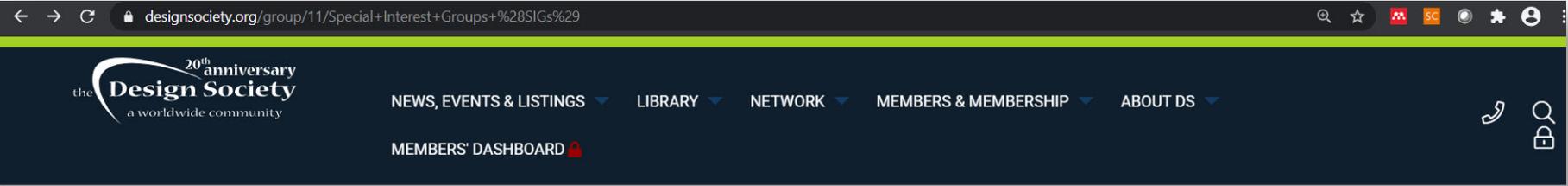




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HEALTHCARE SYSTEMS DESIGN: A SANDBOX OF CURRENT RESEARCH THEMES PRESENTED AT AN INTERNATIONAL MEETING

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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

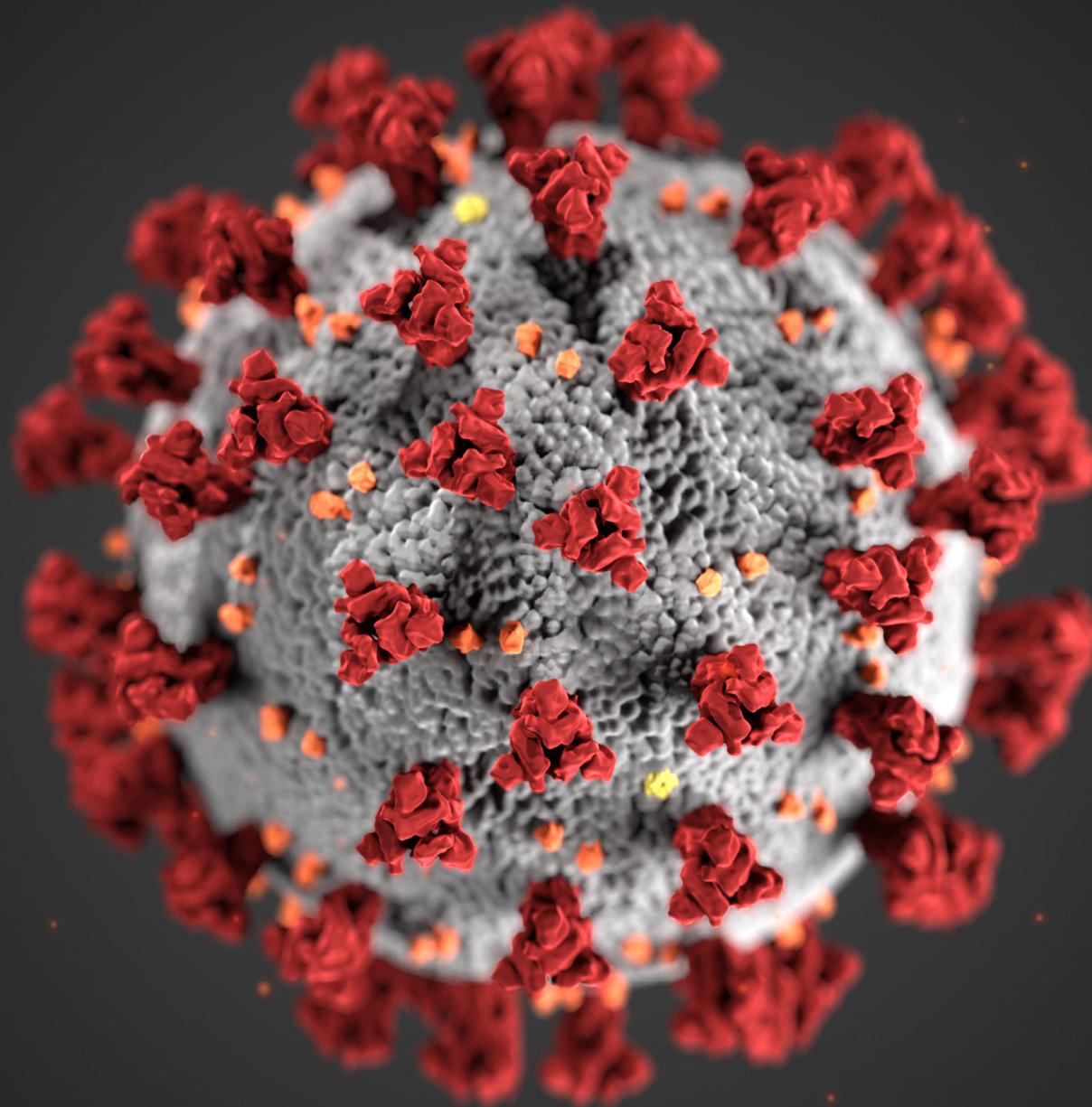
1. Introduction: Designing for future health and care

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**

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- Examples





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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**

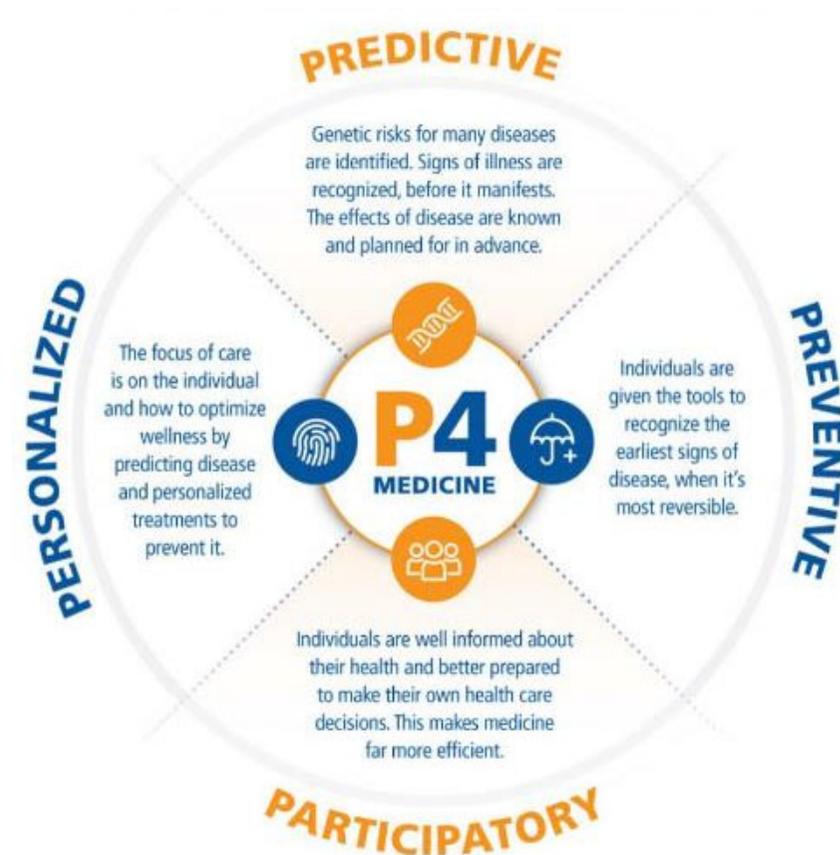
and by extension, create a better every day quality of life for many people.

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)



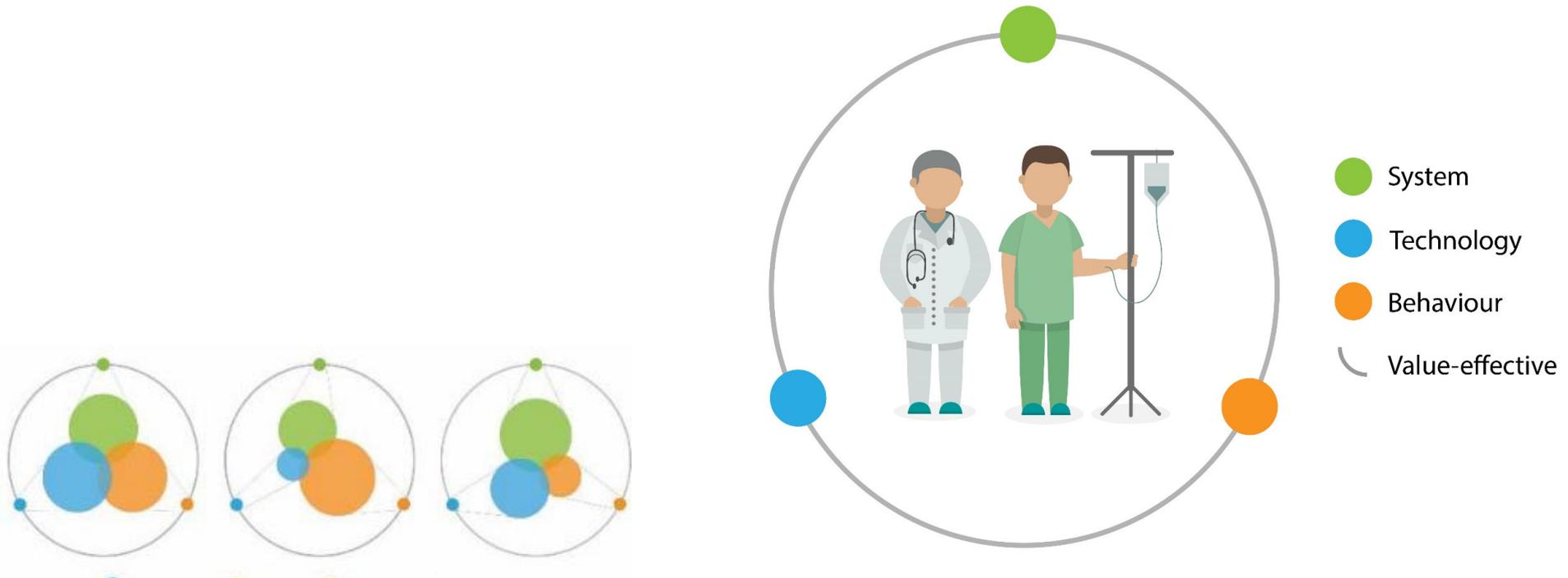
Hood, L., Balling, R., & Auffray, C. (2012). Revolutionizing medicine in the 21st century through systems approaches. *Biotechnology Journal*, 7(8), 992–1001.

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. The header includes the Taylor & Francis logo and the text 'Taylor & Francis Online' and 'Access provided by DTU Library'. The breadcrumb trail is: Home > All Journals > Journal of Engineering Design > List of Issues > Volume 31, Issue 7 > Designing P4 healthcare interventions fo The journal information is: Journal of Engineering Design > Volume 31, 2020 - Issue 7. There is a search bar with the placeholder text 'Enter keywords, authors, ...'. On the left, there are statistics: 137 Views, 0 CrossRef citations to date, and 0 Altmetric. A 'Listen' button is present. 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, & Anja Maier. The article is available in PDF format. The abstract states: '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.' The keywords are: Engineering design, healthcare design, healthcare improvement, P4 healthcare, dementia. The page includes a table of contents on the left and navigation links at the bottom.

- **World**
- **A vision and impact pathways**
- **Research project examples**
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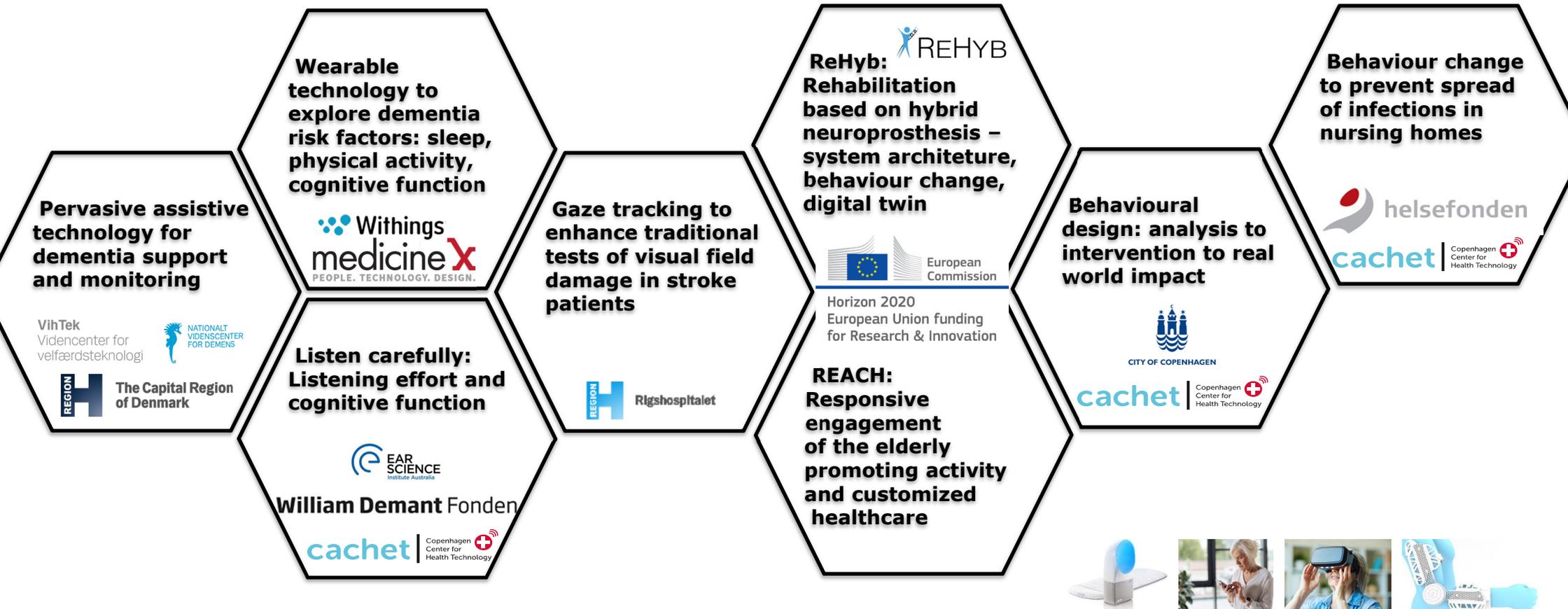
Balancing technology, behaviour, health delivery system for designing value-effective healthcare solutions



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

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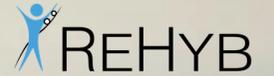
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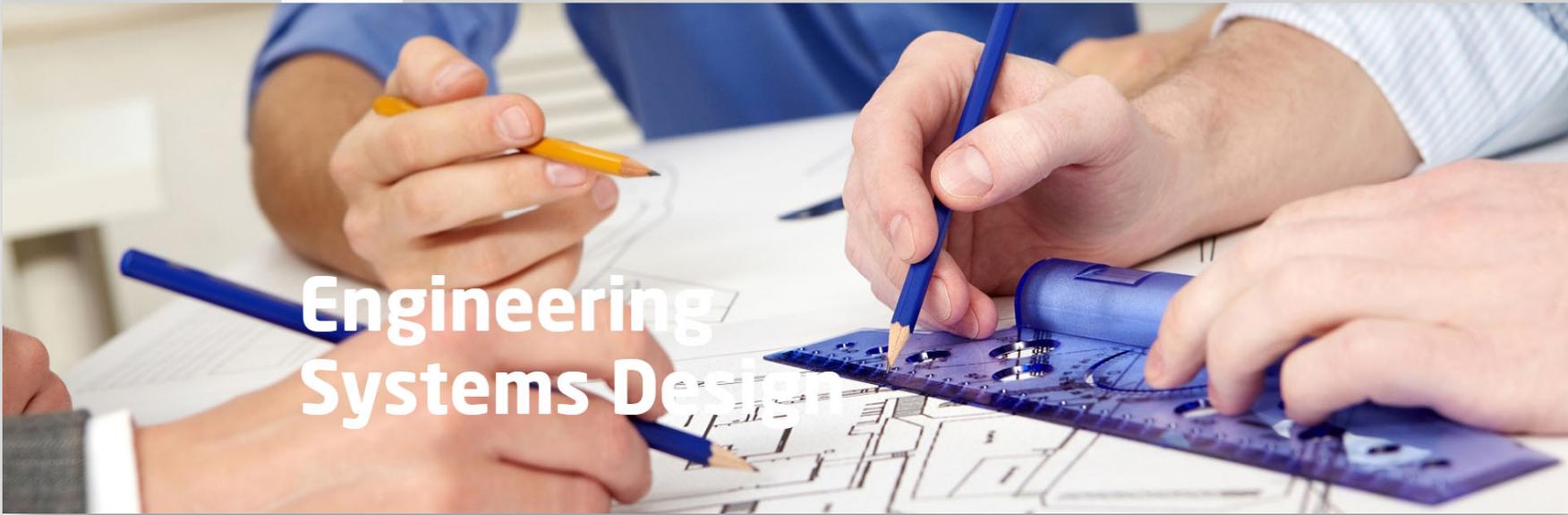


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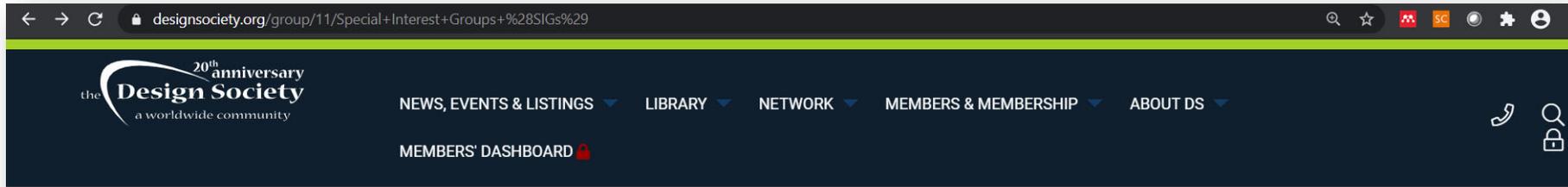


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and by extension, create a better every day quality of life for many people.



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