Designing Nudges in eHealth

Short paper/work in progress

Niels Frederik Garmann-Johnsen
Dept. of Information Systems
University of Agder
Kristiansand, Norway
Email: niels.f.garmann-johnsen@uia.no

Migle Helmersen
Dept. of Nutrition and Public Health
University of Agder
Kristiansand, Norway
Email: migle.helmersen@uia.no

Santiago Gil Martinez
Faculty of Health and Sport Sciences
University of Agder
Grimstad, Norway
Email: santiago.martinez@uia.no

Abstract—**Digital nudging are much used in eHealth and public health promotion. Such nudges can be very useful for patients and citizens in general, as it may help them self-manage their own health, and may in many cases even save lives. But the designing of digital nudges is critical, for the purpose of the nudge to be achieved, and negative consequences of the measure avoided. This study disseminates the state of art in the field and will then seek to elicit purposeful design principles by combining Design Thinking and participatory design with frameworks for compliance with general health policies. The results so far show that this avenue for research seems promising**.

Keywords-digital nudges; Design Thinking; Jobs to be done; user journey funnels; health promotion.

I. INTRODUCTION

Nudging is a "choice architecture", which involves all the outside forces that may subtly guide one's decisions in one direction or another and provide an effective and viable public health strategy [1]. Digital nudging is the use of user-interface design elements for guiding people's behavior in digital choice environments [2]. According to Schneider et al [3] the interactions of designing digital nudges consists of the four phases Define the goal, Understand the user, Design the nudge, and test the nudge (Figure 1). Depending on the outcome of the Test-phase, the three previous phases are iterated again.

Nudging initiatives in a public health setting typically involve arranging environments in ways that make health-promoting behaviors more likely. A classic, oft-cited example of nudging involves positioning healthy food types more prominently than unhealthy ones in cafeterias [1]. Nudging relies mainly on System 1 reasoning, which is quick, intuitive, and automatic, as opposed to System 2, which is slower and more deliberative [4]. Although many nudging techniques are shown to have the intended effects, it is unclear whether they would work outside the study setting [5].

Nudge Theory presents a new collection of methods, deemed "nudges", which have the potential for low-cost and broad application to guide healthier lifestyle choices without the need for restrictive regulation [6]. Nevertheless, there has not yet been a large-scale examination of the effectiveness of nudges, despite several policy making bodies now considering their use.
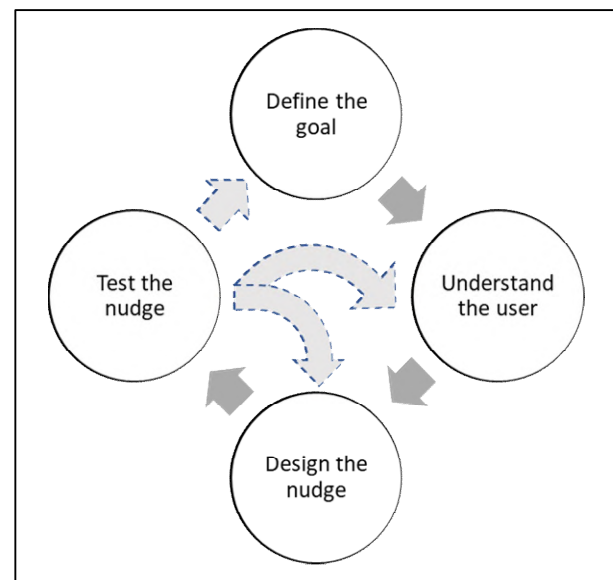

Figure 1. Digital nudge design iterations.

Nudging has been imported into the public health context to address the intransigent problem, from a political-administrative point of view, of individuals not doing what is most beneficial for themselves health-wise [7]. A few articles documented that nudging seems to offer public

health a number of advantages: 1) information based public health campaigns are ineffective in producing desired health changes; 2) nudging operates directly on behaviors rather than attitudes and knowledge (behaviors has been described as the main concern of health promotion); 3) unlike legislating for better public health, nudging interventions preserve individuals' autonomy [5]. Scoping reviews by Ledderer et al shows that most lifestyle-related "nudging" interventions and mechanisms are related to dietary choices [5]. Limitations are big regarding study design, target groups, duration of the intervention, and measures of effectiveness. Critical discussions about nudging are required, and there needs to be ongoing exploration of whether nudging interventions are gaining foothold in various arenas.

As a good example, it was found that nudges resulted in an average 15.3 % increase in healthier dietary or nutritional choices, as measured by a change in frequency of healthy choices or a change in overall caloric consumption (a good public health strategy to combat obesity) [6].

This short paper represents a work in progress. The goal is to elicit design principles for good, effective, and ethically sustainable digital nudges. The work so far, reported here, represents a preliminary literature review for mapping the state of art in this concern, and comparison with methodologies from innovation management. The problem statement here is whether Design Thinking related methods may inform Nudge Theory and health promotion.

II.   LITERATURE REVIEW

A preliminary literature review has been performed using the following method and criteria. The search was done in Scopus electronic database [8] that partially includes databases MEDLIE and EMBASE ++. The search criteria (search string) are shown in Figure 2.

TITLE ((digital* OR online OR web*) AND nudg*) AND TITLE-ABS-KEY (health* OR promot* OR wellbeing OR "well being" OR "physical activ*" OR sedentar* OR diet* OR nutrition* OR food OR lifestyle* OR "life style*")

Figure 2. Search string

Using this string, February 2023, we found 44 articles. The references of the found articles can be found on the web address, Learning Service-Organization [9]. Of 44 articles, 13 are outside scope (dealing with eco friendliness only), or not concluded studies. Of the remaining 31 articles most are concerned with healthy eating. Some articles are concerned with increasing digital literacy among users, responsible use of internet and social media, for more cost-effective public health measures, or more effective healthcare through adoption of technology. A recurring theme is that nudges need to be simple to be effective and strike the right balance of measures. Too much pressure may be counter productive. A general impression of the found articles is that they as a rule seems to be sympathetic and un-critical to the use of digital nudging in general.

Here follows some examples of themes (in this article's authors interpretation), found in the reviewed articles:

a) Nudging indirectly, encouraging development of the factors leading to more responsible behaviour; (here:) involvement in children's nutrition

b) Online grocery shopping: Two-step nudges may be needed, to advocate both eco-friendly and nutritional quality food. Default shopping carts increase nutritional quality.

c) Covid-19 contagion awareness: Nudges can be tailored by designers to different users.

d) Renewal of subscription (disability parking), nudging towards using digital channels. A simple letter appealing using the argument of cost saving, had effects.

e) Nudging general compliance with rules for behaving well, using China's social credits system as a case, shows that freedom to opt in or out, reduce the feeling of intrusiveness.

f) Does the goal justify the means? A survey tests attitudes towards nudges. Freedom for users, transparency and the urgency of goals are important factors found.

g) Switching meat-eating to plant-based: health arguments are the most effective.

h) Health app design may benefit from behavioural economics.

i) Nudges may promote taking part in population-based screening programmes, such as mammography.

j) Study provides insights especially for digital physical activity breaks for students during home studying.

k) Coping is better that threat in an appealing for secure online behaviour.

l) Healthier lifestyle: Finding right amount of nudging measures is critical. Too much information may cancel out effects.

m) Social media and privacy issues regarding minors.

n) Digital healthcare: For a digital nudge to work, it needs to address a user's automatic thoughts; appear when a user is open to making a choice; provide discrete, easy steps toward a goal; and offer positive reinforcement.

III.   LESSONS FROM DESIGN THINKING

As a designer of digital nudges, one must strike the right balance of measures. This issue is arguably like the ones facing developers of good designs in general. Design thinking-inspired service design has emerged, especially the last ten years, as a popular methodology. Especially, the data- and telecommunication industry has embraced the concept.

Design Thinking iterations are depicted in many ways. Figure 3 shows one of the more common ways [13]: Empathize with users (a parallel to understanding the user, ref. Figure 1.), Define the problem space, Ideate solutions, Prototype solutions, and Test solutions. The similarities with

the Digital nudge iterations as depicted in Figure 1 are striking, so arguably, the methods are interchangeable.
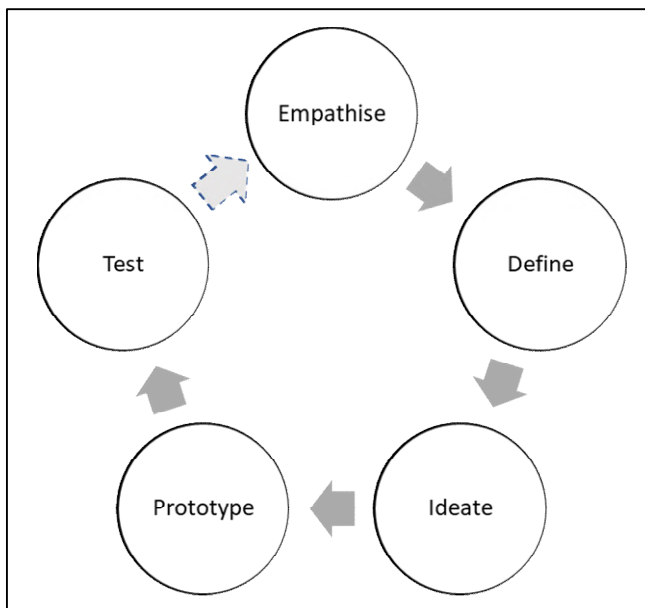

Figure 3. Design Thinking, iterations.

A method often associated with Design Thinking and the phases of Empathizing with users and defining their needs and goals is Jobs to be done – theory [10][11]. The theory in short states that the consumers (citizens, customers, users, or patients) "employ" concepts (solutions, products, or services from a variety of different categories) to cover their needs and long term-goals, see Figure 4. The consumer or citizens experience with the concepts they employ in the now situation (AS-IS), may vary. They may experience both benefits and hurdles in the present situations. In mapping these hurdles, a designer may find clues as to why a nudge does not perform well.

Jobs can be direct (cover core needs), related, emotional, product life cycle based, economic decision based etc. Citizen needs are stable and consistent over time (changes slowly). They are even similar between citizens in the same situation and context, so that if one manages to map these needs, by empathizing with the target group, even with a small number of informants, one should be able to see patterns. Citizens choose concepts (products and services) from a variety of sources. So, digital nudging can be seen as an instrument to direct those choices, a choice architecture.

The adoption of such Design Thinking techniques potentially opens for using other similar tools in nudge design, like creating personas (a narrative and visualization of a typical member of a target group), and story boarding, visualizing the user journey in a patient history [13].
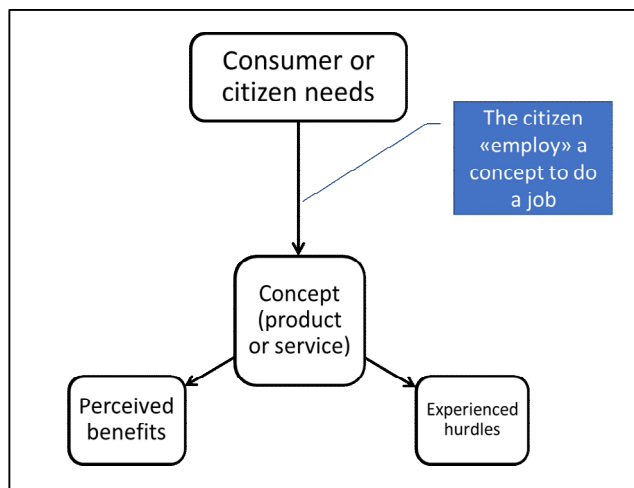

Figure 4. Jobs to be done Theory, AS-IS situation.

The user's process of "employing" a solution is a complicated process with many steps. Digital nudge designers may perhaps benefit from acknowledging this and limit the scope of the nudge, to nudging one stee at the time. The user journey or conversion model is often drawn like a funnel, since not all citizens are converted from one step to the other. This version, Figure 5, is inspired by Rogers [12]. It consists of the steps Situation awareness, users being able to assess hers or his own condition, Attention (to potential solutions), Interest, Desire, and Action ("employing", acquire the solution). The step Loyalty symbolizes the users staying with the solution, e g health promotion program, compliance. The two last steps "Advocate" and Peer mentors, symbolize the user take a passive or even active role in promoting the program towards other new users.
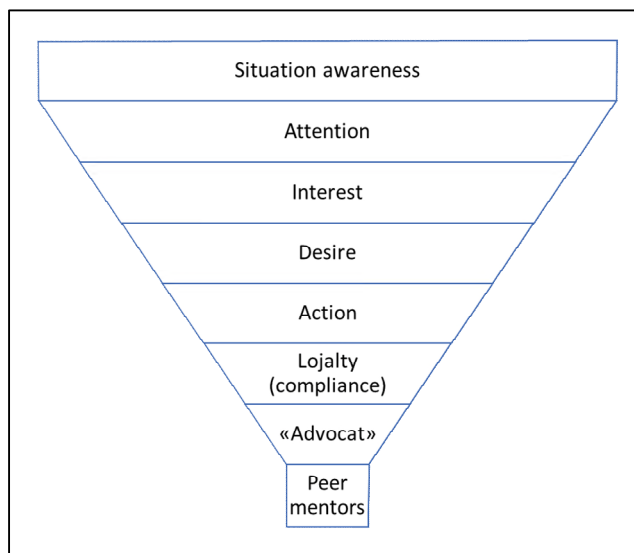

Figure 5. User journey- or conversion funnel.

IV. PRELIMINARY RESULTS

We propose that designers of digital nudges in eHealth may benefit from the study of methods associated with Design Thinking, Jobs to be done theory and user journey design.

The citizen must be perceived as an agent that combines information from several sources and is a part of a network of users that share their points of view [12]. An understanding the process of conversions and Jobs to be done, as seen from the users, together with the literature on public health nudges [5] and others, may inform better and more sustainable digital nudges in future.

Jobs to be done theory in combination with mapping the user journey may provide data for constructing efficient tests, checking the conversions step for step, identifying where along the journey the users are lost, and pinpointing areas for improvement in a health promoting program, in a future TO-BE situation (Figure 6).

This article is a work in progress and contains untested propositions. More work is needed to substantiate the claims that are put forward here.
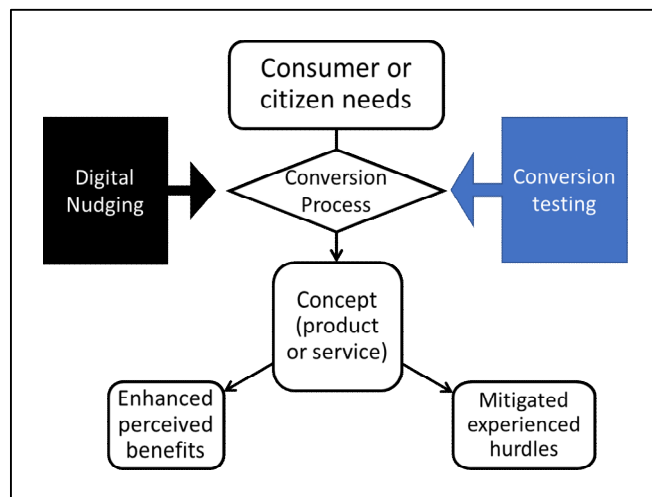

Figure 6. Jobs to be done TO-BE situation, combined with nudging.

There are more themes of interest to the scope of our article, to be found. Since this is a work in progress, this article's authors will extend the literature search using forwards searches and fewer search criteria in future. We will also scrutinize central finds closer in later articles in this area of concern.

V. CONCLUSION AND FUTURE WORK

This study has come some way in disseminating the state of art in the field of interest. We have shown similarities and analogies between digital nudges design and Design Thinking. These similarities lead us to the proposition that Design Thinking methods may inform the design of successful digital nudges in public safety, health, and healthcare.

Future work may consist of an extended search in literature as well as work with a model for an architecture framework or -platform, and an architecture development process, perhaps leveraging the aid of artificial intelligence for analysis and design.

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