emotion"*. Motivating emotion in our case would be the desire to get healthier; player reengagement would happen thorough using the application daily; social call to action would be represented as following diet recommendations and finally "*visible progress / reward"* is the feedback itself and nutrition feedback bar below it. Understanding the social engagement loops is important to get users involved or engaged and then brought back to using the system at any stage of development (Zichermann & Cunningham 2011, p. 67-68, 70).

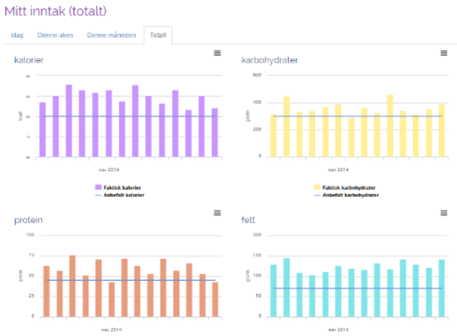

Figure 3 More complex feedback presented as graphs.

Feedback and reinforcement is one of the most important game mechanics that can be defined as the act of returning response to a particular user activity. Such feedback loops are essential to the success of gamification as a whole (Zichermann & Cunningham 2011, p. 77-78). While losing weight or being on a diet, it is difficult to understand where the user is on his journey especially considering the complexity and length of such a nutrition journey overall: this emphasises the importance of guiding the user right from the early interactions.

Figure 2 and 3 illustrate the different levels of feedback complexity used in the application.

2.4 Graphics, charts and data visualisations

"Graphic representation constitutes one of the basic sign-systems conceived by the human mind for the purposes of storing, understanding and communicating essential information. As a "language" for the eye, graphics benefit from the ubiquitous properties of visual perception. As a monosemic system, it forms the rational part of the world of images" (Bertin 1983 p. 2).

Designing charts and visual representations of data is complex and inevitably interdisciplinary. It is about balancing between what is enough information, what is too much, what is displayed where and when, to whom, and to be true to data. In information architecture, this dilemma is often referred to as *"granularity"* (Rogers et al. 2011, p. 301). As Edward Tufte is keen to point out, the creator must minimise *"chart-junk"*: cosmetic, confounding and irrelevant elements (2006 p. 152). Visualisations tells stories and creators must be careful, true to data, and not create charts, visualisations and cartographies that tell "our" story. In the case of this application, representing *no data* is invaluable *information*.

[1] Onboarding is an act of bringing a novice into the game through careful planning and walkthrough (Zichermann, Cunningham, 2011).

Our various feedback objects that the patients will interact with, is data pared down to the absolute minimum; a graphic *representation* of data, as opposed to a chart (Wilkinson 2005 p. 2). Here, it is about calculating means out of multivariable raw data, and the complexity of charts have been reduced to single graphic elements. Data presentation through charts is primarily aimed at staff and patients in the later stages of their recovery.

3 Methods

3.1 User-Centred Design (UCD)

The project followed a UCD approach: a design methodology that focuses on studying users and the context of use in order to ensure that product being created is actually meeting user's needs (Lowdermilk 2013). UCD is also includes user experience (UX) that focuses on the user's entire experience with the product, including physical and emotional reactions (ibid. p.13). Interaction design process (e.g. the UCD approach) and its constituent parts (establishing requirements, designing alternatives, prototyping, and evaluation) should be deployed as an *iterative design* process in order to ensure that prototypes and requirements are evaluated and improved upon based on user feedback (Rogers et al. 2011, p. 329).

3.2 Field studies

In the beginning we had a plan to conduct fully observational ethnographic field studies at Sunnaas hospital, however it was not permitted due to strict privacy rules at the hospital. We had prepared four observational checklists to observe patient behavioural patterns in the cafeteria, such as menu choices, staff behaviour, and food ordering habits. Our reasoning behind this was a common perception to assume that users might not truthfully explain how they do things (ibid. 2010, p. 220). Therefore Lazar points to the necessity of ethnography for comprehension of human routines and procedures (ibid. 2010, p. 219).

3.3 Interviews

When dealing with research subjects that have some form of impairment, it is, according to Lazar et al. (2010, p. 401-402) three main accepted approaches: *small sample size*, *distributed research* and *in-depth case studies*. For our project, the only viable option was *"small sample size"* due to limited time for the project, resources or, in fact, the need for either in-depth or distributed research. Therefore, qualitative data gathering through interviews combined with observation was used as the primary methods for information gathering and evaluation. In the start phase we had an electronic structured interview through mail to the staff at the Sunnaas hospital where we sent them a list of questions. This was followed up by a meeting in person with the staff, were we discussed possible solutions. During the evaluation we asked the participants in a semi-structured manner what they thought of the application with mostly close-ended questions (yes/no) such as "do you like the feedback?" in addition to open up for discussion if the participant had anything else to comment or suggestions. Under the interview we also had one team member observe the participants reactions and how they used the application.

3.4 Qualitative data analysis

One of the main technical methods that we used to process the data collected is the "*content analysis"* (Lazar et al. 2010, p. 285). As a technical process we have systematically gone through the data to look for repeating content to see if there is a pattern in the data gathered. Such *coding*[2] technique for analysis however is *"both quantitative and qualitative"* (ibid.). Context analysis is also applicable to various materials that are using multiple media (ibid.). We are "*subjective coders"* because we were involved in all stages of this project, and therefore we have been aware of the bias and subjective opinion risks. We have systematized raw data in a good order so becomes traceable for verification and can support the drawn conclusions. Nonetheless some subjectivity is inevitable, but it has been decreased to some extent thanks to justification of the data (ibid., p. 295, 299).

3.5 Experimental design

Even though we followed many of the research experiment methods, our experiment used in the later usability testing is in fact a non-experiment. (Lazar et al. 2010, p. 42). This was due to neither having multiple groups for measures or randomized assigned tasks. Our research were descriptive, focusing on examining if a certain element is happening or not (such as if the participant likes the application, or wants to use the application) (Lazar et al. 2010, p. 22).

[2] Coding is defined as *"technical process and technique used to analyse text content"* (Lazar et al. p. 289).

4 Design process

4.1 Establishing requirements and scope

4.1.1 Formal requirements

During the first meeting at Sunnaas on the 10th of September, we had a brainstorm session where all stakeholders contributed to realistic, potential and interesting elements. Out of this, general guidelines for scope and formal requirements were established. During the meeting, responsibilities were divided the between the two student groups. It was agreed that there had to be a mechanism in place for providing feedback to the users based on what meals were consumed. This could lead to some gamification such as achievements or points in response to making good or bad choices in accordance with the patient's nutritional recommendations. It was also suggested that the gamification is done through an *avatar* or *symbol for motivation and fun*. In order to not put excess stress on the patients, it was agreed that the gamification should be inherently positive, so that bad choices are not punished, but instead that the user is made aware that there was a better choice available. Finally, it was agreed that as to making the project useful in the future, perhaps as a data collection tool, there must be an interface for the staff to be able to examine trends in the patient's nutritional habits. This information should be comparable and exportable. Sunnaas also suggested a format that could be used for the exported data.

Due to the nature of patient confidentiality and paperwork involved in order to get access to the patients, and also because of time limitations of the project, fictional and anonymised use cases was provided as a foundation for requirements and use. This meant that for the first iteration of the design process, the group had strictly one-way communication in regards to the users. To ensure that there was an "*early focus on users and tasks"* as suggested by Rogers et al. (2011, p. 329), we communicated with Sunnaas staff during this time, deploying a *proxy user* approach (Lazar et al., 2010, p. 403).

4.1.2 NAM application platform and security

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect." -Tim Berners-Lee (Henry & McGee, 2013).

It was agreed that the application would be developed as a web application using the following web technologies: HTML5, CSS3 and JavaScript. A local file database would be used on each individual client to store data. The reason for choosing a web application instead of a native application, was that such an application will run on any device with a web browser. The target device was assumed an iPad with a display size of approximately 8". Since the application was scoped to read and write data only to the local device (i.e. not over a network to a centralised server), the security mechanisms in place were the ones used by the device itself, therefore offloading security issues from this project. There is a 1:1 relationship between users and devices, negating the need for a user to log in to the application. It was important for Sunnaas that the application was sustainable in terms of further development and maintenance (See appendix 1 "Requirements Specification from Sunnaas" for full requirements).

4.2 Conceptual and physical design

After the first meeting with Sunnaas, we decided to brainstorm and create a conceptual model of the application based on the requirements agreed upon with Sunnaas. We went through multiple model iterations, mainly focused on the flow of data through the system. The final conceptual model outlined in *figure 4*, was based on that data about meals consumed or planned was fed into our application from the black box (the other student group), then manipulated through various calculations, gamified, then shown as feedback to the user.

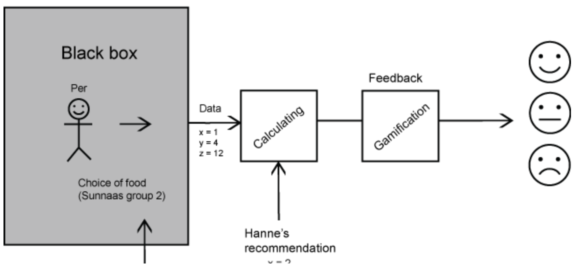

Figure 4 Conceptual model.

Once the conceptual flow was established, the model design quickly moved towards physical design as decisions had to be made about *how* to solve the calculation and gamification aspects (Rogers et al. 2011, p. 409): The data from the black box would be transformed through an algorithm that would extract a *score* from the individual values in the received data. The score was calculated by taking each nutritional component (e.g. kJ, carbohydrates, protein, etc.), and measuring how much (percentage) of the daily recommended amount was consumed, and then averaging all the values to one final daily percentage score. This would roughly indicate how well a user had eaten in accordance with their own personal nutritional recommendations: This gamification aspect was based on a *point system*. In similarity to *progress bars* (See chapter *Gamification*), where the user could follow their daily intake, the score was evaluated between certain thresholds, resulting in interpretation as graphical elements, shown in *table 2*, using thumbs up/down as an example.

Total calculated daily percentage (%)	Resulting graphical element feedback
0-75	Thumbs down (below recommended values)
75-125	Thumbs up (within recommended nutrition)
>125	Thumbs down (too much of certain values)

Table 2

The example using thumbs up/down is a simplified and coarse grained feedback type, intended for the most severe cases of ACI. More fine grained feedback types (e.g. smiley faces with five mood levels, or direct data visualisation through graphs) were implemented to cater for less severe ACI. The idea behind feedback through graphical elements, is that they would act as *"interface metaphors"*, helping the users understand their progress based on existing knowledge of what these elements represent (e.g. thumbs up represents "*good job, you are eating well!"* - thumbs down represents *"there is room for improvement in your diet!"*) (Rogers et al. 2011, p. 403).

4.3 Prototyping

4.3.1 Low-fidelity prototypes

After the conceptual design was in place, and physical design was discussed, we created several low-fidelity prototypes of gamification ideas. We chose to start with simple low-fidelity prototypes because they are quick and cheap to produce and supports exploration of different ideas. (Rogers et al. 2011, p. 392). We generated an array of feedback mechanisms, and had discussions regarding what types of gamification would motivate the users in a best possible manner. *Figure 5* shows one of the sketches and storyboards of the prototypes produced. Some of the feedback mechanisms involved virtual monetary rewards, and visualising progress as climbing a hill.

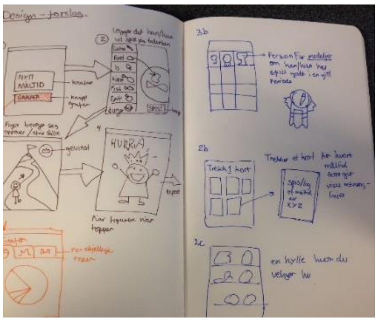

Figure 5 Low-fidelity prototype ideas.

4.3.2 High-fidelity prototypes

We started work on a high-fidelity web application prototype after our first meeting with Sunnaas, as this was a part of the project specification agreed upon. With the high-fidelity prototypes, the main focus for these were how we could present these objectives in a best possible manner to the patients, with focus on functionality and interaction, especially considering the requirements of ACI. We implemented three pages that could be used as a base of providing feedback to the user; the project's main objective. The three pages included a profile where the user (or facilitating nurse) could fill in profile information, and add nutritional recommendations (see *figure 7*), a page where meals could be added (see *figure 6*): this was an abstraction of the Sunnaas group 2 work which was required for us to have data entries to provide feedback on. The final page (see *figure 8*), was a page showing detailed information on nutritional consumption (e.g. carbohydrate and protein consumption against recommended values).

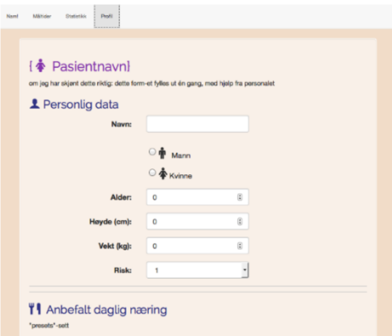

Figure 8 Patient-user profile.

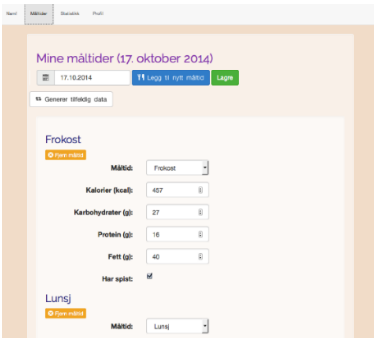

Figure 7 Adding meals per day.

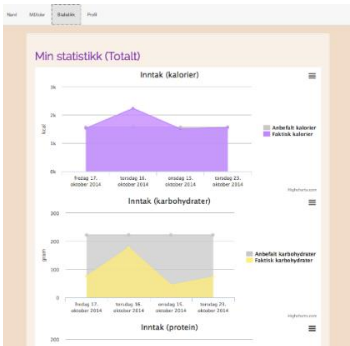

Figure 6 Nutritional consumption presented as graphs.

Graphs (see *figure 8*) as a basic overview, showing daily, weekly, monthly and "all-time" adherence to recommendations. This was initially meant as being entirely for staff as a means of direct data visualisation to be used to aid patient nutrition monitoring, but turned out to be of interest to some patients too.

A cat (see *figure 9*) as a representative avatar for the feedback system was our first attempt to implement gamification into the application. Our reasoning was to associate the functionality of the application with something inherently outside a hospital setting: studies suggests that a relationship to pets improves patient well-being (O'Haire 2010 p. 232).

Figure 9

When the user had chosen their meal the cat would be sad, happy or ecstatic depending on how well the meal corresponds to the user's personal recommendations. If the user had eaten well, the cat would receive fish as a reward. The idea was that the fish would be a *point system*, and the users could acquire more fish during the week. The status of sad, happy or ecstatic over the duration of a week would also be visualised in the left column to provide the user with a simple weekly overview. The cat feedback mechanism was simplified after the second meeting with Sunnaas, removing the element where the cat gets a fish based on the user's choice of meal (see chapters *Usability testing and evaluation and Testing by prox*y).

The following elements were later implemented after the first iteration of usability testing:

Thumbs: During the second meeting with Sunnaas (October 16, 2014), our assigned sign-language specialist suggested using thumbs up/down as an *interface metaphor*. She argued that thumbs are generally interpreted correctly by most users with ACI. She also suggested using *traffic light colours* as this was something that was almost universally understood by the patients (see *figure 10*).

Figure 10

Smileys: Similar to the cat, the smileys provide the same emotions (such as "happy" or "sad"), but is, as the thumb, a more simplified version. This was suggested by one of the users during the pilot testing. In addition, a smiley face can have several levels of expressions (in our case we chose five), and therefore might be useful as the patients get better and can relate to more complex representations (see *figure 11*).

Figure 11

4.4 Usability testing and evaluation

According to Lazar et al., the main purpose of any usability testing is to *"improve the quality of an interface by finding flaws in it"* (2010, p. 252). They make an important point to not only look for flaws, but to sustain and improve on what is already working well. We wanted to test the designed feedback mechanism against Nielsen's *10 Usability Heuristics for User Interface Design* (2014), with focus on the heuristics that minimise cognitive load (i.e. *aesthetic and minimalist design* and *recognition rather than recall*). We had three test sessions: a test *by proxy*, a pilot user test, and a second user test, acting as a summative evaluation.

We were allocated four patients that could participate in both the user test sessions. Traditionally, it is said that five users will uncover 80% of interface flaws (as cited by Lazar et al. 2010, p. 263), as suggested by *the Pareto principle* (Pannafino 2012, p. 61). More recently, it has been argued that the actual amount of users required for testing depends on how much is intended to be uncovered measured against what resources are available in terms of time and money (Lazar et al. 2010, p. 264). In this project, we were left with no choice, as there were no more patients available for us to test with.

In any study, there is a potential risk of the *"Hawthorne effect".* This means that the mere situation of participating in a study alters behaviour. This is notoriously difficult to measure and debated among scientists, but pains should be taken to make sure the testing is as unbiased as possible (Lazar et al. 2010, p. 35, 388). In our study, a nurse was present during the testing, and we had no way of measuring or finding out whether her presence in any way affected the participants or results. Interpreting this becomes a case-by-case judgement.

Due to the nature of the project and the paperwork involved to allow any form of communication with the patients, the first user-based testing happened quite late in the project process. It is generally recommended that the user-based testing happens earlier as this allows users to influence the design to a higher degree, as low-fidelity prototypes and concepts are easier to criticise and change (Lazar et al. 2010, p. 260). As waiting for clearance processes from various hospital departments before starting design and prototype development was not an option to us, we had to rely on the requirements specification decided upon during the first meeting, and evolve requirements with the project. Because of this, the first user-based testing session involved testing a highly functional prototype.

4.4.1 Testing by proxy

At the second meeting at Sunnaas (October 16th), we presented the first high-fidelity prototype. Taking advantage of this access to experts, we approached this as a *testing by proxy* which is commonly used designing for users with impairments such as aphasia (Lazar et al. 2010, p. 403). This meant letting the experts view and argue on behalf of the patients.

Although the staff at Sunnaas were fond of the cat, they mentioned that the cat-fish-patient relationship would be incomprehensible for most users and perhaps be interpreted as in that if the cat gets a lot of fish, it might be understood as a motivation to eat more (instead of healthier) or eat more fish specifically. Our sign and body language specialist suggested we avoid even remotely vague concepts, and stick to simple, well-known relationships, i.e. *good choice* equals *good feedback*, and present feedback using something familiar or relatable, like humanoid avatars or thumbs up/down. Similar suggestions were made by our supervisors during the midterm presentation.

4.4.2 Exploratory user test

Based on the feedback from the midterm presentation and testing by proxy, we decided to keep the cat, but simplify it. In addition, we also included thumbs up/down as an additional feedback mechanism. The application could be configured to use the feedback mechanism most suitable for the current user. (See chapter *High-fidelity prototypes*). The goal of the test session was to in an exploratory manner determine whether the patients could understand the feedback, or not.

4.4.3 Test session structure and setup

Since none of us had in-depth experience with conducting usability tests, particularly with users suffering from ACI, we decided to conduct the test session as an *exploratory* test session (Lazar, 2010, p. 150, 180) in order to familiarise ourselves with the testing environment and users. To ensure that all users would comprehend the test session, we set up the application to present three pages with two images of food; one unhealthy option, and one healthy option.

The users were asked to make a choice by tapping either option. The user would then be presented with feedback corresponding to whether their choice was bad or good (see *figure 12)*. The session was handled dynamically through both demonstration of the application, and interaction from the users depending on the user capabilities and response, and measurement was essentially scoped down to two basic questions:

Figure 12

- Do you understand the feedback?
- Do you like the feedback?

4.4.4 Second user test – summative evaluation

The second and final usability test was a high-fidelity, *"summative evaluation"*. As described by Lazar et al., this was a formal test of the artefact based on previous testing (Lazar et al. 2010 p. 260-261). For this test, we developed some functionality to the prototype: a five-tiered smiley face feedback, and a more immediate, multivariable graph figure (see *figure 13*). For the testing to be as realistic as possible, we added six (random) images for food (see *figure 14*), from which the subjects could select more than one. This is however the scope of the Sunnaas group 2, but we needed the feature so as to make the feedback more realistic.

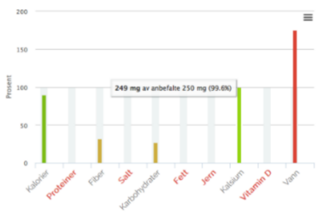

Figure 13

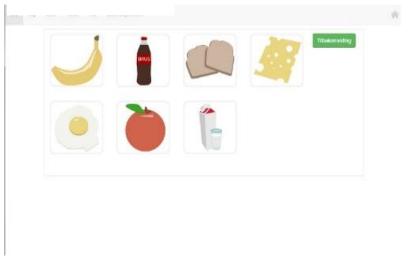

Figure 14

4.4.5 Test session structure and setup

The testing was set up as semi-structured interviews (Lazar et al. 2010, p. 189). The goal was to determine if the feedback mechanism was understandable and satisfactory for the user group: Due to the nature of our users, we chose not to use a scale to measure this, but instead ask *yes/no* type questions.

Prerequisites

- Paper with the three feedback-mechanisms printed (cat, smiley and thumbs).
- Tablet (iPad) with access to the Internet.
- Tester and observer with basic knowledge of behavioural patterns of people with ACI.
- Interview guidelines.

Execution

The procedure itself was divided into four parts:

1. Introduction of interviewer, observer and task.
2. Subjects choose the feedback type (smiley, cat, or thumb) from paper printouts.
3. Using the device, the patient chooses food items out from five randomized alternatives. When the patient was done, s/he tapped the "receive feedback" button, and received feedback.
4. These questions were asked post-test to assess the subjective user's satisfaction:
   a) Did you understand the feedback?
   b) Did you like the feedback?
   c) Would you be interested in using this application?
   d) Would you use the graphs or not?

4.5 Empirical findings

4.5.1 Exploratory test

As expected, the users proved to be of varying cognitive capabilities. The result was mostly measured by observing the users through qualitative measures; e.g., general satisfaction and concept comprehension, and by evaluating the user's experience against Nielsen's heuristics (2014).

What worked well:

- The feedback mechanisms were well understood by all users.
- The thumb and the cat were equally appreciated (two users preferred the cat, the remaining preferred the thumb).
- The thumb was appreciated among the users because of its familiarity and semiotic representation. It was also relatable to e.g. "*liking"* on Facebook.
- The cat was appreciated for its emotional representation of happy or sad, and was referred to as "cute" by one of the users.

Suggestions to improvement:

- Although feedback was comprehended, the thumbs down were interpreted as "too strong" due to its, red colour. An alternative could be to use a softer shade of red, or orange.
- Even though feedback was well perceived, it was, however, clear that there is a need for tailoring feedback to particular users.
- One user suggested using smiley faces as an additional feedback mechanism, as he thought this was just as relatable as the thumb.
- There was a need for more detailed feedback for some users. One user even suggested a new type of combination graph, showing a total overview.

Our exploratory pilot test session was purposefully simplified to ensure that all the users would comprehend the session. However, it was concluded that it was oversimplified, and that the users were more capable than initially expected.

4.5.2 Summative evaluation

Some patients had problems reading the text on the "feedback"-button, and the graph-button was considered to have too low visibility. Some participants have physical impairments that makes tapping inaccurate. The result of this is that the touch-screen will "scroll" a little instead of register the action as a "tap". This is easily solved as newer devices have better accessibility settings that will handle this, than the device we had available.

A. **Did you understand the feedback?** The patient chose the feedback system was entirely subjective. However it was clear that all feedback systems were well understood.
B. **Did you like the feedback?** All participants liked the feedback mechanism of their choice.
C. **Would you be interested in using this application?** Most patients were sceptical if they would have used the application themselves, but would be very interested if they had to dramatically change their diet (on doctors orders), to use it as a way of keeping track of their habits.

D. **Would you use the graphs?** All of the four participants wanted to use the graphs, but wanted the button to show the graph to be more visible.

The testing confirmed that what we learned from the pilot test was valuable: The feedback we received from the patients at Sunnaas at our second user test, was similar to the feedback from the explorative test. Some important matters this time were that the calculations did not give the participants the correct feedback based on their choices (they mostly got negative feedback, even after choosing a banana and a glass of water). We also received a comment that perhaps a feedback system á la “Tamagotchi” might make the application more “alive”.

We also got a comment from personnel that they would use the application to cause less paperwork, but at the same time, there would be concerns about the privacy.

5 Ethical considerations

Working in a hospital environment, there is a number of formalities that needs to be addressed. In our case, the following forms were signed (see Appendix 2).

- “Samtykkeerklæring”: consent form for the patients.
- “Egenerklæring kontroll av tuberkolose og MRSA”: declaration about exposure to tuberculosis and MRSA.
- “Taushetserklæring”: declaration of confidentiality.
- “Avtale om bruk og utnyttelse av prosjektoppgave”: agreement on use of project research and artefact.

5.1 Protecting participants: privacy and confidentiality

Every project that involves user testing needs to protect the participants by ensuring responsible research guidelines and ethical codes are followed. The participants health, safety and rights must be safeguarded; and just as important, avoid emotional distress (Lazar et al. 2010, p. 376-377). It was very important to us that the testing did not distress the patient by either demanding too much time, mental strain or creating confusion in an already vulnerable individual. It is important to inform and assure participants and their guardians that privacy will be protected and that to participate is entirely voluntary, and that they can choose to stop at any point. If the patient shows any confusion or seems uncomfortable, we would deem it unethical to start/continue the testing.

The nature of our application requires no storage of private information, we have no documents that contain sensitive information. No photography, audio or video recordings were used. However, we might in fact end up knowing things about the patients that we *should* not know, that we do not *want* to know. Recording or using this in any way, however innocent it may seem, is absolutely a breach of ethical guidelines, etiquette and should in no way be done (van der Velden, November 5, 2014).

5.2 Informed consent

Informed means that it must be clear that the participants understand what the aim of the research is for, how it will be conducted, what risks (if any) and how they can obtain more information about the study. *Consent* contains the ethical objects of reassuring the participants that there will be no repercussions or retaliation from caretakers, teachers, bosses, or the denial of access to resources as a result of the research (Lazar et al. 2010, p. 381). The basis for informed consent comes from the (U.S.) National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research called the Belmont report. This establishes the three principles regarding working with human subjects:

- **Respect for persons** – the subject are free to make their own decisions regarding their participation. Participants can leave at their will, without providing reason. Researchers must provide the information needed, so the participants can exercise this right.
- **Beneficence** – means that the aim of minimising harm and maximising potential benefits.
- **Justice –** *“the burden of participating in research, nor the benefits of the research should be limited to certain populations, particularly when some groups of people may be easily manipulated”* (Lazar et al. 2010, p. 379).

Working with people with cognitive impairment, it is difficult to assess whether the participants understand the consent forms they sign, whether the user testing may be too taxing, whether our demands on the individual is unreasonable. The consent form was specifically designed for the target group, and was carefully constructed with a final acceptance from the staff. It is very much an ethical issue to figure out:

- if they truly understand what we are asking them to do.
- if, when signing the consent form, they really understand what they are agreeing to.
- if, when the testing takes place, they remember that they have agreed.
- if the patient seems stressed or uncomfortable, when do we abort procedures?

Beyond considering these questions, we had to trust in the judgement of the staff, and our own judgement while conducting the testing: all team members involved in the testing was aware of this responsibility.

6 Discussion and analysis

6.1 Collaboration with Sunnaas

"Coming together is a beginning. Keeping together is progress. Working together is a success" (Lowdermilk 2013, p. 15)

In this project we have collaborated with a variety of personnel from Sunnaas hospital, and it was essential to ensure proper and relevant communication and information exchange. Speaking a common language was challenging at first, as it involved a lot of new terminology for both parties. We had to provide guidance as to what information was relevant to us, and what was possible for us to deliver with such a limited timeframe. Spending more time to bridge the "language" gap would be important if we were to do such a collaboration project again considering the significant difference between professional IT and healthcare language.

6.2 Design process

Due to Sunnaas' requirements expecting an application as a deliverable, we decided to start development of the high-fidelity prototype early in the design process. In hindsight, sticking to a low-fidelity prototyping for longer would have promoted divergence and provided more flexibility in regards to change following the early user testing (see chapter *Exploratory user test*).

Due to the separation of responsibilities between the two student groups (i.e. us focusing on the *feedback* aspect, while the other group (MARTIN) focusing on *meal composition*), we were faced with providing feedback without any content. This meant that we essentially had to implement large parts of the functionality assigned to MARTIN. It is clear that a closer collaboration would have been beneficial.

6.3 Methods and data collection

Ideally, both our user testing and data collection methods would have involved more users, and users in a wider spectrum of ACI. However, considering the time and resource constraint, we believe our approach and methods was the best suited under the circumstances. Clearly, our understanding of the ailments of the patients increased, though working with ACI patients is undoubtedly a specialisation that requires a great amount of dedication and time.

In regards to usability testing, the project time-frame did not allow for enough time to do *longitudinal* validation testing (Lazar et al. 2010 p. 388) to confirm whether the users were motivated in the long run.

6.4 Team collaboration and work process

In order to ensure an optimal work flow, and to cover all areas, we defined our roles by specialisation early in the process. We also set up weekly meetings both with our student advisor, and among ourselves, to follow up and plan ahead (see *figure 15*), and used a Gantt chart to manage task flow and dependencies (see *figure 16*).

Figure 15 Meeting calendar

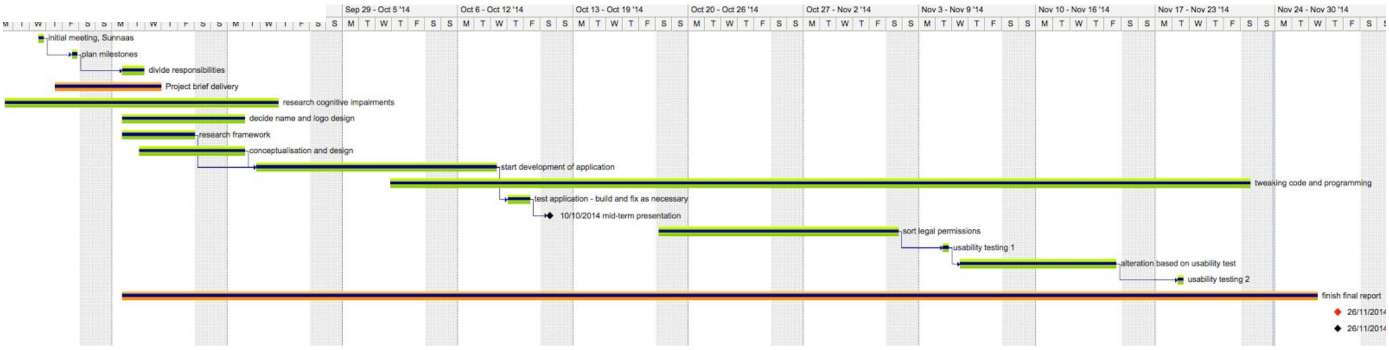

Figure 16 Gantt chart

6.5 NAM as a web application

Our reason for choosing to develop an application based on web development languages, was that it creates an opportunity to run the application on any device that has a web browser, opposed to native applications. These languages also have the flexibility to cater for users with disabilities. With this flexibility, also comes an ethical responsibility to develop web applications that are *accessible* - the *UN Convention on the Rights of Persons with Disabilities* recognises access to the web as a basic human right (Henry & McGee, 2013). This was particularly relevant for us when developing the application, as we wanted the application to be accessible to as many of the users as possible by designing and developing solutions that catered for ACI.

6.6 Sustainability

It was established in the first meeting with Sunnaas that there was interest in carrying on development of the application once the academic aspect of the project was complete. During development of the application, we paid close attention to picking web language frameworks that were both well documented and tested, promoting sustainability, longevity, and maintainability. The JavaScript frameworks are free to use for academic or non-commercial applications and are licenced under various open-source initiatives, e.g. The MIT Licence (Opensource.org, 2014). If this application was to be evaluated to be used as a commercial application, some licensing fees would apply.

7 Conclusion

“How can users with acquired cognitive impairments be empowered to take a participatory role in a relation to their own diets?”

By providing users a tool for informative feedback in response to their dietary choices, we presented an opportunity for them to have a *participatory* role and empowerment in following their personal nutritional recommendations. Previously, nutritional recommendations has been printed on paper, and not accessible to the patients on a daily basis. Through gamification the ordinary users can feel motivated to make good choices, but coupled with engagement in using the application they transition towards "enjoyers".

“How should feedback on their decisions be presented?”

The user-testing showed that there is a need to tailor feedback to different users: ACI impacts users differently, and their requirements vary. As the cognitive capacity of the individual increases, the feedback system can get gradually more complex in correspondence to the user’s cognitive comprehension, and function as an additional motivational factor.

Through iterative practice, we discovered that we needed to create both simpler and more complex feedback systems, because of ACI's different impact on different users. This supports Lazar et al. argument that most impairments are not binary (2010, p. 412). Based on the preliminary information about the patients received from the staff there seems to have been a significant discrepancy between the literature received regarding patients' abilities, and the users we were assigned. The iteration process of designing and developing the application then went from (over)simplified to slightly more complex, all the way to give patient easy access to multidimensional data visualisations.

Our studies show that users *can* be empowered to take a participatory role if they are provided with the tools tailored to their specific cognitive ability. The four feedback mechanism we developed, listed in increasing complexity, are:

Thumbs – have a binary feedback model; thumbs up or down.
Cat –the cat has three states; ecstatic, happy and sad.
Smiley –have a five-tiered scale.
Graphs - represent direct data visualisation; the most complex form of feedback.

Due to the time limitation of the projects, we did not have time to do validation testing to measure long-term motivation intended by the gamification aspect. Our choice of using qualitative methods for data gathering were sufficient considering our resource constraints, but in order to get more rigorous results, quantitative methods should be applied to a bigger sample size.

7.1 Scope for further development

This project can be expanded significantly. Interesting directions to explore would how to make this a tool for non-cognitively impaired people and health workers. This would entail an analysis of security issues and methods. For example could this be seen as something that could be integrated into DIPS[3] and then be an important statistics collecting and educational tool.

We also see that this project has potential as a tool for the general public: to our knowledge there is no similar application with weight on feedback from very simple to complex with a focus on the fundamentally *positive*. It could be a general educational tool both for institutions and private use. One of our focus areas have been on feedback that are not moralistic and finger-pointing, and could conceivably be of interest to people who pay little attention to their nutrition.

Due to the time limitations of the project, not all aspects of universal design were considered during development (e.g. accessibility for the blind or deaf). In order to cater to the general public, considerations must be made in terms of these aspects.

7.1.1 Integration with Sunnaas group 2

Because there was a separation of concerns between the groups in regards to functionality; group 2 focusing on *content* (i.e. composing meals), our group focusing on *feedback*, the groups decided to agree on a data format based on JSON, JavaScript Object Notation (Json.org, 2014).

7.1.2 Gamification

The following aspects of gamifications were not implemented during the project, but could be part of further development:

A leaderboard is a ranking system that serves the purpose of a simple comparison (Zichermann & Cunningham 2011. p. 50). We recommend to use a socially incentive, which always place user in the middle of a better and lower scores, so that they don't get discouraged by people ranked higher than they are, and focus instead on improving their own score. Also the leaderboard has to be sensitive to a private information, so it can focus for example on who used the application the most during the last month, and can act as an additional motivational factor.

Badges can act both as levels and as progress markers to convey progress to mastery and to create sense of surprise or delight in users (Zichermann & Cunningham 2011. p. 57).

[3] DIPS is the electronic system for health information, such as patients journals and health-administrative solutions in use in Norway: http://no.wikipedia.org/wiki/DIPS

Redeemable points are points earned by closely following recommended nutrition that can be redeemed and used for e.g. prizes, or customisation like a special background in the application. By using redeemable points, a user will feel the achievement by earning such points and may be motivated to make healthier choices.

8 Final remark

Working with people with severe cognitive impairments is easily a lifetime commitment, and from our limited insight into it; an under-researched area. The unique experience we gained through this project have a great potential for making us better HCI designers.

The NAM application is, as of 25th of November, 2014, hosted on http://nam.azurewebsites.net.

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11 Appendices

11.1 Appendix 1: requirement specification from Sunnaas

Kravspesifikasjon: Ernæringsapp for pasienter med kognitive vansker

Beskrivelse av løsningen

Løsningen ("appen") skal gi brukeren mulighet til å velge matvarer fra en liste/oversikt og kombinere disse til et måltid. Når en matvare legges til måltidet, skal appen vise hvor mye av dagsbehovet til brukeren de enkelte næringsstoffene (inkludert kcal) i matvaren utgjør. Den skal indikere hvilke næringsstoffer måltidet - kombinert med tidligere måltider den dagen - brukeren får i seg for lite av, og hvilken han/hun får i seg for mye av. Det skal være en funksjon/knapp som lar brukeren fortelle appen at måltidet er spist. Dette skal trigge et belønningssystem, som på en underholdende måte gir brukeren en tilbakemelding på i hvilken grad brukeren har vært "flink" og fulgt kostholdsplanen. Dette skal fungere som et slags belønningssystem, og skal virke motiverende for bruk av appen. Næringsverdien i hver matvare hentes fra en tabell som ligger inne i app'en. Hvor mye av hvert enkelt næringsstoff som er anbefalt for brukeren legges inn i en fil på enheten (f.eks. i et minnekort på et nettbrett), og appen leser informasjonen fra denne filen. En logg over brukerens matinntak skrives til fil, som kan hentes ut av helsepersonell for videre analyse. Appens brukergrensesnitt skal være utformet for brukere med alvorlige kognitive vansker. Dette innebærer at hele grensesnittdesignet må utformes i etter retningslinjer fra kvalifisert klinisk personell på Sunnaas.

Inndata/utdata

Appen skal lese en datafil med verdier spesifikt for brukeren (brukerverdier). Denne har følgende verdier:
- Anbefalte minimums- og maksimumverdier for næringsstoffer for bruker:

Se matvaretabellen http://matvaretabellen.no/
OG Anbefalinger om kosthold og ernæring og fysisk aktivitet
http://www.helsedirektoratet.no/publikasjoner/anbefalinger-om-kosthold-ernering-og-fysisk-aktivitet/Publikasjoner/anbefalinger-om-kosthold-ernering-og-fysisk-aktivitet.pdf
Her finnes spesifikke og generelle anbefalte verdier for daglig inntak av alle næringsstoffer til befolkningen, delt inn etter alder- kjønn og livssituasjon.
Appen tar utgangspunkt i disse generelle anbefalingene, men har muligheter for å legge inn faktorer som påvirker næringsstoffbehovet (større eller mindre behov).
- ID-nr (se Personvernkrav)

Appen skal skrive en loggfil som viser alle måltider bruker har spist, på formatet:

```
<ID-nr>
Måltid: <Dato><tid>
<ingerdiens 1><mengde><kcal><næringsstoffer...>
<ingerdiens 1><mengde><kcal><næringsstoffer...>
<...>
Måltid: <Dato><tid>
<ingerdiens 1><mengde><kcal><næringsstoffer...>
<ingerdiens 1><mengde><kcal><næringsstoffer...>
<...>
```

Tekniske krav

- Løsningen i denne spesifikasjonen er for aktivt innhold som startes av en annen app, og kan kjøres på Android, iOS og web.
- Løsningen skal tilpasses bruk på nettbrett med 8" skjerm, men skal også kunne brukes på skjermer fra 4" og oppover.

Personvernkrav

Før enheten med appen gis til brukeren, skal helsepersonell legge inn en brukerverdifil, med et identifikasjonsnr. Dette nummeret er et helt anonymt løpenummer, som ikke på noen måte skal kunne knyttes til brukerens egentlige identitet. I bruk inneholder derfor ikke appen noen måte å identifisere brukeren på. Først etter enheten leveres tilbake, når data fra logg hentes ut og legges inn i pasientbehandlingssystem av helsepersonell, vil det foretas en knytning av data mot brukererens identitet.

11.2 Appendix 2: Formalities and consent forms

Sunnaas sykehus HF

Egenerklæring - kontroll av tuberkulose og MRSA

Skjema fylles ut og returneres sammen med eventuell dokumentasjon til Felles dokumentsenter – gjerne pr epost firmapost@sunnaas.no Felles dokumentsenter sender det videre til personalleder og bedriftslege <u>for første arbeidsdag/første dag for gjeninntreden.</u>

Navn	[redacted]	Fødselsnummer	[redacted]
Adresse privat	[redacted]	Telefon dagtid	[redacted]
Stilling		Første arbeidsdag	
Avdeling/team			

Tuberkulosekontroll

1. Er du BCG vaksinert?	Ja ☒	Nei ☐	
2. Har du i løpet av de siste tre år oppholdt deg > 3 måneder i følgende land: **Europa:** Bosnia-Hercegovina, Grønland, Kosovo, Romania og alle land i det tidligere Sovjetunionen: Armenia, Aserbajdsjan, Estland, Hviterussland, Georgia, Kasakhstan, Kirgisistan, Latvia, Litauen, Moldova, Russland, Tadsjikistan, Turkmenistan, Ukraina og Usbekistan. **Amerika:** Belize, Bolivia, Brasil, Den dominikanske republikk, Ecuador, Guatemala, Guyana, Haiti, Honduras og Nicaragua. **Oceania:** Marshalløyene, Guam, Kiribati, Marianaøyene, Mikronesia, Niue, Palau, Papua Ny-Guinea, Salomonøyene, Tuvalu og Vanuatu. **Asia:** Midtøsten: Irak og Jemen. Øvrige Asia: alle land *unntatt* Japan, Singapore og Maldivene. **Afrika:** Alle land *unntatt* Mauritius, Komorene og Seychellene.	Ja ☐	Nei ☒	Hvis ja – når?
3. Har du vært utsatt for kjent/mulig tuberkulos smitte i inn eller utland, privat eller i arbeid de siste 2 år?	Ja ☐	Nei ☒	

<u>Dersom du svarer *ja* på noen av punktene 2 – 3</u> har du, i henhold til Tuberkuloseforskriften § 3 – 1 andre ledd, plikt til å gjennomgå Mantoux test og røntgenundersøkelse av lungene *før* du begynner å arbeide ved Sunnaas sykehus HF. Mantoux test bør tas 8 – 10 uker etter siste mulige eksponering, dette kan i noen tilfeller medføre at denne testen må tas etter første arbeidsdag. Røntgen us. må likevel være klar for første arbeidsdag. Er du kontrollert for disse forholdene, legg ved dokumentasjon. Ta kontakt med bedriftslege hvis du må gjennomføre tuberkulosekontroll.

MRSA- kontroll (meticillinresistente gule stafylokokker)

1. Har du i løpet av de siste *12 månedene*		
a) Vært i kontakt med helsevesenet/tannhelsetjenesten utenfor Norden?	Ja ☐	Nei ☒
b) Vært innlagt eller fått *omfattende** undersøkelse/behandling i helseinstitusjon/helsetjeneste i land utenfor Norden?	Ja ☐	Nei ☒
c) Arbeidet/oppholdt deg i flyktningleir, barnehjem eller katastrofeområde m. økt MRSA risiko?	Ja ☐	Nei ☒
d) Undersøkt/behandlet/stelt/bodd sammen med pasienter/personer med MRSA uten at beskyttelsesutstyr er anvendt?	Ja ☐	Nei ☒
e) Oppholdt deg mer enn 6 uker sammenhengende utenfor Norden?	Ja ☐	Nei ☒
f) Blitt tatovert/fått piercing i land utenfor Norden?	Ja ☐	Nei ☒
2. Har du tidligere hatt infeksjon med eller vært kolonisert med MRSA og ikke blitt erklært smittefri?	Ja ☐	Nei ☒

**Omfattende:* Flere timers undersøkelse/behandling med sting, stell av større sår og bruk av fremmedlegemer

<u>Dersom du har svart *ja* på noen av disse spørsmålene</u>, må du i henhold til sykehusets retningslinjer ta en bakteriologisk prøve for MRSA fra *nese, svelg og evt. sår/eksem.* Prøvesvar skal foreligge *før* du begynner å arbeide ved Sunnaas sykehus HF og skal forelegges leder. Prøven må tas i Norge. Du kan ta prøven hos din fastlege og legge ved dokumentasjon på dette. Arbeidsgiver dekker utgifter til undersøkelsen.

Har du blitt ufrivillig (altså ikke planlagt) eksponert for MRSA på reise i utlandet mens du arbeider på Sunnaas, kontakt hygienesykepleier for hvordan du videre skal gå fram før retur til arbeid. Negativt funn av MRSA må foreligge før retur til arbeid. Nærmeste leder skal kjenne til hva ansatte som er eksponert skal gjøre.
Spørsmål? bedriftslege: tlf: 66 96 91 89/48 21 78 18 eller hygienesykepleier Birgithe Teige tlf 90 26 08 63

Signatur arbeidstaker [redacted], dato: 17 10 2014

Samtykkeerklæring

Målet med dette:
Vi er studenter. Dette er en uttesting. Du har fått hjerneslag. En del av hjernen er skadet. Mye er blitt vanskelig nå. Mye er vanskeligere å få til i hverdagen.

Hva skal vi teste:
Prosjektet skal lage en nettside. Nettsiden skal brukes av deg som pasient på Sunnaas. Nettsiden skal hjelpe deg når du velger mat.

Hva skal du gjøre:
Vi skal nå vise deg noen bilder. Vi vil også at du trykker på en skjerm. For å se om du kan bruke nettsiden. Du kommer ikke til å gjøre feil.

Frivillig deltakelse:
Du kan velge om du vil være med. Vil du ikke mer, si det. Vi noterer det vi ser. Vi skriver ikke hvem du er. Du bestemmer over alt selv.

Når alt dette er ferdig, vil jeg skrive om det i fag-blader som andre kan lese. Jeg vil også holde foredrag om det så andre fagfolk kan lære.

Vil du være med? Skriv navnet ditt her:

Sted og dato ____________ Signatur ______________________________

Hvem er vi:
Vi er en studentgruppe i kurset *inf4060 – interaksjonsdesign* ved Institutt for informatikk, Universitetet i Oslo. Kursleder er Alma Kulén, epost almira@ifi.uio.no tlf. 2285 2494.

Prosjektgruppen består av:
Robin Pettersen,
Bente Halvorsen,
Alicia Odincova,
Ina Wangen,
Jon-Robert Skårberg,
Ying Li,
Linett Simonsen og
Ingvild Eide

Sunnaas sykehus HF

TAUSHETSERKLÆRING

(Original sendes HR-enheten)

Taushetserklæring gjelder for alle ansatte ved sykehuset, herunder fastansatte, vikarer, ansatte i engasjement, deltidsansatte, ekstravakter etc. For øvrig skal også studenter, praktikanter, hospitanter og andre personer sykehuset ikke har arbeidsgiveransvar for (eksempel konsulenter), undertegne et eksemplar av taushetserklæring, dette skal beholdes i gjeldende avdeling.

I henhold til Lov om spesialisthelsetjenesten m.m av 2. juli 1999 nr. 61 § 7-1 , har enhver som utfører tjeneste eller arbeid for helseinstitusjon som omfattes av loven, taushetsplikt etter forvaltningsloven §§ 13 til 13e.
For øvrig gjelder for alt helsepersonell, jfr. § 3 i Lov om helsepersonell 1999-07-02 nr.64, taushetsplikt og opplysningsrett i henhold til samme lovs kap.5. §§ 21-29.

Videre binder en seg til den taushets- og lojalitetsplikt som følger av ansettelsesforholdet, reglene for behandling av fortrolige saker i Helseforetaket og de til enhver tid fastsatte retningslinjer innefor offentlighetslovens grenser. Det understrekes at taushetsplikten også gjelder etter at en har sluttet i tjeneste. Brudd på taushetsplikten kan rammes av vanlige disiplinærforføyninger, og vil således kunne få konsekvenser for ansettelsesforholdet. Brudd på taushetsplikten vil dessuten kunne medføre straffeansvar, jf. straffeloven § 121 som lyder slik:
"Den som forsettlig eller grovt uaktsomt krenker taushetsplikt som i henhold til lovbestemmelse eller gyldig instruks følger av hans tjeneste eller arbeid for statlig eller kommunalt organ, straffes med bøter eller fengsel inntil 6 måneder. Begår han taushetsbrudd i den hensikt å tilvende seg eller andre en uberettiget vinning eller utnytter han i slik hensikt på annen måte opplysninger som er belagt med taushetsplikt, kan fengsel inntil 3 år anvendes. Denne bestemmelsen rammer også taushetsbrudd m.m. etter at vedkommende har avsluttet tjenesten eller arbeidet".

Undertegnende erklærer herved å ha blitt gjort kjent med og ha forstått innholdet i den taushetsplikt som påhviler meg ved å arbeide ved Sunnaas sykehus HF.

Sunnaas sykehus HF, den ..17./10..2014...

Arbeidstakers underskrift

Arb.takers underskrift m/trykte bokstaver

Fødselsnr. (11 siffer):

....
Team/avdeling

Postadresse: 1450 Nesoddtangen	Telefon: 66 96 90 00 Telefaks: 66 91 25 76 Besøksadresse: Bjørnemyrveien 11, 1450 Nesoddtangen Hovedsider i ...	E-post: firmapost@sunnaas.no Bankkonto: 1503.27.18144 Foretaksnr.: 883 971 752	HELSE SØR-ØST

Thanks to: Sonja Erlenkamp, Hani Murad, Hanne Bjørg Slettahjell, Hilde Bergersen, Bjørn Kleven, Dr. Nielsen