Preconditions for the Structural Deployment of (Digital) Technology for Healthcare in a Participatory Society

Validation of methodological and practical challenges

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***Abstract*—This article describes the threats and practical challenges of diversity in target groups and the models for the adoption for technology for healthcare in The Netherlands. With the sense of urgency created by the participatory society, in which citizens are responsible for their own direction for health, government and the quality of life within The Netherlands, digital solutions become more and more part of the society and relationship between citizens and governmental bodies. Its mere focus is on validation methodological approaches and practical challenges in order to stimulate vitality and healthy independent living for a longer period of time.**

Keywords-healthcare; digital technology; quality of life; participatory society; methodology; practical challenges.

I. TARGET GROUPS IN A DIGITAL PARTICIPATORY SOCIETY

The development of the participation society makes 'own direction' and 'own responsibility' increasingly important for residents. The described interventions are aimed at taking care for health and quality of life yourself. However, equipping citizens for the participation society is not self-evident. Because 'own direction' and 'own responsibility' of citizens presuppose that they act themselves, they must have sufficient motivation, knowledge, skills and potential for action. In that context, the Scientific Council for Government Policy [1], introduces the term ‘doing ability’ next to 'thinking ability'. The Council states that citizens need ‘doing ability’ to be able to set goals, to formulate steps and implement them. Most online sources now facilitate knowledge and thereby stimulate 'thinking ability'. Stimulating ‘doing ability’ is something else. For example, there are initiatives to make road maps available online [1], for living a longer vital, health and independent life.

According to the National Social Media Research, the use of social media is intensive: ten million Dutch people use WhatsApp and Facebook, of which 80% daily; more than seven million use YouTube, of which 20% daily [2]. In 2016, The Netherlands has the relatively largest number of online shops [3], and the largest number of online therapies. This high degree of digitization of the Netherlands and the Dutch people means that the active use of digital solutions at the urban level is a real possibility - the use of the internet is spread so widely that all population groups of all ages (up to 75 years) are online. That creates opportunities but also challenges. Recent research by Stichting Pensioenfonds Zorg en Welzijn (PGGM) among 30,000 professional care workers shows that only 10% of them use digital resources in their work. In the consulting rooms of general practitioners, patients do not very often suggest e-health [4].

The next section describes the possible models of technology. Section three will threat the methodological and practical challenges in the applicability of health models focussing on participation. The final section will conclude on the awareness and motivation of possible solutions.

II. MODELS FOR THE ADOPTION OF TECHNOLOGY

The literature describes a number of models for the adoption of technology. Some are too general (such as Venkatesh's Technology Acceptance Model) while others focus more on organizations [5]. Such models do not focus on the practical introduction into a larger urban environment. An interesting model for gaining insight into aspects of adoption is the 'eHealth Value Framework for Clinical Adoption and Meaningful Use' (in short: 'eHealth Value Framework') of the University of Victoria in Canada [6]. Originally developed to map the aspects of adoption of Electronic Patient Dossier (EPD) systems, it is sufficiently generic to get an overview of the aspects that are important in stimulating a diversity of applications on an urban scale.

In addition to implementation itself, there is a broader context for the deployment of technology at the urban level, an interest that extends beyond the current project. For the stimulation of health in urban environments, literature refers to its own character in size, density, diversity and complexity and advocates a tailor-made approach that does justice to this [7]. In 'theory of smart cities', Harrison and Donnelly [8] describe how new technology creates 'making the invisible visible' and thereby creates the possibility for a new way of (more real time) thinking about the city.

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Harrison and Donnelly [8] also propose to think in an 'urban information model' as a way to structure and classify the many different types of information contained or flowing in the network. This makes it possible to describe urban development's statistically not only on a macro level, but also through new observations and new models on a more individual level. The recent collaboration between the Municipality of The Hague and the Statistics Netherlands (CBS) as an Urban Data Centre, is in line with this notion. Another possibility is the Extramural Leids Academic Network (ELAN) data network, in which General Practitioners information is made available anonymously.

III. VALIDATION: METHODOLOGICAL AND PRACTICAL CHALLENGES

The project explicitly aims to validate the results to show whether and to what extent the chosen interventions contribute to longer independent living. Here, a number of methodological challenges are described that must be taken into account when realizing this ambition.

Validating single applications is easier than validating the effect of multiple applications at the urban level. Validating is easiest in the situation where an individual client uses a single intervention for a clearly defined (health care) need, e.g., added value of digital glucose meters in diabetes sufferers, use of apps in people with sleep problems or home automation in elderly people who live independently. Much evidence-based research focuses on such direct applications.

Validating the effect of multiple applications on an urban scale is more complex. This complexity arises from the multidimensional character of concepts such as: 'longer independent at home', 'quality of life', 'social strength' or 'vitality'. In addition, this complexity is created by the scale of applications: longer independent at home is not only realized by individual users but equally strongly in groups of users such as client systems, or in the social networks of neighbourhoods or districts. In both cases, the number of factors that contribute to an improvement in quality is often much greater than a single (digital) technology that is used. A direct causal relationship is particularly difficult to demonstrate. This, therefore, requires new or different analysis techniques and smart use of epidemiological analyses. The dimensions of positive health try to give new frameworks in which measurements can be made. This is in line with the observation that the added value as determined by professionals is not always that of users. For example, there is no evidence-based long term research for the effect of online 'brain training', but it does noticeably contribute to the feeling of rehabilitation patients that they 'do something' and for that reason it is sometimes included in the treatment regime (personal communication from a rehabilitation doctor and -psychologist). It is a fundamental question, which is also described by the Council for Public Health and Society [9].

With regard to e-health, the National Competence Centre for eHealth (Nictiz) outlines the dilemma in its report 'Evaluation of eHealth technology: in the context of policy', the broad definition of e-health, the diverse nature of the stakeholders and their different need for evidence [10]. In the report, several methodological approaches are described in which way an investigation could be designed. This includes a number of specific methodological solutions (such as the use of Social Return on Investment (SROI) [11]). There are other statistical possibilities (such as the N = 1 method [12]) to be able to determine validity in complex situations, but these can only be taken into account when determined which form of validation is required: when is healthy and vitally longer independent living successful?

IV. CONCLUSION

A number of conclusions can be drawn:

- There are existing and available digital and technological solutions that can support independent living for longer.
- A reasonable number of those solutions have been examined and found useful.
- Each user has his or her own needs that can and must be customized.
- The urban scope of the project creates a number of specific challenges.
- Validation requires attention through methodological complexity.

The fact that digital solutions deliver added value is in itself insufficient precondition for success. The project is preferred to encourage the use of 'existing' solutions among residents, which means that such solutions not only have to 'exist', but that citizens must know them and be able to use them. This presupposes the creation of awareness and motivation, making knowledge and skills available and facilitating the possible solutions to actually purchase, pay, install and use:

- Awareness - information via media, professionals and organizations.
- Motivation - indicating added value.
- Knowledge - explanation and courses tailored, direct and online.
- Skills - instruction, direct and online.
- Practical use - financing, installation, management and maintenance.

For example, the use of digital solutions is always supported by a coherent set of activities. If these are not present and use is still desirable, compensation will have to be made for this. Three scenarios can be distinguished when stimulating digital solutions:

- Stimulating a broad approach aimed at the use of digital solutions in general by the entire population.
- Stimulating a specific target group to use specific digital solutions.

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- Or a mix of both.

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