An introduction to the design of products and services for older people... for all ages

My background…

… is in **Human-Computer Interaction** (HCI), which is a discipline concerned with the understanding and the **design of different relationships between people and computers**. In these relationships, HCI designers **shape** and create (digital) **products and services that** support and **are fit for people's use and everyday lives**.

In my research…

… I am interested in exploring ways in which we **can leverage technology to promote the health, quality-of-life and wellbeing of the older adult population as well as their active and continued participation in society**. Yes, this is very broad! So is design!

> *"A significant branch of designerly ways of knowing, then, is the knowledge that resides in objects. Designers are immersed in this material culture, and draw upon it as the primary source of their thinking.* ***Designers have the ability both to 'read' and 'write' in this culture****: they* ***understand what messages objects communicate****, and they can* ***create new objects which embody new messages****."*
>
> *Nigel Cross, 1982, Designerly ways of knowing*

Designers…

… give **shape** and **create value** through design.

In doing so, designers

- Become **responsible for** spreading **socially and ethically responsible behaviours** and for enabling sound and **appropriate interactions** between humans and technology.
- Play a **role in encouraging the creation of an age-friendly world**, through products, services, environments and even in changing representations of older people.

708,000,000

708 million persons aged 65+ in the world in 2019, 1.5 billion estimated in 2050

Source: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf

Population trends

- The world's population is growing older, with **persons over age 65** being the **fastest-growing age group**.
- By **2050**, one in six people in the world will be over age 65 (16%), up from one in 11 in 2019 (9%). In Europe and Northern America, **one in four** persons living could be aged 65 or over.
- The number of persons aged **80 years old or over** is **projected to triple**, from 143 million in 2019 to 426 million in 2050.
- Life expectancy at birth for the world, which increased from 64.2 in 1990 to **72.6 in 2019**, is expected to increase further to **77.1 in 2050**.

Source: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf
For the latest numbers check: The European Commission Report on the Impact of Demographic Change

Challenges and opportunities

Rise of chronic conditions, more people in need of care and assistance, when doctor-patient ratios are already very low in general, especially in remote areas.

More active, happy, engaged older adults who ready to take back their agency and fully enjoy their independence and lives.

People far more **invested in** their own **personal health** and **increasingly comfortable with digitalization** and the proliferation of tech-related healthcare

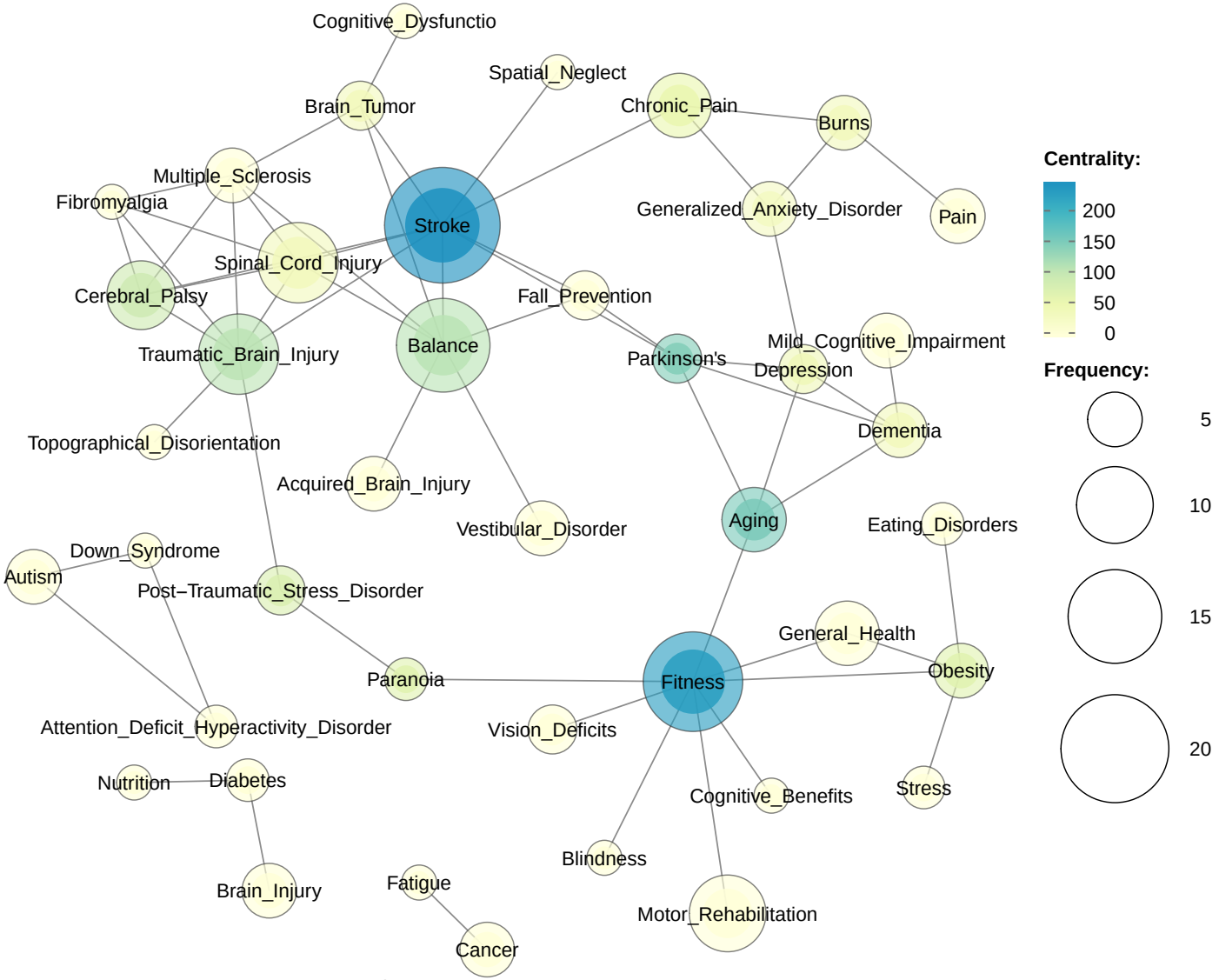
Large percentage of people at retirement age and huge pressure on social protection systems, when proportion of people at working-age is already falling.

High maturity of technology that is now seamlessly integrated in current service models from smart devices to virtual health services.

So much **room to re-imagine** re-design, and re-write **the future** health, care, socialization, play, culture, life.

Diving into a Decade of Games for Health Research: A Systematic Review

Silva, P. A., Bermúdez i Badia, S., & Cameirão, M. S. (2021). Diving into a Decade of Games for Health Research: A Systematic Review. In X.-S. Yang, R. S. Sherratt, N. Dey, & A. Joshi (Eds.), Proceedings of Fifth International Congress on Information and Communication Technology (pp. 520–528). Springer. https://doi.org/10.1007/978-981-15-5856-6_51



Most central domains of intervention: Stroke, Fitness, Ageing, Parkinson's.

But how? And where to start?

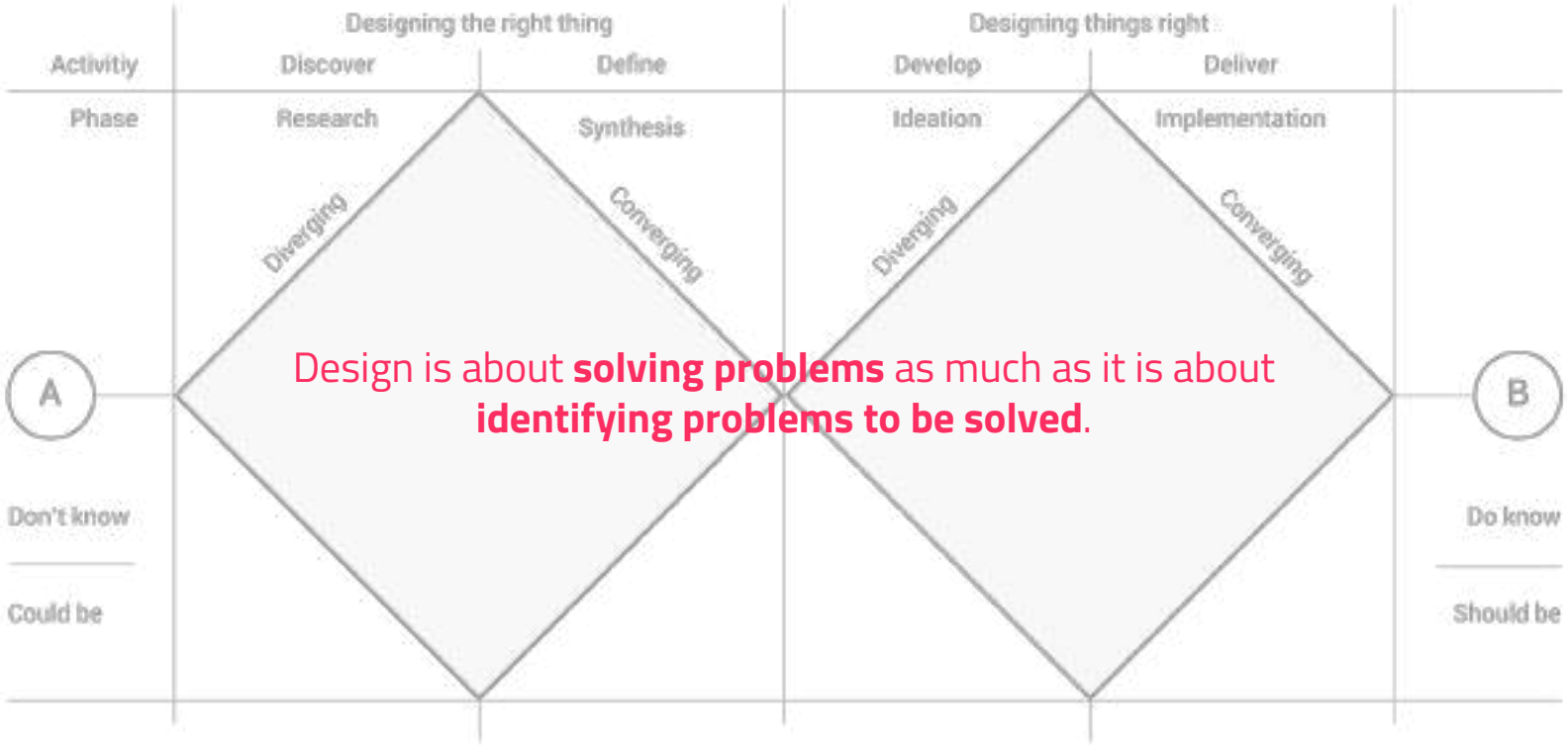
Don Norman, a renowned expert in design, usability engineering, and cognitive science talks about design for the elderly…

''The person with a **stigma** is not quite human.'' Erving Goffman

How to go about it?

A general, simple, and personal approach to and HCI design approach…

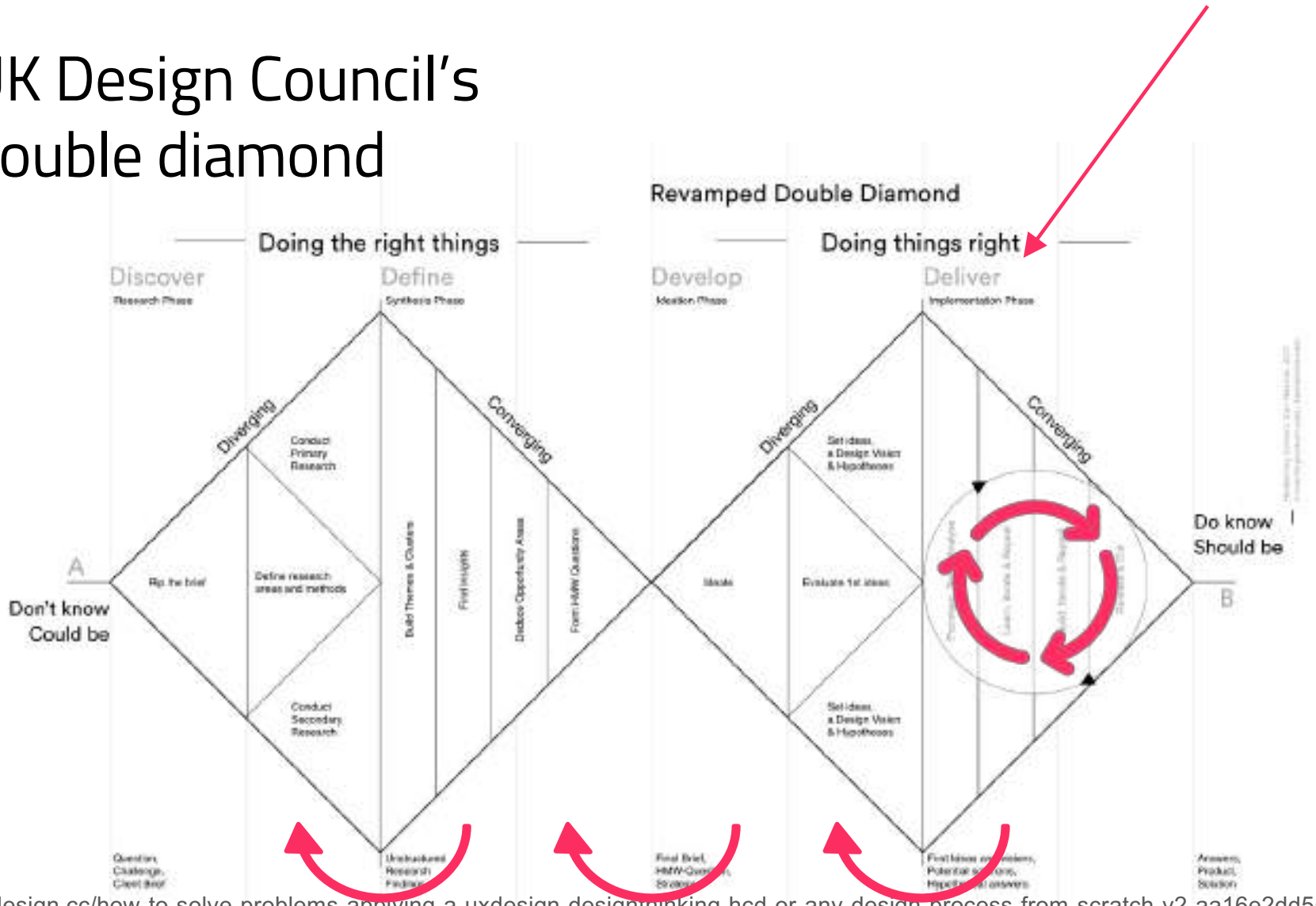
UK Design Council's double diamond



Design is about **solving problems** as much as it is about **identifying problems to be solved**.

Source: https://uxdesign.cc/how-to-solve-problems-applying-a-uxdesign-designthinking-hcd-or-any-design-process-from-scratch-v2-aa16e2dd550b.pdf

UK Design Council's double diamond



Source: https://uxdesign.cc/how-to-solve-problems-applying-a-uxdesign-designthinking-hcd-or-any-design-process-from-scratch-v2-aa16e2dd550b.pdf

Discover, research, empathize

It is not simply about improving the product or service, it is about **improving the experience for older adults and their lives**, so we need to **keep then at the center of the process** and **study their whole context**, their current experiences, who and what do they interact with...

Discover, research, empathize

- The older adult population is a category of individuals **who differ greatly from one another**, and who have been shaped by their unique experiences and lifestyles, which make them who they are.
- New generation, **silver-surfers**, the first experiencing **usability.**

- Place the **user at the center** of the process
- Develop empathy and **immerse** yourself in their world; **they are the experts**!
- Set out a **methodology to collect data and gain insight into their life**, rituals, desires, frustrations…
- Older adults have **real needs**, identify them!

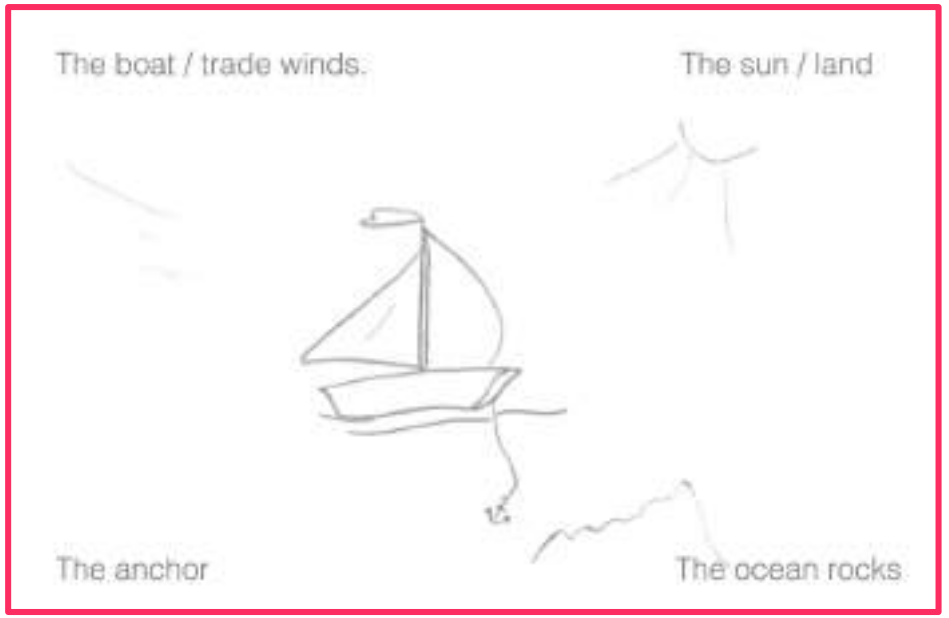
- *Set aside the feeling of **otherness.***
- *Challenge the **myths***
  - *In 2019, 73% were **online**, 59% had home **broadband** (40% and 25% in 2009)[1]*
  - *Web comfortable and savvy as any millennial.*
- *Move beyond **assumptions,** preconceptions.*
- *Plan and do **research**!*

[1] Source: https://www.pewresearch.org/internet/fact-sheet/internet-broadband/

Co-design methods and multi-stakeholder approaches

Silva, P. A. (2020). The Sailboat Exercise as a Method for User Understanding and Requirements Gathering. Cardiff University Press. https://doi.org/10.18573/book3.d

Silva, P. A., & Daniel, A. D. (2019). Training Non-designers in Co-design Methods Through an Active Assisted Living Interactive Workshop. In D. Lamas, F. Loizides, L. Nacke, H. Petrie, M. Winckler, & P. Zaphiris (Eds.), Human-Computer Interaction – INTERACT 2019 (pp. 166–175). Springer International Publishing. https://doi.org/10.1007/978-3-030-29384-0_10



The boat / trade winds → GOALS
What's working well at the moment?
Anything that helps achieving your goal.
Things, skills, qualities currently available.

The sun / land → DESIRES
What would the truly perfect experience look like?
What are you striving towards?

The anchor → FRUSTRATIONS
Aspects, situations, which are making things difficult, slowing you down.
What's holding you back?

The rocks → CHALLENGES
Problems you find along the way.
What obstacles hold outside which are preventing you from achieving our goal?

Define, synthetize, understand

The previous phase is mostly about research, collecting data, this one is about **making sense of the data collected through research** and **defining the problem from a human-centered point-of-view**.

Define, synthetize, understand

- Derive **insights from the research** data you collected and define the problem to be solved **– the problem statement** – find **the root causes**, not just the symptoms.
- Specify the **concrete requirements** that arise from the research.
- Determine **potential fields of action** and opportunities.
- Make sure to **solve the right problem before solving the problem right**.

- *Remember you are **not yet solving** the problem, but rather **still defining** it.*
- ***Move away from** obvious solutions and **quick fixes**.*
- ***Do not jump into** the **solution space** too soon,*
  - *If too many ideas start to emerge, capture them on a idea wall and then let go.*
- ***Do not to let myths and assumptions ramp up**.*

Develop, ideate, conceptualize

Having defined the problem statement, identified the ‘right problem’, the ‘Develop’ phase is dedicated to **exploring the space of possible alternatives solutions** and transitioning into **solving the problem right**.

Develop, ideate, conceptualize

- Explore the design space, **generate as many** potential **solutions as possible**.
- Assess the ideas and the concepts generated and **select** those that should be explored further, **those that help you solve the core user problems** or provide the elements to circumvent them.
- Consult and **develop a partnership** with users and **check** weather your initial conclusions **echo** with them.

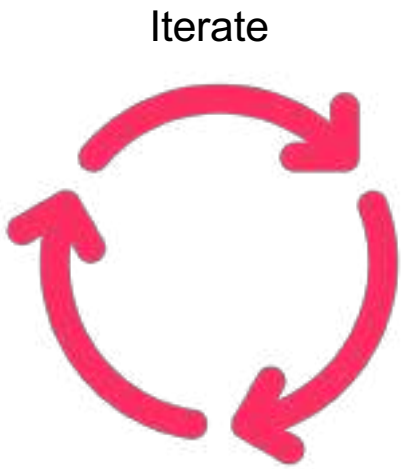
- *Stay **open-minded**, be **bold**, keep it simple, and **avoid becoming** hyper-specific or **overly critical** and falling for quick fixes or obvious solutions.*
- *Continue placing the **user at the center** of the process, better yet **co-design, co-create, partner with end-users in finding solutions***
  - *In the Scandinavian approach, **designers** were viewed **as technology consultants** who helped users (the task experts) to redesign their tasks for maximum benefit.*

Deliver, prototype, evaluate, iterate

In the ‘Deliver’ phase the design team **elaborates on their design concepts through proto**types of increasing fidelity which are **iteratively tested** and redesigned, based on **users’ feedback**. Eventually those prototypes validated and released… So much happens in this phase!!!!

Deliver, prototype, evaluate, iterate

- Know and apply user interface design **principles, patterns, recommendations, and guidelines**; there is a wealth of useful literature for ach of these tasks, from interface design to testing, even deployment.
- **Add depth** to your ideas and concepts and **start prototyping**, considering what you derived and synthetize from previous phases but not without combining it with the knowledge of the discipline.
- **Test with end-users every step of the way** and as soon as you have the first sketches/prototypes**.**
- Prototype, test, analyse, learn, **iterate**, and repeat… …



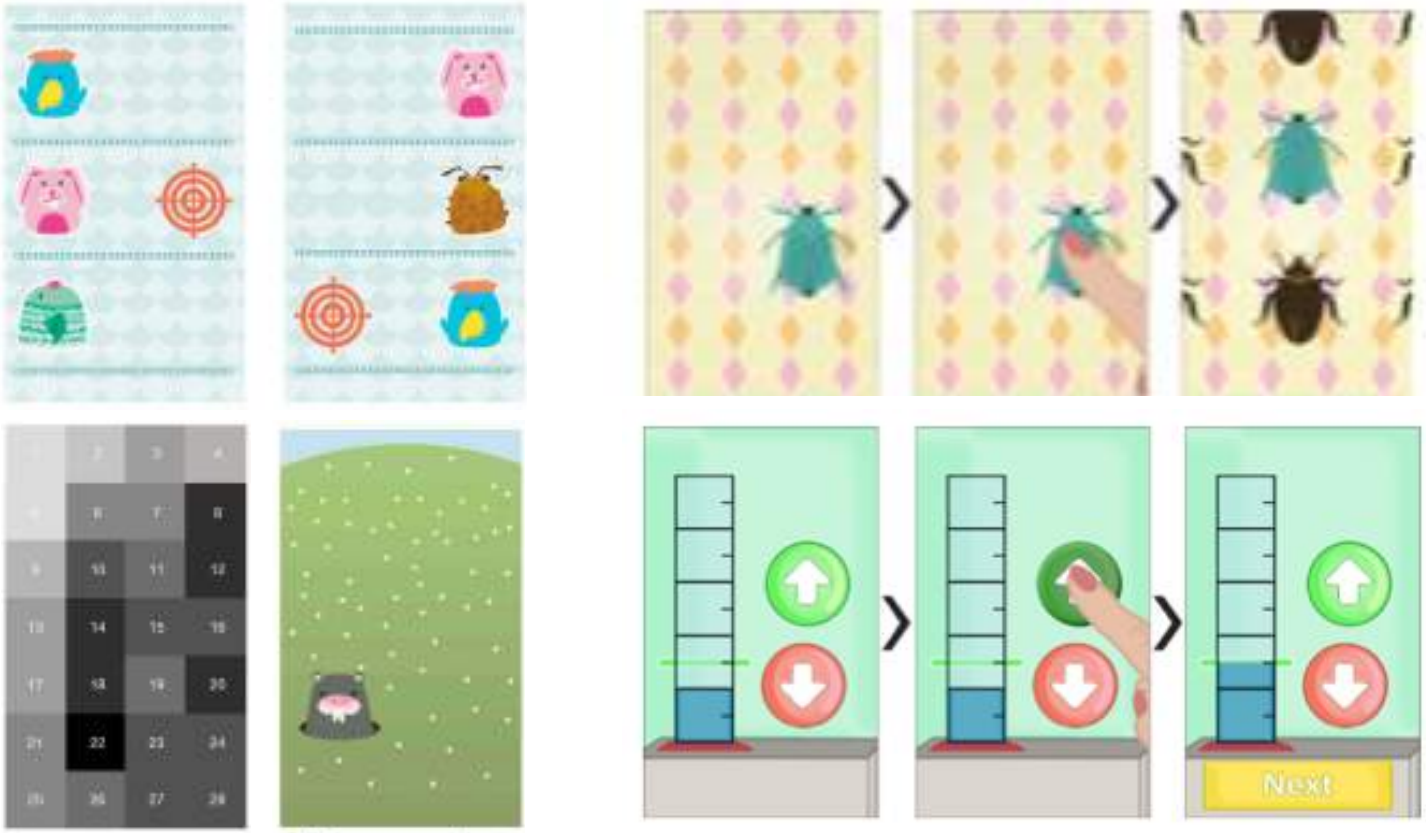
Know and apply the principles of the discipline

- As we age, (more) changes start taking place and our human body deteriorates:
  - Hearing and eyesight weakens.
  - Thinking and learning abilities slow down.
  - Fingers and hands loose dexterity.
  - Cognitive and physical abilities are eventually affected.

- User interface design must accommodate for ageing users:
  - Create high contrast between the text and its background.
  - Give cues in the interface about the action the user recently took.
  - Make links and button targets large enough to click or tap and add padding between them.
  - Change global navigation only when necessary.
  - … …

- These changes will positively impact everyone -

Design guidelines and patterns for mobile user interfaces



- Targets for tap gestures: at least 14mm square
- Targets for swipe gestures: at least 17.5mm
- 0-10.5mm spacing between adjacent tap targets
- 0-7mm spacing between adjacent swipe targets
- 10 tap gestures comfortably
- Other guidelines and recomendadations in the article

Silva, P. A., Leitão, R., & Kerwin, M. (2017). Investigating activity zones on smartphones: An empirical study with older adults. 2017 24° Encontro Português de Computação Gráfica e Interação (EPCGI), 1–8. https://doi.org/10.1109/EPCGI.2017.8124301

Nunes, F., Silva, P. A., Cevada, J., Barros, A. C., & Teixeira, L. (2015). User interface design guidelines for smartphone applications for people with Parkinson's disease. Universal Access in the Information Society, 1–21. https://doi.org/10.1007/s10209-015-0440-1

Recommendations on Age-friendly and Gender-balanced Media Content Delivery of Products for Seniors

Silva, P. A., & Antunes, M. J. (2020). Recommendations on Age-friendly and Gender-balanced Media Content Delivery of Products for Seniors: Findings from a Case Study. ESSACHESS – Journal for Communication Studies, 13(2(26)), 129–155.

Online presence

Service/Platform	Product X
Website	√
Facebook	+10K followers
Twitter	37 followers
Instagram	734 followers
YouTube	38 subscribers
LinkedIn	779 followers

On Sunday, nearly 20k on Facebook

Overview of data analysed

Service/Platform	# posts	# text excerpts	# pictures	# videos
Website	Not applicable	Not applicable	13	1
Facebook	83	83	278	14
Twitter	0	0	0	0
Instagram	29	29	60	0
YouTube	6	6	0	6
LinkedIn	2	0	1	0
Total	120	120	352	21

Recommendations on Age-Friendly Media Content Delivery

- Develop a community and celebrate (it) together
- Treat everyone as unique and as peers
- Express gratitude
- Leverage audio-visual materials to create impact
- Share ‘real’, humorous, positive and inclusive content
- Know your users and engage them individually
- Privilege end-users over (explicit) product promotion
- Take advantage of the potential of the sharing and tagging features

Deliver, prototype, evaluate, iterate

- Start **prototyping as early as possible**.
- Start with **simple low-fidelity** prototypes and **evolve into higher fidelity** prototypes, from paper prototypes to click through mock-ups that represent the final system to a more realistic degree.

Design and development of a gait training system for Parkinson's disease

Garzo, A., Silva, P. A., Garay-Vitoria, N., Hernandez, E., Cullen, S., Cock, V. C. D., Ihalainen, P., & Villing, R. (2018). Design and development of a gait training system for Parkinson's disease. PLOS ONE, 13(11), e0207136. https://doi.org/10.1371/journal.pone.0207136

Fig 7. Paper prototype screens used in the Wizard-of-Oz mobile application mock-up evaluated in the first iteration.

Design and development of a gait training system for Parkinson's disease

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Fig 11. BeatHealth mobile application session screen flow. (a) Screen flow from home screen through preparation for session. (b) Continued screen flow from the end of session preparation, through the session itself and eventually the end of session and progress screen.

Deliver, prototype, evaluate, iterate

- Start **prototyping as early as possible**.
- Start with **simple low-fidelity** prototypes and **evolve into higher fidelity** prototypes, from paper prototypes to click through mock-ups that represent the final system to a more realistic degree.
- Test, **test**, test. Nothing justifies an untested product!
- **Iterate** until you get it right, or you run out of time…
- Test both **usability** and **user experience**.
- Use both formative, **inspection** and summative, formal testing with **end-users**, methods.
- *Be **resourceful**.*
- *Testing does **not** need to be **boring**.*
- *Be **mindful of how test are conducted**[1]:*
  - *User drive and control.*
  - *Test settings and preparation.*
  - *Care communication and listening.*
- *If you do not find the right tools, **create them**[2].*

Sources:

[2] Silva, P. A., et al. (2015). Towards a List of Heuristics to Evaluate Smartphone Apps Targeted at Older Adults: A Study with Apps that Aim at Promoting Health and Well-Being. https://doi.org/10.1109/HICSS.2015.390

[1] Silva, P. A., & Nunes, F. (2010). 3 x 7 Usability Testing Guidelines for Older Adults. http://eprints.maynoothuniversity.ie/6030/

Martin LeBlanc
on user interfaces...

CHESS: Connected HEalth Supporting home Stay with dementia

Guisado-Fernandez, E., et al. (2020). A Smart Health Platform for Measuring Health and Well-Being Improvement in People With Dementia and Their Informal Caregivers: Usability Study. JMIR Aging, 3(2), e15600. https://doi.org/10.2196/15600

Guisado-Fernández, E., et al. (2020). Informal caregivers' attitudes and compliance towards a connected health platform for home care support: Insights from a long-term exposure. Gerontechnology, 18(4), 231–242. https://doi.org/10.4017/gt.2019.18.4.005.00

Withings Go – activity monitor

Withings Weighing Scale

Omron – BP monitor

Design, development, and validation, through trials in the home of the PwD of an online platform system to support informal caregivers. CH can potentially change PwD current care model, facilitating a proactive and preventive model, utilizing self-management based strategies, and enhancing caregivers' involvement in PwD's management at home.

To keep in mind across all phases…

Design for real people, real needs

- **Technology and design can play a key role in enabling people**, so we need to **ensure** that the **digital solutions** we create **effectively enable people**.
- Right from the start:
  - Remember that digital solutions are meant to **support/be used by humans**.
  - Consider the **implications of what the system will enable/encourage**.

- Digital products and services should be:
  - Fit for **purpose**, e.g. alleviates caregivers' burden, not just surveillance, economic interests.
  - Fit for **independence**, e.g. ageing in place, not just prescription or quick fixes.
  - Fit for **life** (everyday spaces, routines, relationships, etc.), holistic, not just the engineered system 'purpose' (DDF).
  - Fit for **play**, **fun**, **self-expression**, **inclusion**, **identity**, healthy **longevity**, not just for mundane tasks or stereotypes.
  - Fit for **agency**, **self-determination**, **autonomy**, **self-management**, not just prescription.
  - Fit for **everyone who is actually involved**, not just for the designer, the programmers, the company director, policy, governments.

Dance! Don't Fall

Silva, P. A., Nunes, F., Vasconcelos, A., Kerwin, M., Moutinho, R., & Teixeira, P. (2013). Using the Smartphone Accelerometer to Monitor Fall Risk while Playing a Game: The Design and Usability Evaluation of Dance! Don't Fall. In D. D. Schmorrow & C. M. Fidopiastis (Eds.), Foundations of Augmented Cognition (pp. 754–763). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-39454-6_81

Kerwin, M., Nunes, F., & Silva, P. A. (2012). Dance! Don't Fall—Preventing falls and promoting exercise at home. Studies in Health Technology and Informatics, 177, 254–259. https://doi.org/10.3233/978-1-61499-069-7-254

Dance! Don't Fall!: Monitor fall risk while actively reducing it through a fun and easy

Monitors risk of falling while actively reducing it through fun and easy exercise: dance.
Accelerometer and fall algorithm assess Accuracy, Timing, Grooviness, Stability
When it appears the person may be at risk, the game triggers a short questionnaire
Evaluations are stored and progress can be monitored over time

My three adjectives checklist

Humane

Inclusive

Fun

My three adjectives checklist

Humane

Inclusive

Fun

Humane, because digital solutions need to solve a human need, that respects and extends human nature, regardless of the age of the person.

My three adjectives checklist

Humane

Inclusive

Fun

Inclusive, because we all have different levels of abilities and design needs to accommodate, meet, and fit people's particular abilities.

My three adjectives checklist

Humane

Inclusive

Fun

Fun, because we want people to keep using it, without it needing to feel like a chore...

What else can we do?

What else can we do?

Get involved

From gerontologists to psychologists and doctors, all are key stakeholders, so being available is crucial.

Push forward

Things advance slowly, specially when it comes to policy, so keep pushing every chance you can.

Advocate

Everyday we write culture, in our thoughts and actions. So, be kind, and every chance you have, start the change.

A Commentary on Blue Zones®: A Critical Review of Age-Friendly Environments in the 21st Century and Beyond

Marston, H. R., Niles-Yokum, K., & Silva, P. A. (2021). A Commentary on Blue Zones®: A Critical Review of Age-Friendly Environments in the 21st Century and Beyond. International Journal of Environmental Research and Public Health, 18(2), 837. https://doi.org/10.3390/ijerph18020837

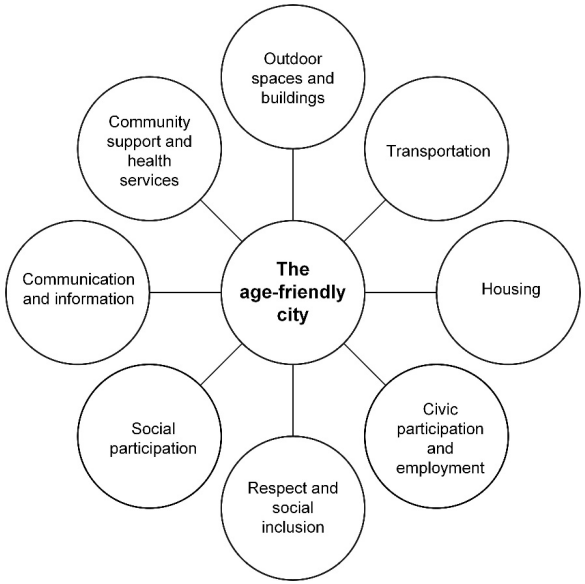


Figure 1. The eight domains of an age-friendly city [3].

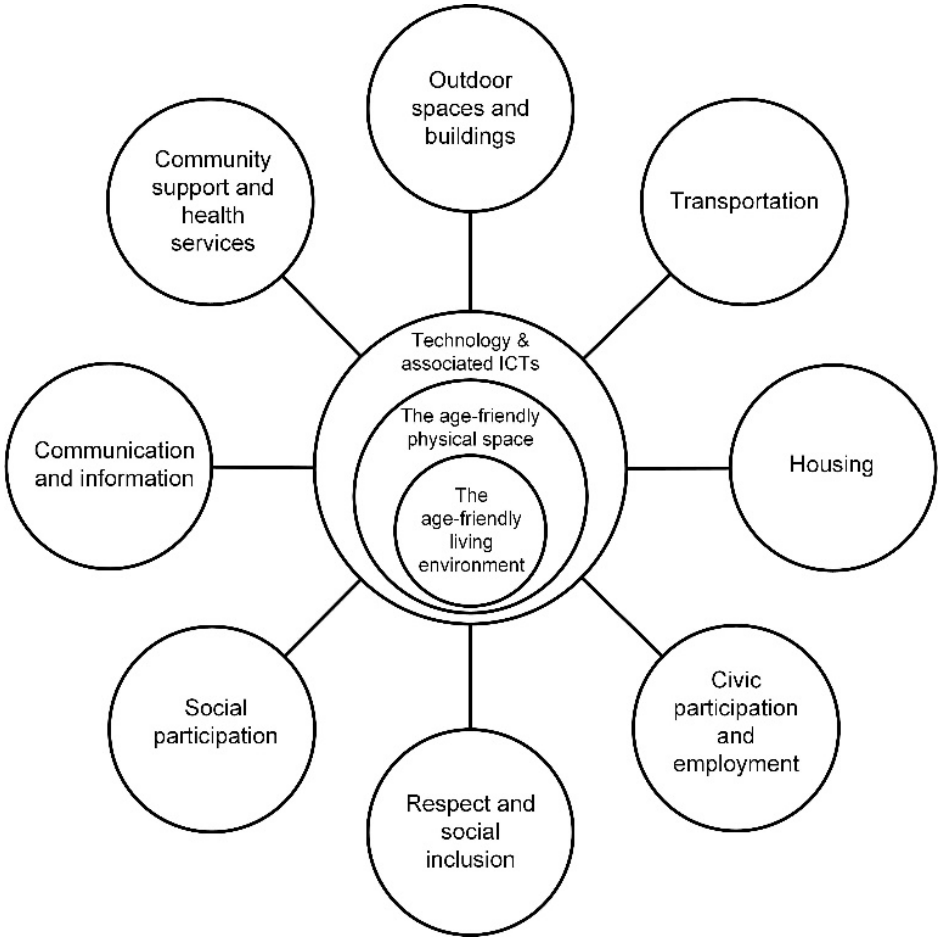


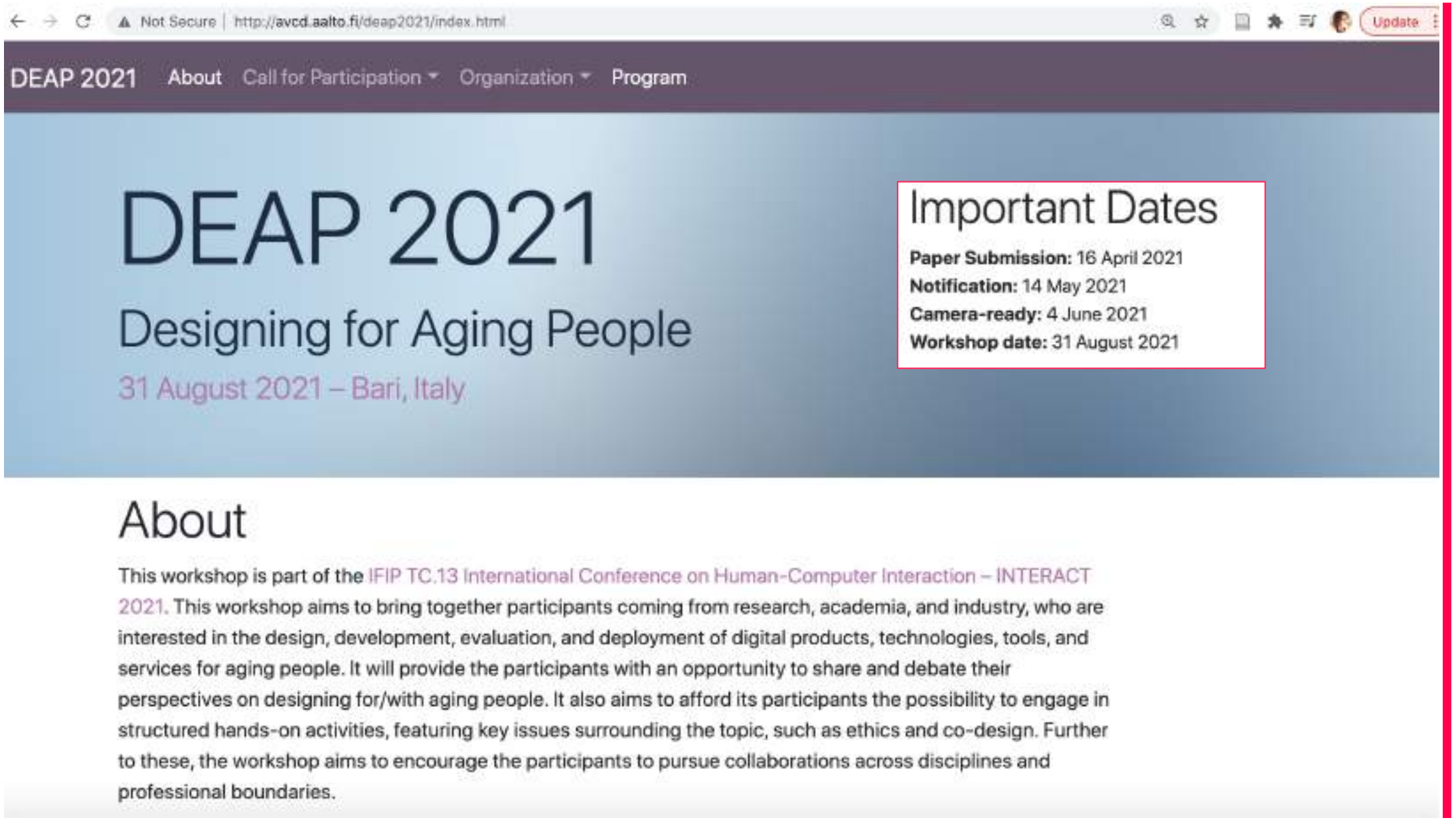
Figure 2. The Smart Age-friendly Ecosystem (SAfE) framework [48]. Permission gı

The paper argues that the **Blue Zones® checklists are limited in accommodating for diversity** and that the **WHO age-friendly framework does not match current re**ality with regards to **technology** use, deployment, and implementation **in the environments in which older adults live.**

“ Thank you!

While we cannot ignore the physical, sensory and cognitive changes that emerge as we age, and that eventually catch up to us all, we must acknowledge that often older people are disabled by the design of the technology, the products, the services, and the environment around them...

Feel free to reach out:
paulasilva@dei.uc.pt


Not Secure | http://avcd.aalto.fi/deap2021/index.html
Update
DEAP 2021
About
Call for Participation
Organization
Program
DEAP 2021
Designing for Aging People
31 August 2021 – Bari, Italy
Important Dates
Paper Submission: 16 April 2021
Notification: 14 May 2021
Camera-ready: 4 June 2021
Workshop date: 31 August 2021
About
This workshop is part of the IFIP TC.13 International Conference on Human-Computer Interaction – INTERACT 2021. This workshop aims to bring together participants coming from research, academia, and industry, who are interested in the design, development, evaluation, and deployment of digital products, technologies, tools, and services for aging people. It will provide the participants with an opportunity to share and debate their perspectives on designing for/with aging people. It also aims to afford its participants the possibility to engage in structured hands-on activities, featuring key issues surrounding the topic, such as ethics and co-design. Further to these, the workshop aims to encourage the participants to pursue collaborations across disciplines and professional boundaries.