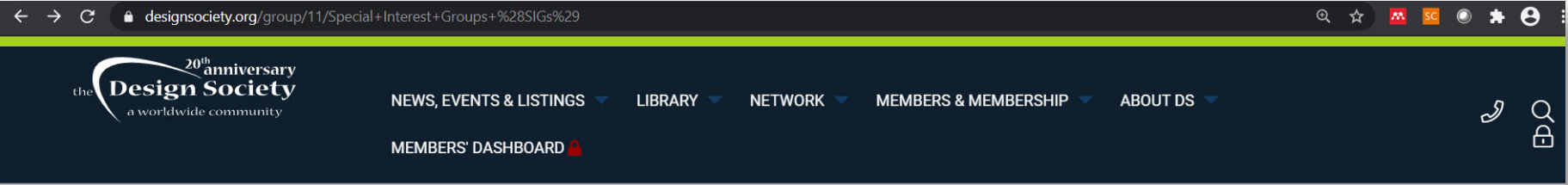




Health Systems Design @ DESIGN2020 Special Interest Group worldwide Design Society

Professor Anja Maier

Health Systems Design. Design Society Special Interest Group.





HEALTHCARE SYSTEMS DESIGN: A SANDBOX OF CURRENT RESEARCH THEMES PRESENTED AT AN INTERNATIONAL MEETING

N. Ciccone^{1,✉}, F. Patou¹, A. Komashie³, G. Lamé², P. J. Clarkson³ and A. M. Maier¹

¹DTU-Technical University of Denmark, Denmark, ²University of Cambridge, United Kingdom, ³THIS.Institute, United Kingdom

✉ nicic@dtu.dk

Abstract

Healthcare systems are under strain, this creates a challenge for designers to develop solutions for better health and care delivery. This paper presents a sandbox of illustrative design themes used to improve health systems based on state of the art research projects. These were collated from presentations at The Second International Meeting on Healthcare Systems Design Research, held at DTU-Technical University of Denmark. Attending groups were mapped based on their research keywords, target journals and methodologies in order to gain insight on the communities research landscape.

Keywords: healthcare design, complex systems, systems approach, healthcare, engineering design

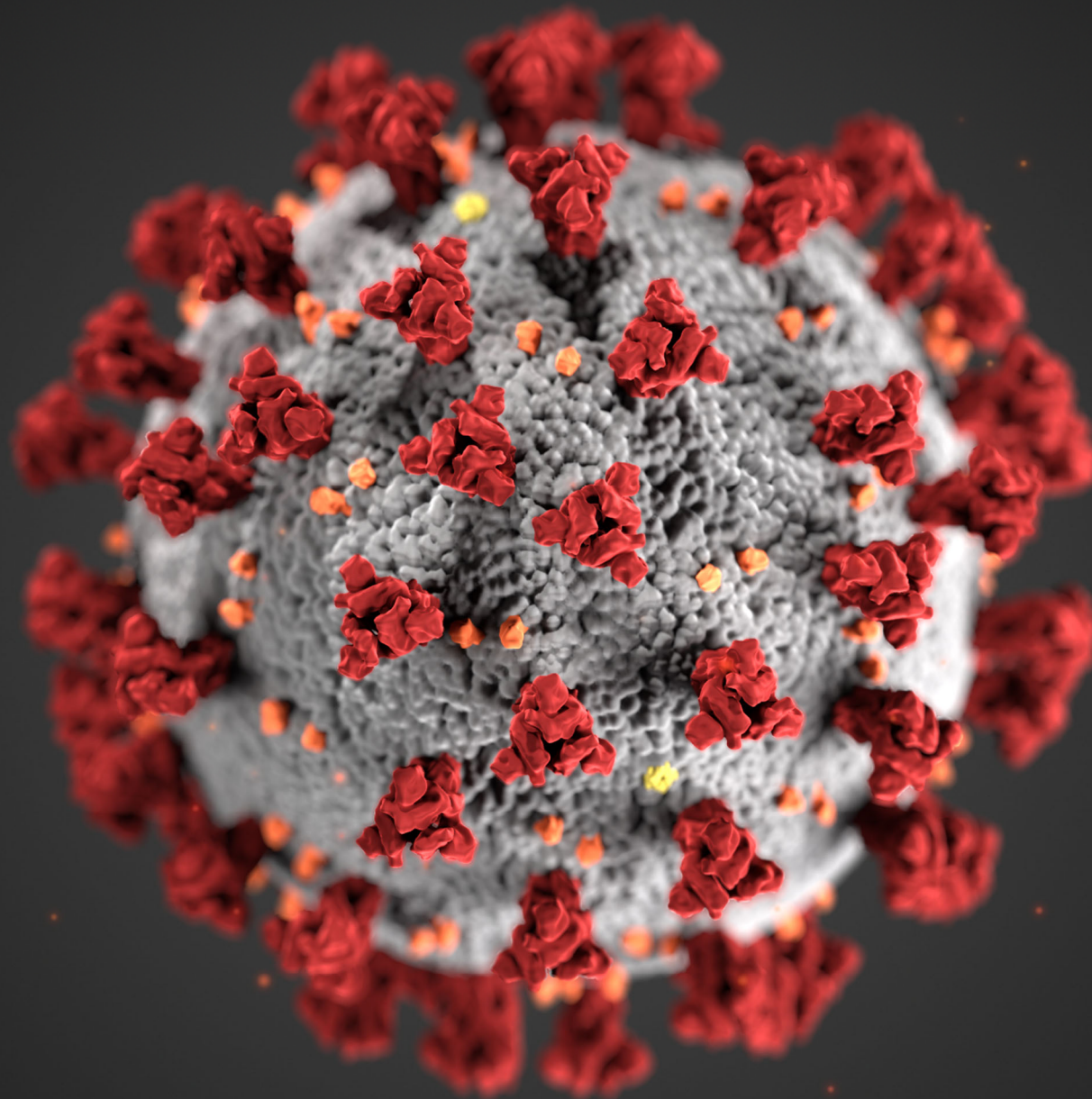
1. Introduction: Designing for future health and care

Healthcare is a fundamental human need (Ghebreyesus, 2017). Goal 3 of the 17 United Nations Sustainable Development Goals (SDGs) calls to action for changes to ensure healthy lives and to promote well-being for all at all ages. Healthcare is a vital aspect of society and as such, progress towards better health and care has a symbiotic relationship with other aspects of sustainable development. Health is one of the greatest of today's societal challenges. As people age they become more susceptible to develop chronic conditions and as such, the resources required to deal with their medical needs increase (Denton and Spencer, 2010). The ageing of the population in the Western world, concurrently with greater need for access to healthcare drives higher costs. This weighs on economies, with higher GDP spending being needed to maintain quality and accessibility of care (WHO, 2018). Designing better health and care is a continuous and iterative process, involving improvements in infrastructure, treatments, diagnostics and design frameworks (Pannunzio et al., 2019). Also, recent and rapid advances in technology have been transformational to healthcare improvement, greatly contributing to the increase in quality of life and lifespan of the last few decades (Cutler and McClellan, 2001). Technology has changed the experience of ill-health for the patient and their relatives and it has also had a radical impact on medical processes, driving fundamental change in healthcare professional practices (Hofmann, 2015). Yet, increasing technology-adoption costs, process inefficiencies, budget limitations, and scarcity of care personnel (Cutler et al., 2006; Spillman and Lubitz, 2000) all contribute to the faltering of healthcare systems performances. Today, only 50-60% of care is being delivered in line with guidelines; around a third of medicine is wasteful considering its expenditure and the rate of adverse medical events remains approximately 1-in-10 patients (Braithwaite, 2018).

Ciccone, N., Patou, F., Komashie, A., Lamé, G., Clarkson, P. J., & Maier, A. (2020). Healthcare Systems Design: A Sandbox of Current Research Themes Presented at an International Meeting. In *Proceedings of the Design Society* (Vol. 1, pp. 1873-1882). [163] <https://doi.org/10.1017/dsd.2020.24>

- **World**
- **A vision and impact pathways**
- **Examples**

- **World**
- A vision and impact pathways
- Examples





- **World**
- **A vision and impact pathways**
- **Examples**

A Vision

*With design central in humankind's relationship with the artificial world and natural world
(borrowing and adapting from Herbert Simon),
my vision for the Special Interest Group Health Systems Design is*

**to create a space that illustrates what design can do
and inspires designing healthy societies**

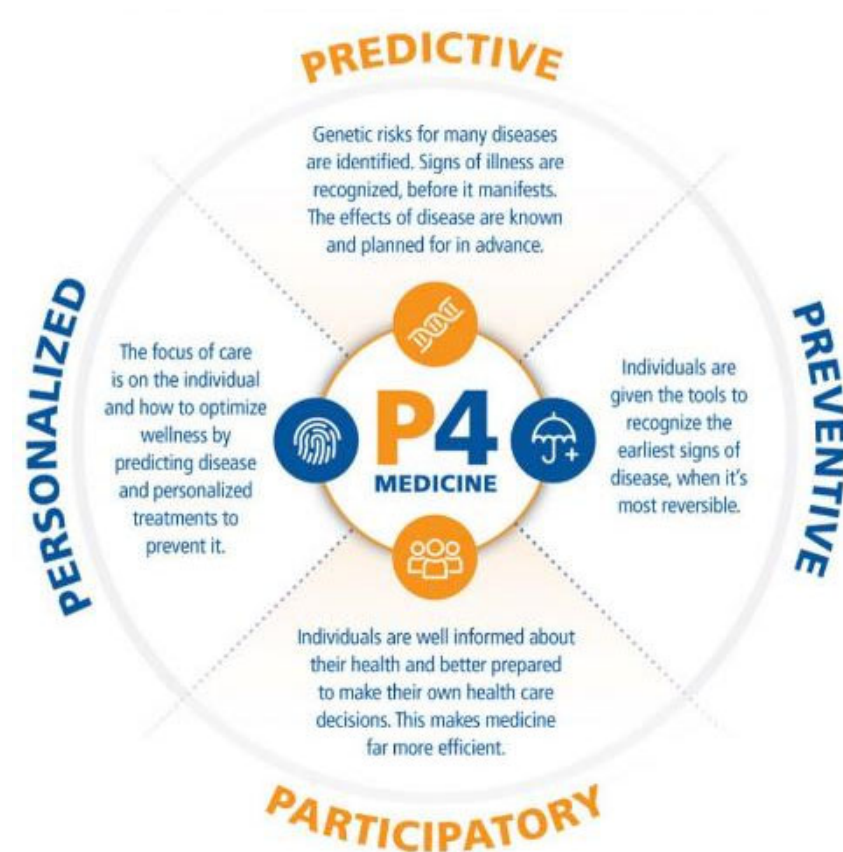
and by extension, create a better every day quality of life for many people.

Impact pathways

- iii) **Designing across**
a spectrum of system solutions (products, services, experiences)
and spectrum of intervention levels (individual, group, societal)
- ii) **Research interdisciplinary**
e.g. design and behavioural-, health-, and medical sciences, ...
- i) **Partnerships connecting**
design researchers and practitioners,
with medical service providers, healthcare professionals, patients,
formal and informal caregivers, policy makers, citizens

Transformative healthcare delivery model

*“[P4 ...] arises from the confluence of a **systems** approach to medicine and from the digitalisation of medicine that creates the large **data** sets necessary to deal with the complexities of disease.”*
(Hood et al, 2012)



Hood, L., Balling, R., & Auffray, C. (2012). Revolutionizing medicine in the 21st century through systems approaches. *Biotechnology Journal*, 7(8), 992–1001.

François Patou, Nicholas Ciccone, Julia Thorpe & Anja Maier (2020)
Designing P4 healthcare interventions for managing cognitive decline and dementia: where are we at?
Journal of Engineering Design, 31:7, 379-398,
 DOI: 10.1080/09544828.2020.1763272

The screenshot shows the article page on Taylor & Francis Online. At the top, the journal is identified as 'Journal of Engineering Design', Volume 31, Issue 7. The article title is 'Designing P4 healthcare interventions for managing cognitive decline and dementia: where are we at?' by François Patou, Nicholas Ciccone, Julia Thorpe, and Anja Maier. The page includes a sidebar with navigation options like 'Full Article', 'Figures & data', and 'References'. The main content area features an abstract and the beginning of the '1. Introduction' section.

ABSTRACT

This paper presents a systematic literature review aimed at assessing how well current technology-based interventions that focus on dementia and other cognitive impairments align with the principles of the P4 vision for healthcare: *Predictive, Preventive, Personalised and Participative*. A search of the SCOPUS database yielded 887 articles, of which 48 were ultimately selected for analysis. Looking at whether and how each intervention implements each 'P'-principle, our results suggest a partial and non-systemic embrace of the P4 vision. Reasoning on possible explanations for this state-of-the-art, we propose that our findings represent an opportunity for the engineering design community to engage with P4-based healthcare delivery models through the development of design frameworks, new indicators for assessing the success of such healthcare delivery models, as well as tools and methods.

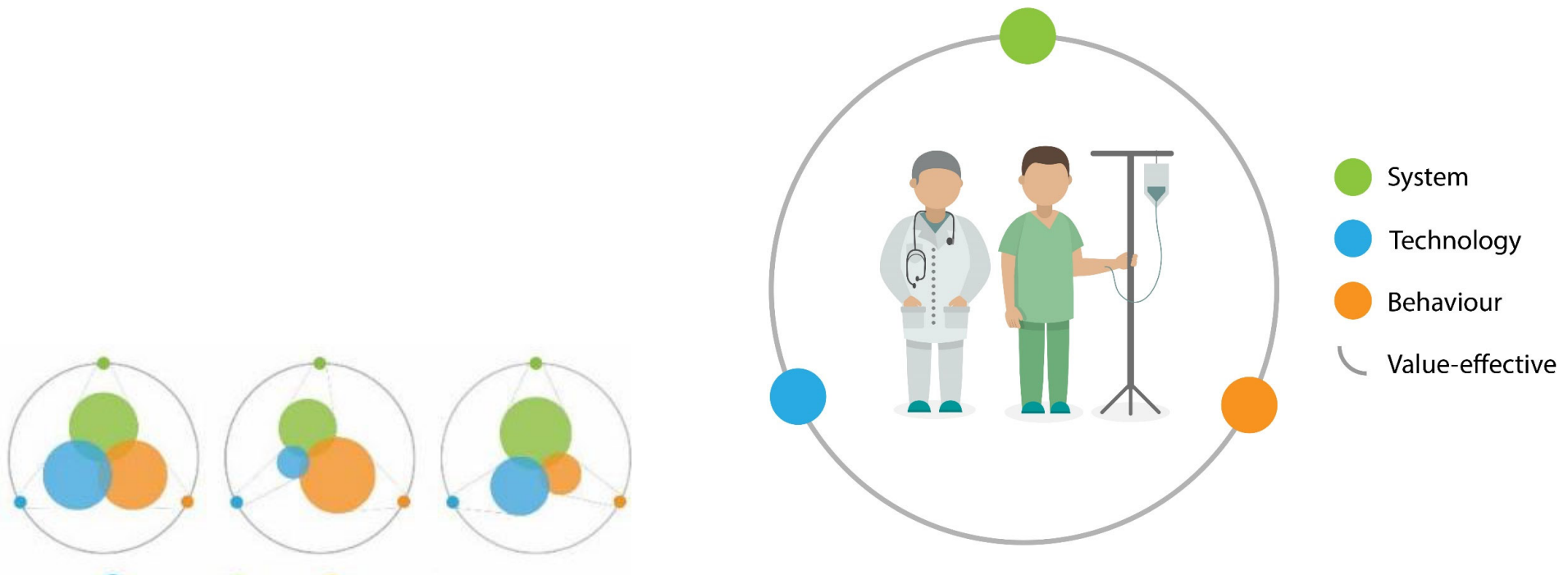
KEYWORDS: Engineering design, healthcare design, healthcare improvement, P4 healthcare, dementia

1. Introduction

Design for health is gaining attention. More specifically, design thinking and engineering methods generate growing enthusiasm as means to improve our healthcare services and systems (Clarkson et al. 2004; Craig and Chamberlain 2017; Doss 2014; Kim, Myers, and Allen 2017; Komashie and Clarkson 2018; Clarkson 2018; Ku and Rosen 2016; Lamé 2018; Patou and Maier 2017). This relatively recent realisation comes as process inefficiencies, budget limitations, increasing technology-adoption costs, rising prevalence of chronic diseases, and the scarcity – and work overload of care personnel continue to challenge the performance of our healthcare systems (Cutler, Rosen, and Vijan 2006; Spillman and Lubitz 2000). Only recently promoted by leading voices in healthcare organisational management and clinical practice, a call for design thinking and the adoption of engineering methods in healthcare have emerged from large systematic investigations of healthcare systems at both the national and international levels (Christensen, Hasman, and Hunter 2010; WHO 2009; Clarkson et al. 2017). These studies have revealed the potential of design thinking frameworks

- **World**
- **A vision and impact pathways**
- **Research project examples**
DTU Engineering Systems Design

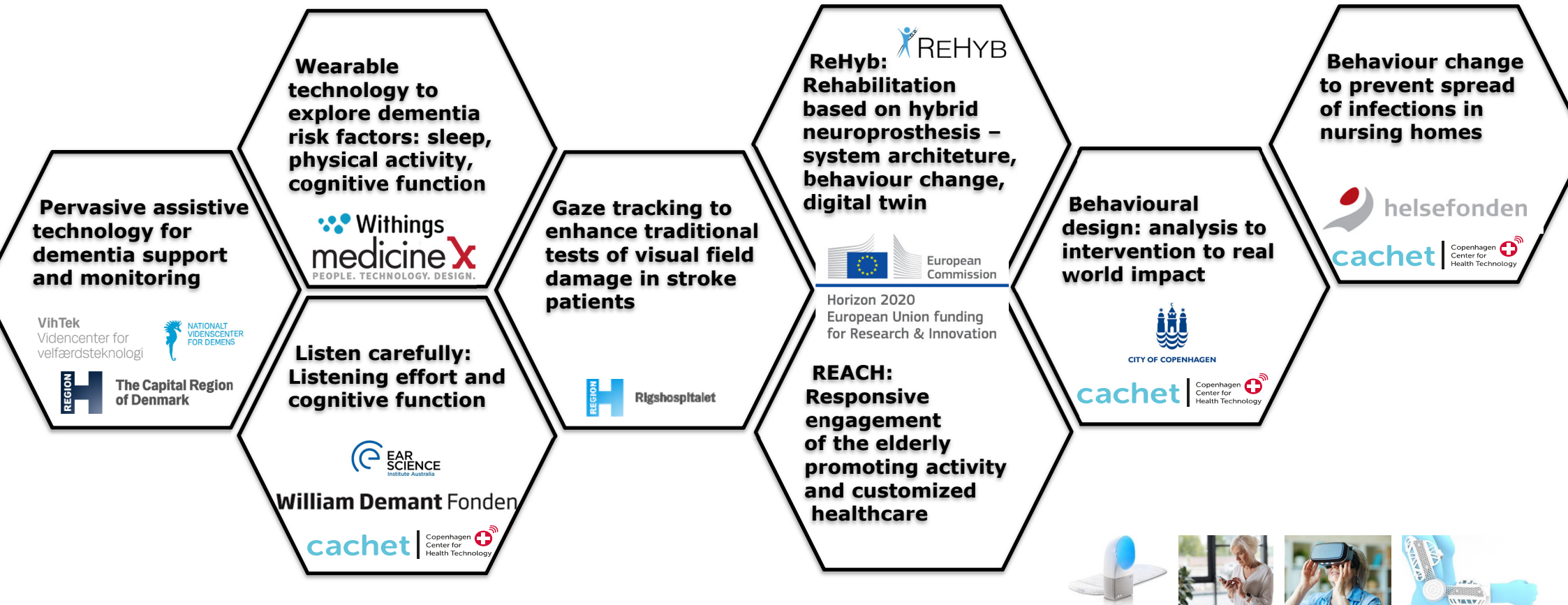
Balancing technology, behaviour, health delivery system for designing value-effective healthcare solutions



Ciccone, N., Patou, F., & Maier, A. (2019).
Designing for better healthcare: A systemic approach utilising behavioural theory, technology and an understanding of healthcare delivery systems.
22nd International Conference on Engineering Design (ICED19), Design Society.

Designing health futures, research project examples

www.es.man.dtu.dk





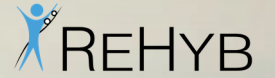
ReHyb@DTU: New technologies for supporting recovering stroke pat...



Watch later



Share



REHYB
<https://rehyb.eu/>



RESEARCH

COLLABORATION

EDUCATION

ABOUT THE DIVISION



Engineering Systems Design



> PUBLICATIONS



> PROJECTS



> PEOPLE



> RISKLAB



> PROJECTLAB

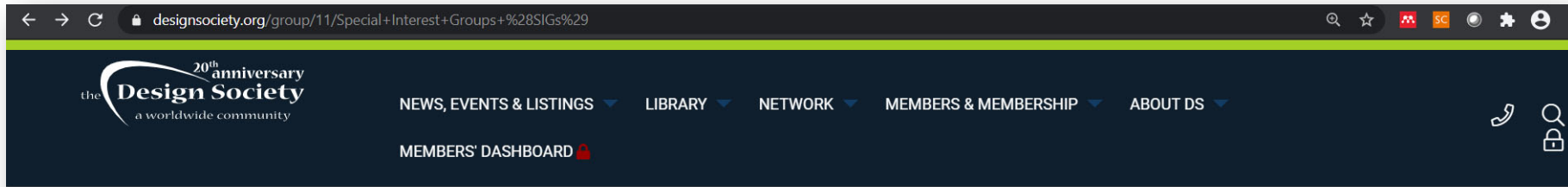


> DESIGNLAB

www.es.man.dtu.dk

To create a space that illustrates what design can do and inspires designing healthy societies

and by extension, create a better every day quality of life for many people.



healthsystems.designsociety.org



HEALTH IN THE SDG ERA



World Health Organization

www.who.int/sdgs





Health Systems Design @ DESIGN2020 Special Interest Group worldwide Design Society

Professor Anja Maier