Maintaining tooth brushing habit

A service design to motivate young people in Sweden

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Abstract
Sweden has a complete public oral hygiene system while there are still problems existing on young people which are caused by their individual habits. In the research, the main reason was found having connections with lack of daily tooth brushing. With the development design for behavior change, this research was trying to find how design can change when it was related to young people’s oral care behavior at home. As a result, a service design concluding a reward system was put forward to motivate young people to maintain a good tooth brushing habit.

Keywords
Service design, motivation, tooth brushing, reward, habit maintaining.
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1. Introduction

The role of design in influencing human behavior has become widely acknowledged (Lockton et al., 2010). But there is not much research discussing how design approach can help change people’s behavior when it comes to oral health. This research has a focus on the situation of young people’s tooth brushing behavior and is trying to use design methods to help them to maintain their tooth brushing habit.

1.1 Background

1.1.1 Oral health

“Oral health is essential to general health and quality of life. It is a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual’s capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing” (WHO, 2003).

Oral health has always been one of the public health problems that people are concerned about. It is not only about having good teeth but also related to people’s general health conditions. The impact of oral diseases on individuals and communities, as a result of pain and suffering, impairment of function and reduced the quality of life, is considerable (WHO, 2003). With WHO broaden the definition of health, research on oral health and people’s wellbeing also has been worked with. Locker (1988) explained that oral diseases and conditions can affect quality of life. People who are satisfied with their teeth in terms of function and appearance seem to have developed an optimized self-esteem, which contributes to the well-being of individuals (Folke et al., 2009).

The major risk factors of poor oral health related to unhealthy lifestyles, and limited availability and accessibility of oral health services (Petersenl et al., 2005). Around all the
problems, dental caries and periodontal diseases have historically been considered the most important global oral health burdens. In most industrialized countries, Dental caries is affecting 60-90% of schoolchildren and the vast majority of adults (WHO, 2003). It is caused by the progression and build-up of dental plaque (Darby & Walsh, 2010), which is also the mean reason of many periodontal problems such as gingivitis and periodontitis (Wolf & Hassell, 2006). Correct daily or twice-daily tooth brushing and use of interdental aids such as dental floss and interdental brushes can help control and remove dental plaque (Darby & Walsh, 2010). Factors such as time devoted to brushing, hand pressure, patient motivation etc. can affect the efficiency of tooth-brushing (Addy, 1998).

1.1.2 Young people’s oral health in Sweden

General situation of oral health has improved during recent decades, with the professional information given in schools and at dental visits, young people have a good awareness of risk factors for dental problems (Johansson et al., 2015). Nevertheless, according to Tanner et al. (2013), there is a stagnation of young people’s oral health. Sweden, one of the most important problems - dental caries, is having epidemiological consequences in young people’s oral health, as they are less concerned than children and adolescents (Johansson et al., 2015). A 40-year study in Sweden showed that there is a reduction of regular proximal tooth cleaning, for example, toothpicks, which individuals today frequently are advised to use. In the younger age groups, 20–40 years, only a limited number of the individuals (3-14%) answered that they performed proximal cleaning (Norderyd et al., 2015).

In Sweden, the dental expense for young people until 20 is free of charge. Besides, there is an annual dental care subsidy for adults over 19 consisting of general and special dental care allowance plus a high-cost protection (Johansson, 2015), after the free dental care period, the attendance in dental care of young people has had a decrease until they get problems with their teeth (Nordenram, 2012). Usually, these people may have other priorities than dental care (Östberg et al., 2010).

Although young people had knowledge of the causal connection between oral hygiene, sugar
consumption, and caries, they often failed to perform proper daily oral hygiene (Johansson et al., 2015). Johansson et al. (2015) also found that these people sometimes will have a bad conscience when they do not have enough motivation.

There is still a high percentage of individuals who feel frightened, sick, or ill at ease at the prospect of visiting a dentist (Norderyd et al., 2015). Females were significantly more likely to report a high dental anxiety compared with males. The distribution of high dental anxiety and age showed a clear and significantly higher portion of dental anxiety in the age group 20-39 (Hakeberg, M et al., 1992).

1.2 Needs for research

The public oral health service and the social system in Sweden is well developed. Many problems are then depending on people’s personal behavior. It is worth exploring what kind of role design can play when is aimed for a changing of human behavior.

Due to technological improvements in the cosmetic industry and market competition, home-use oral care products available in the marketplace offer a great variety of options. People have the awareness of the importance of oral health and an increase in the consumption of oral care products has been observed in the last decades (Jardim et al., 2009). Sometimes it might make people confused about what to use rather than to have better oral hygiene habits (Johansson et al., 2015). Thus, there is big potential space for what design can do to help motivate young people to maintain a good habit with home-use oral care products.

The relationship between oral health and individual habits and attitude can be changed by design. It has been proved that design can help people to transition from the lifestyle they have to the lifestyle they want by helping them change their behavior (Consolvo, 2009).
1.3 Objectives

The first purpose of this research is to find the gap between young people and dentistry when improving their oral health and to help them maintain a good habit. Then the question is to how to combine human behavior theory and design within a context of health-related action maintaining. The process will show how design direction is gradually determined based on a specific topic. Some relatively new design theory and different design methods will be used and tested. The outcome will be an innovative system combining design, technology and business thinking.

The aim is to explore more possibilities by using design to help people change their behavior in a healthy and long-term way.

1.4 Research question

How can design help motivate young people in Sweden to maintain tooth brushing habit?
2. Theoretical and methodological framework

2.1 Theory

2.1.1 Design for behavior change

Buchanan (1985) stated that all design is intended to influence user behavior. Design for behavior change was developed from Norman (1988) who introduced how design can influence people’s behavior. Designers can make contributions to diminishing lifestyle problems which have a bad influence on people’s health and wellbeing (Lee et al., 2012). According to Norman et al. (2007), design, as a type of non-personal interventions, creating by designers in order to change lifestyle behavior, can reach more people than traditional interventions can.

Ludden and Hekkert (2014) presented a framework of design for healthy behavior (Fig.1) based on the transtheoretical model of behavior change created by Prochaska et al. (1992). They discussed about how design interventions give support to different stages of people’s health behavior change. They also suggested that different design interventions should be used at different stages. People will not adopt the interventions until interventions match their motivational states.

![Fig.1 Preliminary framework for stage-matched design interventions](image-url)

In this framework, there are four design strategies. The first is about raising people’s awareness. “Enabling” means the design interventions that help people make a healthy choice
in accordance with their situation and preference. Next is when people have already changed, interventions could help them maintain it or find new possibilities. After the habit is formed, design interventions should fade out.

Based on the context and later research, it shows that young people have the awareness to brush their teeth and they do understand the consequence of doing it but their behavior is not coherent. The problem of changing their behavior to a more healthy habit consists in motivating them to maintain this behavior. In Ludden & Hekkert’s (2014) framework, it is in the third design strategy area where design needs strategies aimed at motivation.

2.1.2 Motivation

Motivation refers to the psychological process that stimulates people to have a driving force to achieve the desired goals or repeat a behavior (Denhardt et al., 2012). It is the reason for people’s action. It is often regarded as the forerunner of a behavior that can often help predict the direction and pattern of people’s behavior. According to Ryan & Deci (2000), by distinguishing between different orientations of motivation, there are two kinds of motivation: intrinsic motivation and extrinsic motivation (Fig.2).

![Fig.2 Intrinsic and extrinsic motivation](image-url)
In the beginning, intrinsic motivation was acknowledged in animal experiments. White (1959) found out that animals have behavior driven by curiosity, exploration and fun without extraneous incentives. Hull (1943) claimed that intrinsic motivation gives individuals the satisfaction of their psychological needs. Intrinsic motivation is defined as doing an activity for the process that can bring joy or the activity attract one’s interest itself (Ryan & Deci, 2000). It intrinsically affects people’s behavior, but not every task implementation could be related to it.

Extrinsic motivation is an intentional behavior that let people do activities for a separable outcome (Ryan & Deci, 2000). It varies for different degrees of autonomy or self-determination. The more internalization and integration people have, the more self-determined extrinsic motivation will be.

External regulation is controlling and make people perform with an external perceived locus of causality (deCharms, 1968). Introjected regulation is the type that people perform actions to enhance or maintain self-esteem and the feeling of worth (Nicholls, 1984). When people identify the importance of their behavior, it is identification regulation. If the regulations are fully assimilated to oneself, it is the integrated regulation (Ryan & Deci, 2000). To summarize, extrinsic motivations can let people start to perform an action even without interest. People can be at any stage of the regulations (Ryan, 1995), but they all come for instrumental value (e.g. rewards and punishments) which is separate from the behavior.

2.1.3 Rewards

Many health-related behaviors have a habitual component, including tooth brushing (Judah, 2012). Habits are formed through repeating a stimulus and response behavior which have a certain outcome. If the outcome is positive, which means it is a reward, it will help strengthen the habit (de Wit & Dickinson, 2009). In research of Judah et al. (2012), they stated that even this reward is potential, it still helps when people perform actions towards desired outcomes. “Rewards are crucial objects that induce learning, approach behavior, choices, and emotions”
Rewards have function of learning, approach behavior, decision making and pleasure. Rewards have basic sensory, attentional and value components (Schultz, 2015). Sensory components have physical parameters which can bring people perception of basic sense (visual, auditory, somatosensory, gustatory, and olfactory). Attention component comes from physical salience, novelty/surprise salience and motivational salience. Value component has our understanding of a reward. According to Schultz (2015), there is one type of rewards called primary homeostatic and reproductive rewards which represents basic needs for individual survival. Another type is nonprimary rewards. It can be physical objects needing people’s sensory receptors and subjective value, nonmaterial rewards or intrinsic to behavior (Barto et al, 2005).

Eyal (2014) presented a model - the Hook framework of a four-phase process that helps connect solutions to user’s problem to form habits. The four components are trigger, action, variable reward, and investment. He claimed that traditional feedback loops cannot create interest since they are predictable, but when the reward becomes variable and uncertain, it will activate users’ wanting and desire.

2.1.4 Service design

Due to the development of service economy and technology, product design is getting advanced while people have more individual needs. Service design was first introduced as a design discipline by Prof. Dr. Michael Erlhoff in 1991 (Moritz, 2005). It was applied to public service industry at the beginning (Ahn et al., 2016). As time went by, service design became a comprehensive implementation of all design requirements in the service sector (Ahn et al., 2016). The growth of service design helps bring the service market new ideas and meet various needs, wants and feelings. It is a system design approach containing people, things, behavior, and environment to develop or improve service (Wang et al., 2017). Service design is an ongoing process and can constantly offer service evolution (Moritz, 2005). According to Trischler & Scott (2015), when users are integrated within a service system, they will only experience specific points instead of the whole system. These are called touchpoints. Service
design revolves around analyzing user’s experience and identifying the touchpoints in the service system (Trischler & Scott, 2015).

Service design methods depend on design thinking in service context (Ojasalo & Somasundaram, 2018). In the process, designers should think from a human-centered perspective. Based on different context, there are many tools can be used, for example, storyboard, user journey map, etc (Ojasalo & Somasundaram, 2018).

2.2. Methods

2.2.1 Interview

“Interviews are a fundamental research method for direct contact with participants, to collect firsthand personal accounts of experience, opinions, attitudes, and perceptions” (Martin, et al., 2017). In this research, the interview is used to collect needed data and information for the purpose of finding out design possibilities with professional support and individual feedback. Different types of interviews can be distinguished by targeted audience. It can be structured or unstructured.

A structured interview follows a script of questions that make it formal and impersonal (Martin, et al., 2017). Key informant interviews are used to contact with people who have specialized or expert knowledge (Martin, et al., 2017). An unstructured interview does not aim at producing the same types of information from every participant. Researchers do not control the overall conversation with interviewer, but try to find the connection of the interviewer experience with his or her problem of interest for the project (Burgess, 1984). It is more comfortable for participants (Martin, et al., 2017).
2.2.2 Design with intent method

Lockton et al. (2010) presented a guidance called Design with intent (DwI). It is a method to design or redesign the system which could be a product, service or environment in order to “influence users’ behavior towards a particular ‘target behavior’” (Lockton et al., 2010). It gives inspirations to designers which have real-world behavior change context and can be developed into concepts later. Thus, it is more practical than theoretical development. Firstly designers can have a basic inspiration of various fields to formulate a target behavior: “intended outcomes, particular user behaviors, which we want to achieve through design” (Lockton et al., 2010). Then designers can have different patterns with description of examples, advantages and disadvantages for each target behavior to get more creative ideas. The patterns are divided into eight groups of different research fields. Lockton et al. (2010) named them Architectural Lens, Errorproofing Lens, Interaction Lens, Ludic Lens, Perceptual Lens, Cognitive Lens, Machiavellian Lens and Security Lens. Their division is in appendix.1. The division is not strict. Many cards can also fit other lenses. The main point is to encourage designers to think from different perspectives and get more inspirations.

2.2.3 Case study

“The case study is a research strategy involving in-depth investigation of single events or instances in context, using multiple sources of research evidence” (Yin, 2002). Case study focuses on detailed, intensive knowledge about cases of individuals, organizations, entire communities, events, or processes (Martin, et al., 2017). It covers interrelationships, therefore, is considering the whole. Case studies can not only help understand the existing situation with comparison and inspiration but also be used in research of innovations (Martin, et al., 2017). Behavior is a personal action thus it needs a specific context and a real-world phenomenon. This research has a focus on health-related behavior change and design innovation. It is not easy to collect data or to have measurements widely. Case study offers an in-depth research which can make up some shortcomings in breadth (Martin, et al., 2017).
2.2.4 Tools in service design

Storyboard

Storyboard is a visualization of stories that help designers to think of technology and forms when using from user’s perspective (Martin, et al., 2017). It has rich content and will directly show factors influence the way people use products, their reasons, using places, environment and technology (Martin, et al., 2017). Designers can change their mind and rethink about touchpoints or even new design concepts at the early age.

User journey map

According to Martin, et al. (2017), a user journey map is a visual interpretation of user’s experience of a product or a service. It describes user’s behavior, feelings, attitude and mental activity during the interaction. It helps designers to determine which part users will have strong emotional effects and which parts need to be improved.
3. Context

3.1 Analysis of products in the market regarding tooth brushing

Analyzing products in the market, it showed that some of them are focusing on promoting young people’s consumption but not changing their behavior. For example, there is no adequate research proving that appearance of toothbrushes has good effects on people’s behavior changing, while some products use this point to attract consumers to buy. Some products are trying to solve problems people having and bringing new design of functions. There are many good cases of toothbrushes designed for helping children develop good habits. Nevertheless, the period of time that users would continue to use needs to be analyzed. These products in the market did not get more attention to young people, who did not the design adequate for motivating them to maintain tooth brushing behavior.

3.2 Case study

Based on the theories, it can be concluded that a variable reward system will have a good effect on helping people to maintain a good habit. Regarding the intentions of helping people to maintain their behavior with a use of rewards, there are products and service also on digital platforms. Many services are trying to use a smartphone as a touchpoint. With the development of technology, smartphones have become commonly used items worldwide. The diffusion rate of smartphones in Sweden is high, according to IIS (2018), 85 percent of the population have their own smart mobile in Sweden 2017. The high usage of smartphones brings people advantages. According to Abraham & Michie (2008), smartphones and the embedment of sensors can become a tool for measuring people’s behavior in daily life. (Abraham & Michie, 2008). There are many applications about health and wellness now. From Sama et al. (2014)’s evaluation, the majority of applications use approaches like self-monitoring and progress
tracking and because of the high use and convenience of mobile phones, they are growing faster than traditional telemedicine actions to help change people’s behavior and make them live healthily. More and more evidence shows that even some smartphone games have good effects on people’s health-related behavior. For example, in the research of Kaczmarek et al. (2017), Pokémon Go, a location-based augmented reality mobile game having a system of collecting, training and battling virtual game creatures, is encouraging people to walk around and becoming a new useful tool of healthy behavioral change.

The research also had a case study on a habit and productivity website (also with its own smartphone application) named Habitica which is, as it states, aiming to help people achieve goals to become healthy and happy by treating life like a game (Fig.3). In this platform, it designs a reward system with a virtual fantasy world like another space users live. Users can plan their real-world life and set tasks. For example, in Fig.3, brushing teeth was added into the habit task list. When people finish one, they can click a finish button which is a blue one in Fig.3 and earn a certain virtual currency that can buy different stuff in the Habitica world. In the right part of Fig.3, there are Habitica’s weapons and medicines in the virtual store. People can buy them in order to fight monsters. This world can also satisfy user’s social needs that they can invite real-world friends to beat a virtual monster or make new friends in this world.
This platform combines two kinds of reward system. One is traditional reward—when you finish a task, you get virtual money. Another is a variable reward that people can have a chance to receive virtual stuff, for example, a pet egg which is good for later fight and users cannot know what it is until it is hatched.

This system has a great use of rewards. It creates a new virtual world with virtual currency as rewards so that it gives a high degree of freedom for users to get different rewards. By using rewards, users can defeat strong virtual enemies. This brings users a sense of accomplishment. The need for growth shows people a process of development and makes them have a long-term use.

Although one problem is that people should report by themselves every time through the app. It was not convenient neither instantly and has no supervision mechanism to prevent cheating which means all the rewards depend on users’ self-control.

It shows that it works when includes smartphones in the reward system. However, it is important to think about how to make it more directly and fairly to reflect changes in people's behavior.
4. Process

4.1 Interview

4.1.1 Preparation

During the research, interviews had been taken with two types of group. First were groups of dentists and oral hygienists from four dental services. Half of those dental services were public service and the other half were private service. After that, the interviews were with young people aged 23-30.

The interviews were first to understand the general situation of young people’s oral health nowadays in reality and their oral care behavior and what kind of problems young people are having now as main reasons. Many factors that have influence on oral health such as education, awareness and experience were all talked about. Then the following part was about which part is relatively lacking in the system. This gap would become the space for further research to work on.

The interviews with dental service were all chosen to be in a face to face interviews in order to instantly collect advice and professional information giving by dentists and oral hygienists. An unstructured interview (Martin, et al., 2017) was used to interview individual young people making participants feel more comfortable since it was about their personal behavior. Picture cards were used as a supplement to give them inspirations. Since it was also related to private behavior, an anonymous interview form was also sent to young people to collect information (Appendix.2). They could do it online without a face-to-face meeting.

4.1.2 Responses

Information from interviewees could be concluded in following:

1. Young people have acquired knowledge of oral care since they were young. Public dental
services give lessons to parents. They will have a regular check based on different oral conditions. Ways of using oral care products, for example, the method of brushing teeth, are taught by dentists during their dental visits. Right now most problems they are having are caries and dental plaque which will lead to gingivitis and periodontitis.

2. When they over 18 and become adults, some of them do not have plans to have dental check even it is for free. An oral hygienist pointed out that even some young people do not see teeth are a part of their body which can affect their general health.

3. It is very hard for young people to change their behavior and it might take a long time. Many dentists thought there is a big problem in their work that young people sometimes will forget their advice and not implement it in a right way.

4. Considering regular tooth brushing, it is an excellent preventive way to control oral plaque (Aunger, 2007), dentists and oral hygienists gave advice that the design should motivate young people to brush their teeth twice a day. They also mentioned that it would be better to help bring them a positive attitude as well. The age of free dental check is until 23, they suggested the age of target group can be from 23 to 30.

5. Young people said they usually brush teeth twice a day. One was before or after breakfast, another one was before bed. The most easily missing one is the one before bed. When they brush their teeth, a majority of people thought the taste of toothpaste could affect their feeling.

6. Reasons for not brushing teeth were complex and examples were given from young people. Some of them are students having food without oral care or having an irregular lifestyle when facing studying pressure. Some of them, when they become adults and can have alcohol without age limitation, have neglected tooth-brushing after drinking alcohol. It was proved that alcohol consumption was indirectly related to gingival disease activity (Mizutani et al., 2015). Some of them just have overconfidence about their oral condition and are defeated by laziness. They said sometimes they do not brush because they felt tired.

4.1.3 Conclusion

To summarize, these groups of Swedish young people have acquired good knowledge of oral
care and have awareness of the importance of oral care. As they become independent and have different personal choices, when related to dental service, their activity at home becomes a key. Most of their problems can be prevented by brushing teeth. The lacking point is that sometimes young people do not have enough motivation to brush their teeth twice a day. Thus, the direction of further research was decided to focus on helping these young people maintain a tooth brushing behavior.

4.2 Exploration

4.2.1 Design with intent method

With information from interviews, many ideas came up. The method Design with intent helped to give inspirations.

Firstly, using this method should define the interaction between people and the behavior designers want to change. Tooth brushing is a behavior conducted by individual with help of toothbrush, toothpaste, toothbrush cup and water. It happens between human and products so it is a user-system interaction instead of user-user interaction. Target behavior categories S1-S7 of user-system interaction are given in Fig.4 (Lockton et al., 2010).

![Fig 4. User–system interaction](image)

Secondly, tooth brushing behavior should be analyzed and categorized into different types. People need water and a place to pour so it usually needs to be in a particular space such as
bathroom. It may satisfy S7 - “users only get functionality when environment criteria are satisfied” (Fig.4). For the target group – the young people, it is a choice for them to do it if they do not have enough motivation. This may satisfy S3 - guiding users to make a decision among alternatives (Fig.4). When they perform it, they only do it for preventing dental disease without any extra steps which means it goes to S2 - users follow an optimized process in a specific situation (Fig.4). These target behavior have suggestion of different patterns that allow designers to brainstorm and generate ideas (See relative patterns in Fig.4). The used patterns are in appendix.3.

Using the suggestions given by the toolkit of Design in intent method, some design ideas applicable to motivation are inspired. They were written below according to different lenses in Fig.5. Color and lenses are based on recommended ones in appendix.1. Some other helpful patterns were also used (See appendix.3). Some patterns help generate more than one idea.

![Fig.5 Early design ideas](image-url)
4.2.2 Screening the early design ideas

At this step, there were many ideas and their directions were not similar. It was important to choose where to focus on and determine a basic concept. As Lockton et al. (2010) said, not every suggested patterns used in this method can give inspirations and there are some patterns can work together. Research results can then be combined with this ideas and then generate a better solution for the problem.

The answers from interview with young people of question 4 - “Which specific part usually affects your feelings or mood during the brushing? How and why?” (Appendix.2) was then used as an important factor to narrow down the brainstorming results. As majority people were caring more about the flavor of toothpaste, some of the ideas related to toothpaste were then be selected.

Based on the Hook framework theory, a variable reward was suggested to continuously motivate users. This also gave a guide to choosing the ideas. Referring to results from interview, a new flavor of toothpaste can be a reward. Moreover, flavor is very personal that everyone would have different favorite tastes. When there is no guarantee of what they will get is what they like, the reward is a variable reward. To achieve this effect, a single product might not be better to implement than a system.

After some combination and reorganization, a concept of a system with new flavors of toothpaste as rewards was be decided.
4.3 Ideation

The initial concept of how this system should look like is shown below (Fig.6).

![Fig.6 Sketch of the system](image)

In the sketch, two different ways of how this reward system works were designed.

The first one which is the inside circle began with a toothpaste provider. When users buy a toothpaste, they will get one with a sensor that can weigh how much toothpaste was used in order to know if they brush their teeth on time or not. Users can download an application which is connected to the sensor. Every time a user finishes a daily task of tooth brushing, the sensor will report it to the app. If they maintain this habit well, they can earn virtual points on the app and use it for gashapon. Gashapon is similar to a lottery machine that allows users to get a new flavor of toothpaste randomly. After that, they will keep using it and form it into a loop.

The second way is the outside circle. It needs users to buy a package. In this package, users will get a toothpaste and a sensor first. They work in the same way as the description above. When they start to use the toothpaste, they need to set a wish list of their favorite tastes. If they maintain the habit well, the sensor will report to the app which is also connected to the provider. So they will randomly get a new toothpaste delivered by the provider until finishing
using one.

Compared to the first one, the second way has fewer options or decision-making power for users and the degree of variable is not that much. An advantage is that the package is pre-paid and guarantees a long-term use. The motivation factors are not clear though. It can be rewards - a new flavor of toothpaste or can be a reason that people do it because of they have already paid money so they do not want to waste their money, which is not positive.

Afterward, the first way was used as a foundation of the system. There were also some ideas from the second one was adjusted and added to it. Gashapon was designed to be both online and offline. The toothpaste can be delivered by provider if it was ordered. The package can only be used as gift sending to others.

The improved version of this service system can be seen in Fig.7.

![Service system map](image-url)
4.4 Design proposal

The final design proposal is a service including a reward system. The following is a storyboard to show from a user’s view that how they experience the service.

![Storyboard of the service](image)

Fig.8 Storyboard of the service

The provider of this service is a toothpaste brand or a supplier. The provider has general products - very basic flavor of toothpaste - for young people to buy through basic sales channels. These products have the role to firstly get in touch with these young people and are also included in the service system. When these young people buy toothpaste, they will get a sensor and information about this system by downloading an APP. The function of the sensor is to help record user’s habit in an automatic way. The APP is used as a tool to visually display information to users and help motivate them. It is also the connection between users and the provider. The more consistent and longer users maintain brushing teeth, the more rewards – new flavor of toothpaste - they will get. These versions of taste will not be sold in the market and should be ensured uniqueness by the provider. This service should always bring a positive feeling to users and convey an attitude of a healthy lifestyle.

It is a long-term service, however, the basic steps are always circulating. To summarize the connection between provider and users and how this system works, a user journey map is
showing below. Some marketing actions, like commercials, giveaways, etc., might also be included in the “beforehand” stage.

The orange parts are what users want and what they do. The blue part shows how the service reacts to users. Touchpoints are how users come in contact with the service. Answers are how the service meets users’ demands.

In this system, touchpoints are products developed by the provider and all of them are combined into a system through a logical sequence.

**Toothpaste**

The toothpaste should be normal size, for example, 100g. Different flavors would have different colors or with special elements inside. The shape of toothpaste coming out is also a way to represent different flavor.

The package of it would be better to use semitransparent material so that users can always know how much toothpaste is left. It is also easy for them to remember a flavor when it is related to one color. There should not be too many decorations on the package. It is aimed to let users focus on the flavor. The design of the package should be clean, only with a logo of the provider and required information. The colors and font of words on it must consistent with provider’s logotype. The barcode on the back is also for users to scan through the APP. Users
can understand what flavor they get, understand it more and give feedback to the provider. It is convenient for them to review if they have collections of different flavor.

The flat bottom is recommended below in Fig.10. It will be easy for a toothpaste to stand whether there is a sensor or not. The cover of it should suit the sensor in order to allow users to simply put it and weigh it.

![Fig.10 An example of the toothpaste](image)

**Sensor**

The sensor is required to be contained in the first consumption. It is separate from the toothpaste. Users do not need to change it every time when finish using a toothpaste which means the sensor can be used for many times. Therefore, charging is better than using a battery.

It should have a place to weigh a toothpaste. For example, a notch that suits the size of cover of the toothpaste can allow users to easily put toothpaste there and weigh. Considering it is a
home-use product, it can report to smartphones through Bluetooth or Wi-Fi. Its shape should be round and friendly. The size should not be too big. The material should be sustainable and water-proof. The charging port needs to be away from water. The following example in Fig.11, the shell of the sensor is plastic and a rubber cover on charging port is used. It is 40mm long, 40mm wide and 30 mm high. In case the basin becomes slippery, the bottom of the sensor needs something to prevent it from falling, for example, a suction cup. The principle is similar to electronic scales. When people put toothpaste on it, it will wake up and automatically connected to smartphones. Otherwise, it will sleep and save power. There should be components to show its status and charging notification. An indicator light having different color in Fig.11 is shown as an example.

There is a range of the weight that every time can people consume in order to prevent unnecessary wasting or cheating. There is also a monitor on the reported time when people use toothpaste for the same reason. Excessively frequent operations are considered abnormal.
App

Basically, there are three parts in this app. Habit calendar, users’ collections and gashapon, or in other words, rewards section. In the example Fig.12, these three sections are represented by three circles in the navigation bar. When one becomes bigger, it means that the user is in its corresponding section.

Habit calendar will record user’s brushing behavior through the sensor. It can show users’ history of brushing teeth and consumption of using toothpaste. It will help users to understand themselves more and know where should be improved. They can set their tasks and get notification from the app every day. The design of the calendar and history should be intuitional with a timeline and visually show the degree of completion of their brushing tasks.

Users’ collections are all the flavors they have used. When they buy a new one, they can scan the barcode through the app. If they get a new one from gashapon, it will automatically go into user’s collection. Every flavor has its own color and icon. When people tap one, there will pop up a window for users to know more about it and give feedback to the provider. In Fig.11, a coffee flavor is used as an example. Personal information management and application settings can all be arranged in this section. It is also very important to put share buttons which are connected to users’ social media. It can not only help to bring users a sense of achievement but also become a promotion for the provider.

The reward section is established on the score points that users earn every day through their behavior. Here is an example of how the score points system works (Table.1). Until users finish a daily task of brushing teeth twice, they will get one point. There will be extra points if users maintain for a certain period of time.

<table>
<thead>
<tr>
<th>Days of maintaining</th>
<th>Everyday point</th>
<th>Extra point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>More maintaining days</td>
<td>1</td>
<td>More points</td>
</tr>
</tbody>
</table>

Table.1 An example of the score points system
By using the points, users can have a lottery of toothpaste flavor with a virtual gashapon in this section. They can exchange the points to chances to have a lottery. The needed points for one chance should be well calculated based on the point system. For example, if the quantity of toothpaste is almost one-month use, points that users need to earn for a lottery chance should be at least 30 points (considering 3 times of missing possibilities).

After people having one lottery, they will get a notification without telling them any information about this flavor. If they want to open and see the result of this lottery, they should pay. After this, the provider will deliver them a new one according to their result.

The interaction of reward section should be fun and can have random effects, sounds or even be customized. The colors and font of words of the app must consistent with provider’s logotype.

**Fig.12 An example of the APP**

**Gashapon**

Users can play gashapon on their APP. It can also be a physical machine in the stores or supermarket. Users can exchange their points into a code and enter into a physical gashapon to get a chance. The physical one should be self-service and widely applied in supermarkets and convenience shops. The implementation of physical machines depends on the market area and the development of the service. It will be at a later stage.
5. Summary and discussion

5.1 Analysis of design process

Service design contains more things than only product design. It allows designers to think more from a user’s view to improve services. As users’ needs change, the service should also be constantly adjusted. Design with Intent toolkits in this process helped expand more possibilities of ideas. It brought for designers many design inspirations combining with other disciplines. In future work, it would be a worth try to use this method with more people from other disciplines at an early brainstorming stage. When a service design concept was determined, user journey map played a good role to help the designer to organize different components and also easy to let others understand the service. However, the description of user map was linear, there would be additional information when it comes to a multi-cycle structure. Though there were places for providers to know what they should do, it was still more from a user’s perspective and talking about how providers can meet their needs. There were more design criteria for providers to do behind the scenes and they should be described in detail.

There were some limitations of this research. The number of interviewed young people could not represent all young people in Sweden. Time was so limited that there was only one month for interviews. Thus, the design proposal was based on more typical problems. Moreover, the time to use the tool Design with Intent was a little bit late. It was a tool to help designers get more inspirations, but at that point, the logic of the theory was almost determined which would to some extent limit the generation of ideas.

5.2 Analysis of design proposal and future work

This design proposal is a reward system provided by toothpaste companies or organizations. It will not only help motivate people to use toothpaste and brush their teeth but also bring
providers economic benefits when more people consuming their products. The connection between users offers companies more chances to understand their costumers and get improved. Using a mobile phone APP as one touchpoint makes this communication even more convenient and fast. It can also become a good tool for promotion when connects to social media.

In this service, the descriptions of touchpoints are conceptual and giving a general design direction and needed effects. In practical development, more things need to be discussed, for example, cost of material, production, electronic technology.

This service provides a framework to motivate people to maintain a behavior. Tooth brushing is a health-related behavior. So when designing a new service concerning motivation, this reward system needs to be tested and adjusted. The choosing of a target group – young people – was based on the situation in Sweden. When applying to other countries, new context and problems should be redefined, which means that the target group would also change.
6. References


7. Appendices

Appendix.1

Division of eight lenses

![The eight lenses of the toolkit](image_url)
Appendix 2

Interview Form

How old are you? *

1. When do you usually brush your teeth? (If you do it more than once a day, please write down them all, thank you!) *

2. What activities do you usually do BEFORE brushing your teeth? (e.g. prepare for your breakfast) (If you do it more than once a day, please write down them all, thank you!) *

3. What activities do you usually do AFTER brushing your teeth? (e.g. take a shower) (If you do it more than once a day, please write down them all, thank you!) *
4. Which specific part usually affects your feelings or mood during the brushing? How and why? 

- material
- shape
- color
- ... 

- smell/taste
- color
- package
- ... 

- material
- shape
- ... 

- the whole environment
- the mirror
- the sink
- ... 

5. Do you have any time NOT brushing your teeth? What’s the reason? 

- 
- 
- 
- 

6. What interests do you have or what topics are you concerning recently?

- 
- 
- 
- 

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Appendix.3

Design with intent

Used patterns