

ATTACHMENT 2

Health care services track

Perspectives and scenarios for mHealth

This document presents some examples of perspectives and user scenarios using mobile solutions (mHealth) in connection with prevention of NCDs and support when living with NCDs. An mHealth solution is successful if the users experience a better quality of life **and** the supplier is able to build a healthy business, stay long in the market and leverage the experience and knowledge to continuously develop more and better services.

The perspective analysis is meant to provide overview, while the user scenarios provide realistic day to day settings for how mHealth is visualised to function. Hence, the user scenarios will identify and work with real-life dilemmas in single use cases, while the perspective analysis will have a holistic approach and extract general principles from the user scenarios to pave the way for policy and strategy creation.

The project will work with the following perspectives

- **The user perspective.** A group of users often needs a portfolio of different solutions from different suppliers to satisfy their needs
- **The health care professional perspective.** Health care professionals need methods, guidelines and evidence based reasoning for adopting new tools.
- **The health care institution perspective.** The institutions the health care professionals represent have responsibilities and requirements that need to be met.
- **The solution provider perspective.** suppliers need to reach as many as possible users/usergroups/markets with their solution to manage positive cash flow. In this perspective it is important to look at this market from both sides, both from the users and from the suppliers.
- **The government perspective.** The government creates policies, regulates, finances, provides methodology and guidelines, follow up on compliance and deliver national infrastructure-

In this document we have described some possible scenarios seen from the user perspective and from the supplier perspective. These are to be seen as examples of how the project itself will approach the task.

The Norwegian strategy for NCDs addresses four key areas for reducing deaths, secondary health problems, reduced quality of life, and costs of care:

- Primary prevention: Prevent healthy people from getting sick by reducing risk factors
- Secondary prevention: Prevent people who are sick from getting secondary complications and health problems
- Earlier diagnosis: Too many people with NCDs are discovered too late, i.e. they have already contracted secondary health problems
- Improve treatment and care for people who have an NCD

Challenges and motivation for use of mHealth:

- Increase in NCDs due to increased life time expectancy
- More people will live with complex co-morbidities, even several NCDs
- Changes in demography shifts the proportion of the population who are “elderly” compared to the number of people in productive age groups. I.e. fewer hands available for providing health and care services
- mHealth can provide improved tools for self-management, reducing the need for interaction with healthcare and/or improved management of their NCD and/or lifestyle

- mHealth can provide more efficient ways of collaboration and coordination of services
- mHealth can provide mechanisms for motivation and support of a more healthy lifestyle - thus reducing risk
- mHealth can provide health research with new understanding of individual health risks, as well as group-level health risks, through individually, continuous collection of health-related data
- mHealth can support novel models of patient-centered care, such as the Chronic Care Model that emphasises the active and participating patient and informed and pro-active health teams
- mHealth poses particular challenges in terms of privacy and security, as well as safety. Health data stored on the device must be safeguarded in case of theft of the device, while communication of data to a repository for data information or directly to a health service provider requires trust in the communication, the way that data is stored, accessed and used
- Data collected on an mHealth device can amount to huge numbers of data with little or no relevance to the medical problem the health professional is addressing. Turning large volumes of data into relevant and useful information is a challenge
- Business models for apps is sometimes in conflict with promotion of safe, persistent and transparent management of personal information

Scenarios

Key words

Health topics: Smoking cessation, information about risks related smoking; Obesity; promoting physical activity; Primary prevention - assisting healthy people in reducing risk of NCD

Models of organising healthy lifestyle promotion: personal initiatives; employer initiated; insurance incentives;

Scenario 1: Prevention obesity

Harald, 47 years, computer engineer working for a small company developing controller systems for off-shore installations - Harald is valuable for his company IP-value. Harald is overweight, and has never been physically active in any sports, he smokes, but wants to quit. Likes to take photos on his spare time, but is otherwise a workaholic. Harald is married to Lisa (39).

Harald and Lisa have started to talk about Harald's health and that he needs to get control of his weight and start leading a more healthy lifestyle. Harald's workplace is also worried that Harald, who is a valuable asset for the company, is reaching an age where his health might become an issue and risk for the future of the company.

Lisa has been using mHealth tools for her own motivation to be physically active and wants Harald to take a look at some of the step counters and they discuss what could motivate him to become more active.

Harald's boss has started working out an agreement with one of the local gyms to create a program with personal trainers for her employees. She knows that it will be difficult to get Harald and some of the other colleagues to go to a gym, but she hopes that the personal trainer can use mHealth to provide individual encouragement and advice to each of the participants of the program. She wants to make sure that the personal trainers get involved in a long-term follow up of each of the participants in the program. She is also considering changing the strategy for bonuses and incentives to award those who join and adhere to the program. She is convinced that this will be an important long-term investment in the people working in her company, and reducing the risk of health problems among her staff and increase productivity.

Over the next few months Harald takes a real change in his lifestyle by cutting out cigarets, taking short walks in the morning and afternoon, and even takes a few rounds around the campus where his company is located, especially on days when he knows he will be working long days. These walks have motivated him to take his exercise up one step and he now has a plan to extend his afternoon walks by 50 meters every day. For a while he also used a diet diary. This thought him to become more aware of what kind of food he eats. He has reduced his intake of sugar and tries to avoid sweetened soda drinks all together. His wife notices how much more energy Harald has, even in the weeks with a lot of work, and she has booked a trip to a mountain lodge where they can take walks in the mountain and Harald can shoot some nice nature photos.

Harald's employer has seen how Harald has influenced some of his colleagues as well to become more active. While it has resulted in a couple of sick leaves when some of them decided to start playing football again, she notices how the atmosphere at work has improved and that there is a new kind of team spirit at work.

Scenario 2: Secondary prevention diabetes

Amelia is 19 years, single, student at the university. Two years ago she was diagnosed with type 1, insulin dependent diabetes. Over the two years she has struggled with managing her diabetes and has had some episodes where her flat mate has saved her life. Amelia has had a long talk with her physician, who recommends that she considers using two apps and services to help her get more control of her diabetes. The long term effect of not controlling her diabetes is increased risk of contracting heart and kidney problems, blindness, and other serious conditions.

The first app Amelia is considering is the DiabetesGuard that provides services in case she is in need of assistance. After talking with her flat-mate and thinking about the two incidences, Amelia decides to join the service.

The second app Amelia considers is the Diabetes Diary. The Diabetes Diary is also integrated with a cool smart watch to make the registering of data easier and more discrete. Amelia has been interested in these new smart watches anyhow, so she really likes the concept.

Two months later Amelia is visiting her physician again. This time she has brought her apps and is eager to show and discuss the data with her physician. The data is transferred to her EHR and then automatically analysed and a summary is presented to the physician. Amelia explains how the Diary analysed her data and showed her that she had consistent problems with regulating her blood glucose on Fridays and on Mondays. On Fridays she would often hang out with her friends and get to bed too late and not eat enough for the night, meaning that she would have an extremely low blood glucose value on Saturday morning. Mondays were a bit harder to explain, but discussing with her physician, and looking at her data more closely, she realised that she might not be taking the right dose of insulin after visiting the gym on Mondays and drinking sports drinks. Amelia showed how the fluctuations in her blood glucose values had decreased and that she now had far fewer blood glucose values above or below the recommended range. She showed her physician how using the smart watch for entering data was making it faster and easier to actually record her diet and insulin use. She also liked the fact that the watch would discretely remind her to check her blood glucose within 90 minutes after she had recorded a meal, something she had previously sometimes forgotten.

Amelia's physician was pleased with the data that Amelia presented and could inform Amelia that her long-term blood glucose values had indeed improved, and that would have an impact on Amelia's risk of contracting other health problems as a result of her diabetes.

Scenario 3: Earlier detection of NCD , cancer

Johan is 53 years, married and has two teenage daughters. Johan owns a bar and a restaurant. One morning his wife, Lisa, commented one day that Johan had a strange mole on his back that she had not noticed before, and asked Johan to consider to make an appointment with his GP. Johan just shrugged his shoulders and said he had several moles and was not convinced that his wife actually had made a mental note of his moles.

One of Johan's employees is a young computer science student called Fredrik. As Fredrik and Johan was preparing the bar before opening, Johan made a joke about his wife's comments. Fredrik told Johan that this was serious stuff. Malignant moles can be one of the most dangerous types of cancer! However, Fredrik had read about this app that could be used to take a photo of the mole and analyse it. That way John could calm his wife for less than 40 US\$. Johan was unsure about having photos of his hairy and mole ridden back being put out on the Intraweb, as he called it, but Fredrik was convinced that the security was good. He had just read a paper on privacy in health apps and this particular app was mentioned as having a really convincing privacy policy and mechanisms for securing information that was connected to the Norwegian Health Net. Fredrik downloaded the app for Johan and installed it on his smartphone. The app used the camera of the phone to take a picture. The app provides two services: the first is a low-cost service where an image can be sent to a server that analyses it and provide an initial advice on what to do, and highlights areas of interest in the image.

The second level of services involves paying a fee of US\$40 to get the image analysed by a specialist. John went home that day and showed the app to his wife, who immediately told him to test the service. She followed the instructions on the screen and got a few images of John's back and the mole. Before sending the image, John was asked to fill in a form about his health and provide contact information for his GP, and also answer how he would prefer the feedback in case of a positive find of malignant moles. John crossed out that he would like to get the result directly to him, but with a copy to his GP. The next day he got a reply from the service. There was a high probability that his mole was indeed a malignant mole with a high risk of cancer. He was also informed that the results had been sent to his GP and that he should get an appointment as soon as possible, because early intervention was important for reducing risks.

Scenario 4: Improved care, multiple diagnosis (COPD, diabetes type2, heart condition)

Maria is 63 years, widow, lives alone in her flat. She has a son and daughter that lives within an hour's drive from her place. Maria has COPD, diabetes type 2, and a heart condition.

Maria's GP is Anders. Anders has been working together with the local university hospital to develop a model for stepped care for Maria. The health and care services make up a virtual team where Maria and the GP are the coordinators.

Maria and her GP have discussed what goals are important to Maria, and these have been transformed into the stepped care plan.

Maria's main priority was to be able to spend more time with her great granddaughter and be able to share time and experiences with her. To do this she has to work on her physical condition, and work on her fear of heart attack. This requires that she improves her control over the diabetes, as that is putting a load on her heart condition.

By defining goals that are relevant and important to Maria, the GP has been able to place the life style changes and self management that Maria has to do into a context that really motivates Maria. Anders has worked closely with the physiotherapist and psychological services in the municipality to create a program for Maria to achieve her goals.

Maria now has a treadmill at her home, with an mHealth solution that allows her to get advice and support from her physiotherapist while she is doing her exercises. She can measure her oxygen saturation and pulse whenever she wants to and the data is immediately sent to a call centre operated by trained nurses. The call centre receives a status indicator symbolising Maria's health condition on their monitor where several patients' status can be displayed. If there is a yellow or red indication, they can proactively contact Maria to check up on her. This makes Maria feel a lot safer.

The same indicator is made available in an app used by Maria's son and daughter, as well as a couple of friends that Maria trusts. With this service, Maria feels that she is no longer as worried and anxious as previously.

One day Maria falls and is knocked unconscious. Her fall-alarm is triggered automatically based on input from an activity sensor in her belt that triggers a house radar that scans for her location, and concludes that she is not in a normal position according to analysis of her pattern of her normal activities. The red alarm is signaled to the call centre and to her next of kin and friends. Her son attempts to call his mother. The call centre can see a log of what actions her trusted alarm receivers do, and knows that this is a situation where an emergency team is dispatched immediately. Before the emergency team is dispatched, they get a call from the neighbor, who was notified by her app, saying that she is now with Maria. The emergency team is called off and the call centre has a dialogue with the neighbor and Maria's son who arrives a little later. A home care nurse swings by and makes sure that Maria does not need to go to a hospital or in need of any other immediate health services. They agree about a plan to have someone stay with Maria at all times the next two days, just to make sure that she recovers and that she has not sustained any more serious injuries.

After this incident, the virtual team is notified by the incident and they use this to adjust their activities (the physiotherapist cancels her appointment with Maria for her next day training) and plans. A cognitive test is ordered and Maria is automatically assigned an appointment with her GP. The records from her diabetes diary is studied and the cause of the fall is assumed to be related to her blood sugar levels. When Maria is back on her feet again, she and her GP has a long talk about how she can use the diabetes diary to better understand how her body responds to what she eats and how active she is.

[Scenarios - topics that might be of interest to illustrate through the scenarios

Primary prevention - assisting healthy people in reducing risk of NCD

Key words

Health topics: Smoking cessation, information about risks related smoking; Obesity; promoting physical activity;

Models of organising healthy lifestyle promotion: personal initiatives; employer initiated; insurance incentives;

Secondary prevention - helping people with a diagnose reduce the risk of getting secondary health problems

Key words

Health topics: Self management of diagnosed health problem; health literacy; stepped care models; support lifestyle changes; motivate for adherence to rehabilitation and other interventions aimed at reducing risk (physical activity); medication management;

Organisation models: personal initiatives; healthcare promoted use of mHealth; interaction between personal health systems and professional health systems;

Improved care - improved chains of care (care as a true eco system with seamless transitions between service providers)

Key words

Health topics: eRehabilitation, monitoring, adherence to interventions,

Organisation models: Patient-centred virtual health service teams; direct patient-health service provider contact;]