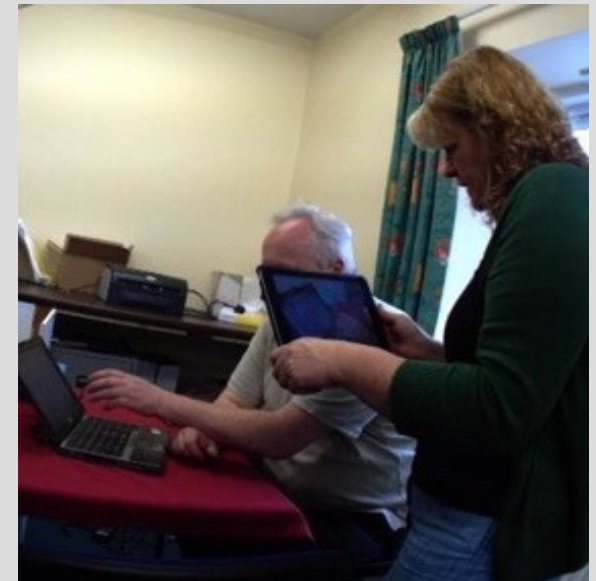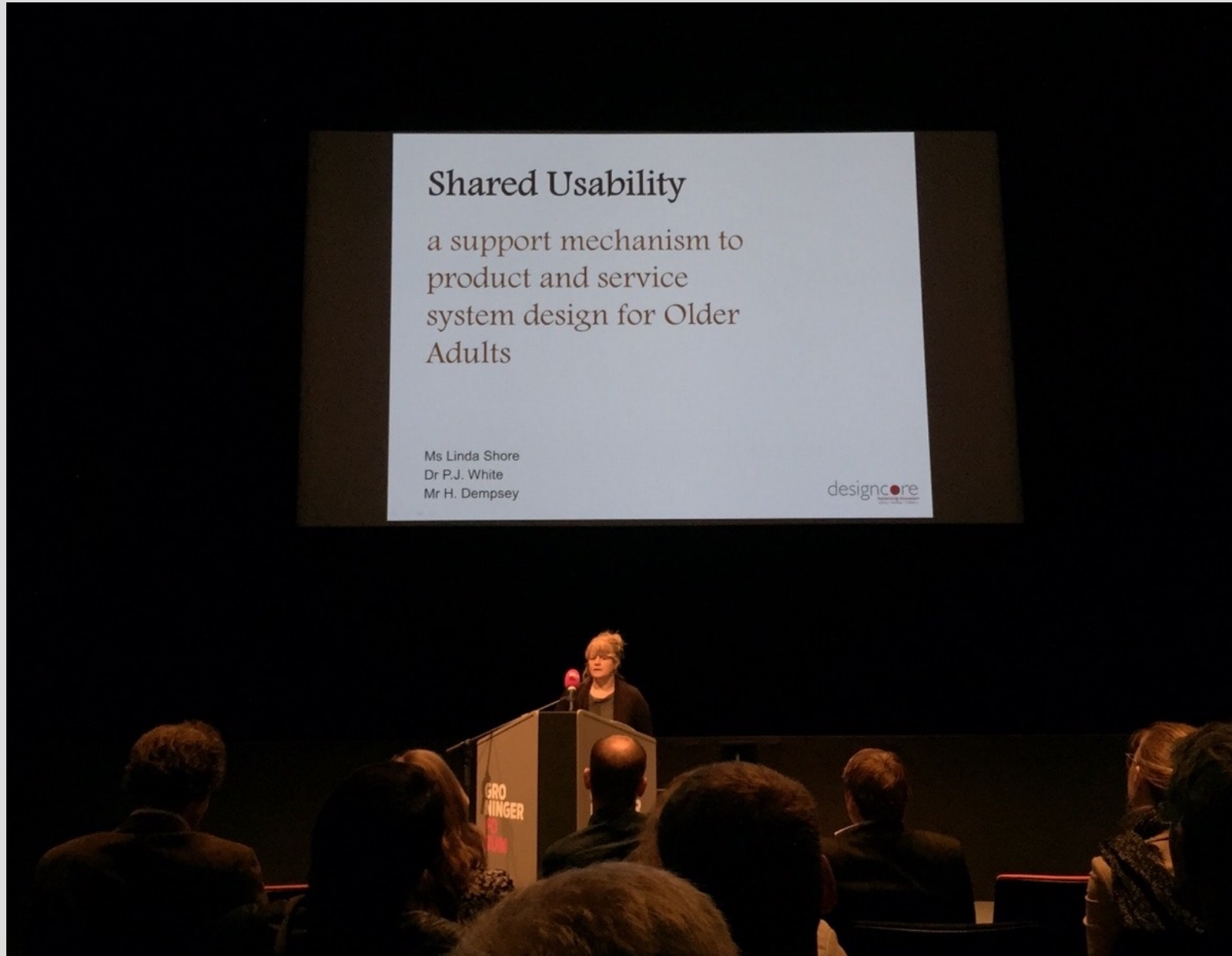# Development of a design tool to optimise acceptance of exoskeletons by older adults

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GSA Highlands and Islands

The Glasgow School of Art

INNOVATION SCHOOL
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Introduction

Introduction

Research Statement

"This research proposes to develop empirical evidence that will lessen negative product related stigma and improve technology acceptance for older adults with reduced mobility that wear a soft robotic biomimetic exoskeleton when conducting everyday tasks and activities".
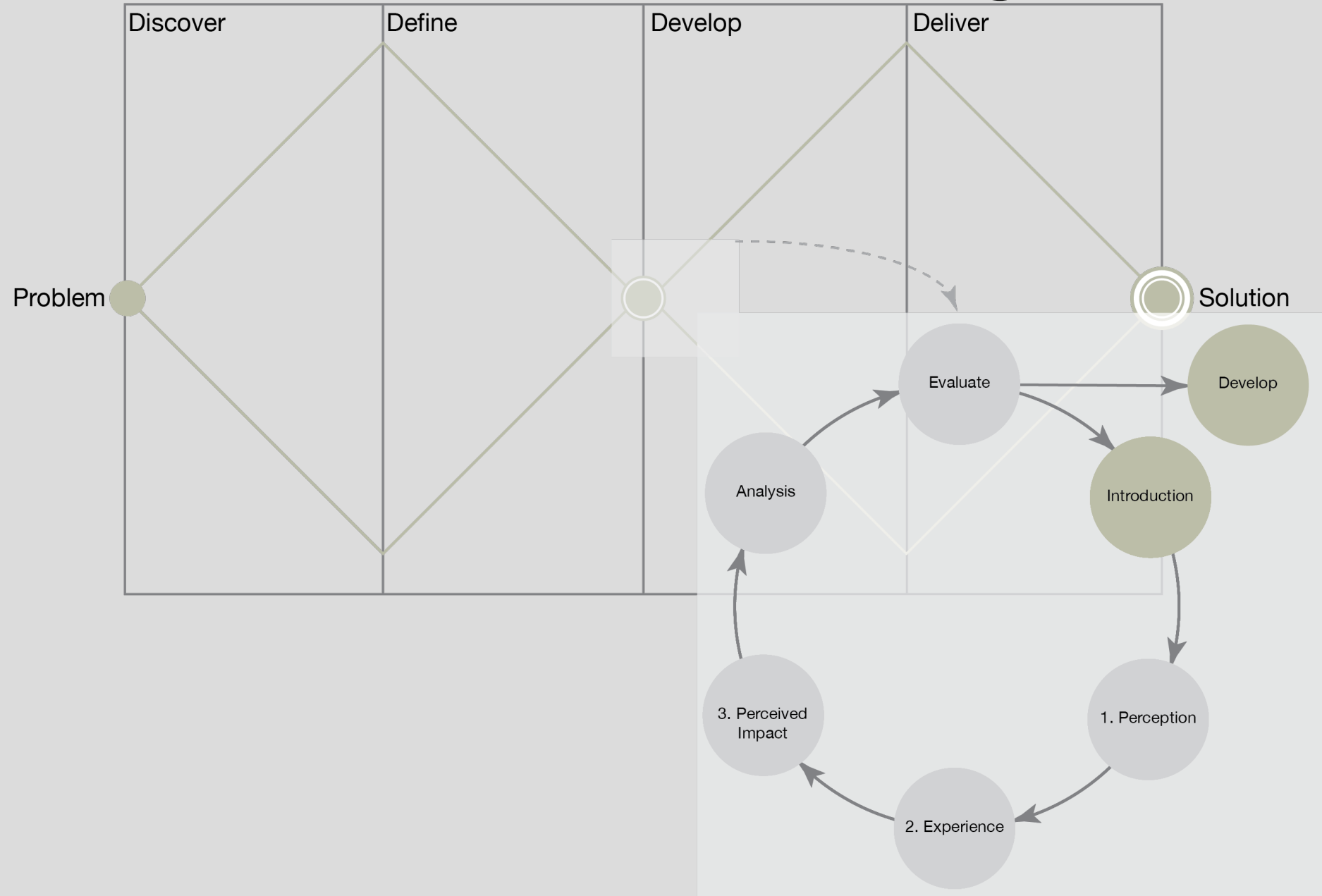
Research Overview
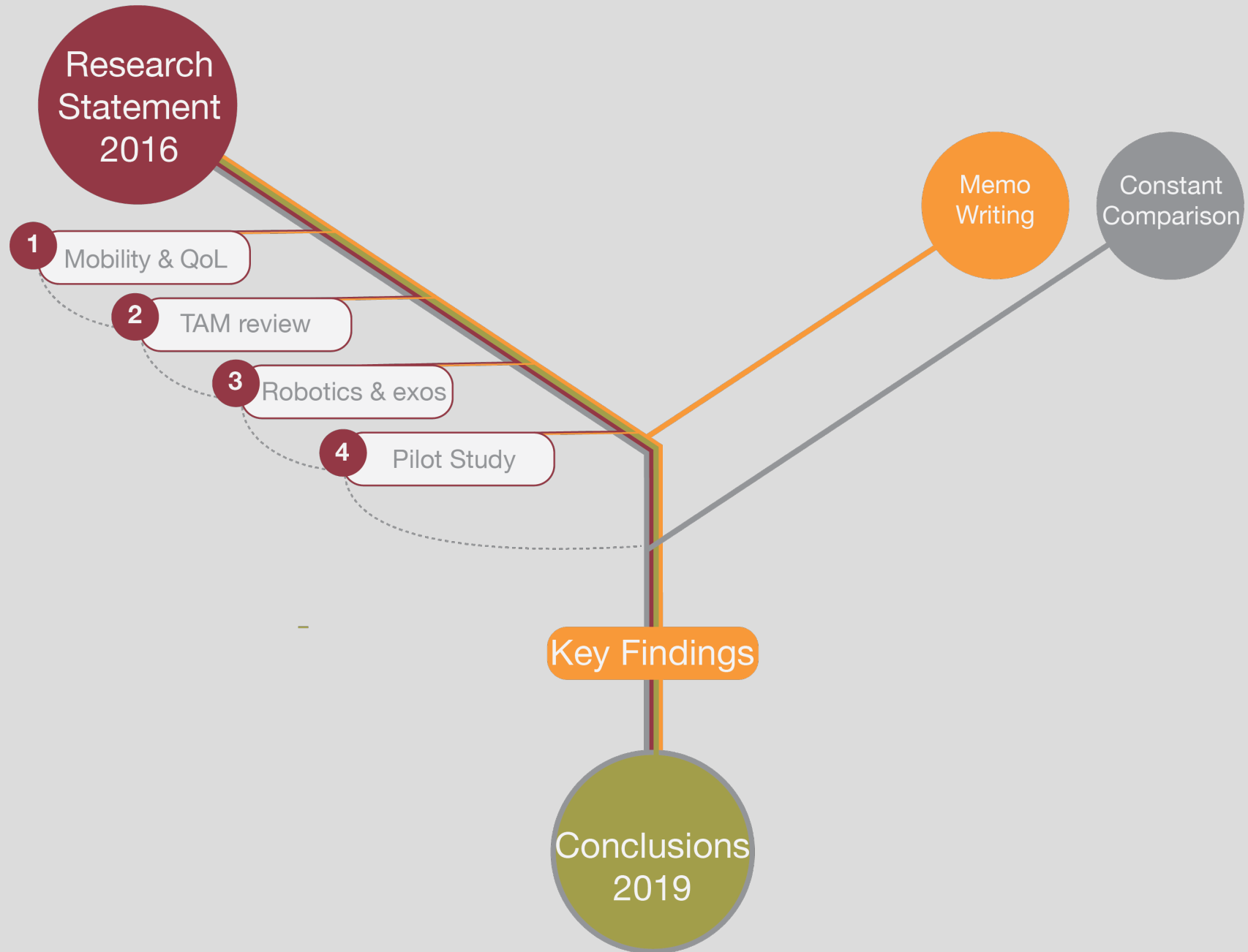
Innovations #1 – IDAM & Exoscore
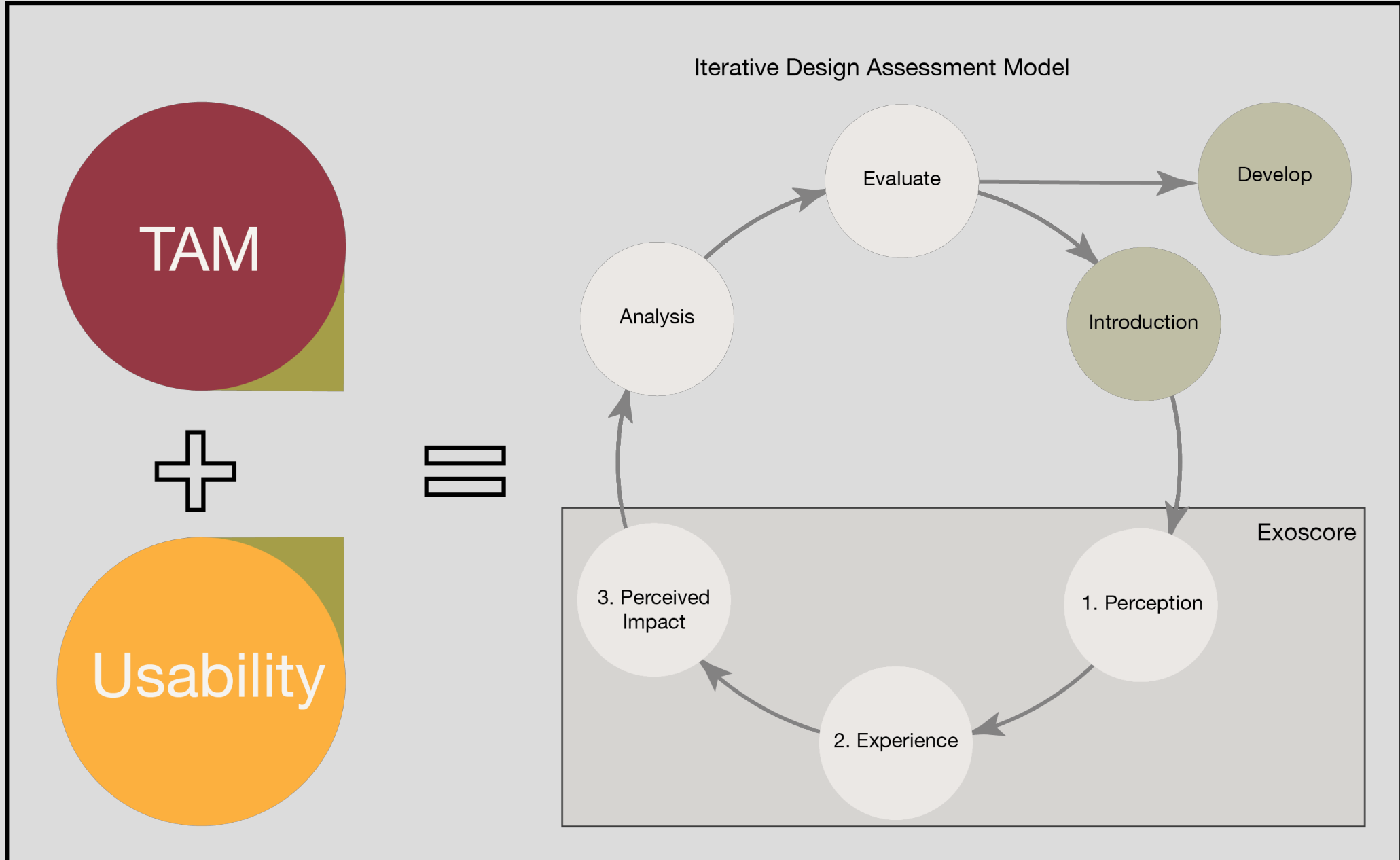
Innovations #2 – IDAM Positionning

Innovations #3 – New & Original Constructs

PERCEPTION	EXPERIENCE	PERCEIVED IMPACT
What is this...? (exo etc information)	**What is this...?** (Intro, tasks etc...)	**What is this...?** (Summarise, self-contextualise)
Constructs	Tasks	Constructs
P.U. | Perceived Usefulness	**DON.** | Ease/Efficiency?	**A.T.T.** | Attitude towards Technology
E.E. | Effort Expectancy	**S.t.S.** | Ease/Efficiency?	**Anx.** | Anxiety
Anx. | Anxiety	**Walk.** | Ease/Distance/Time?	**S.E.** | Self-Efficacy
S.E. | Self-Efficacy	**Stand.** | Ease/Time?	**B.I.** | Behavioural Intention
E.P | Experiential Perception	**DOF.** | Ease/Efficiency/Time?	**P.Ad** | Perceived Adaptability
	Charge/Store? | Ease/Effort/?	**S.I.** | Social Influence
		S.L | Self-Liberty
		QoL.E | Quality of Life Enhancement
		Trust | Trust

Method & Approach

Context & Application

Context & Application

Highlights
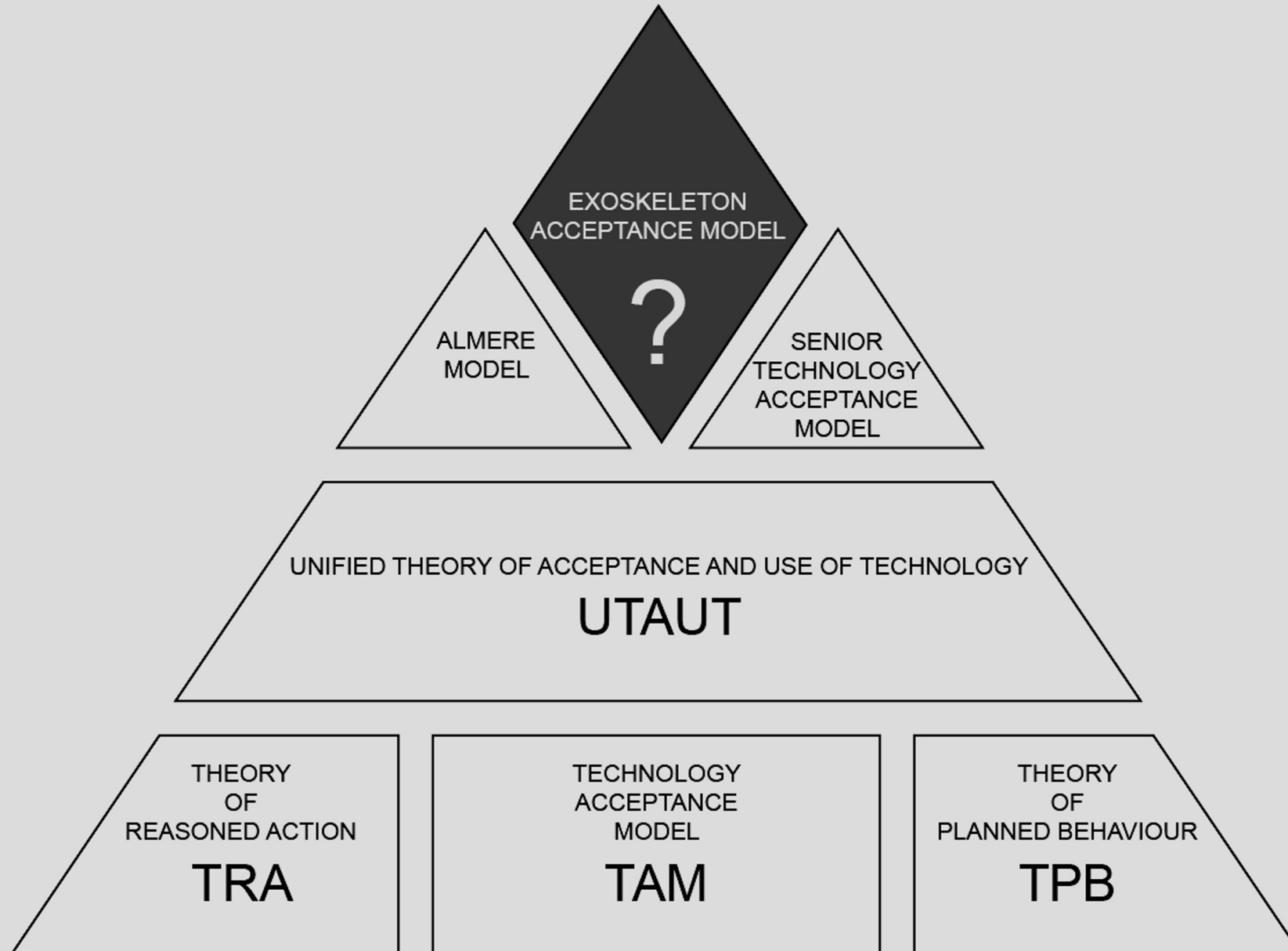
Highlights

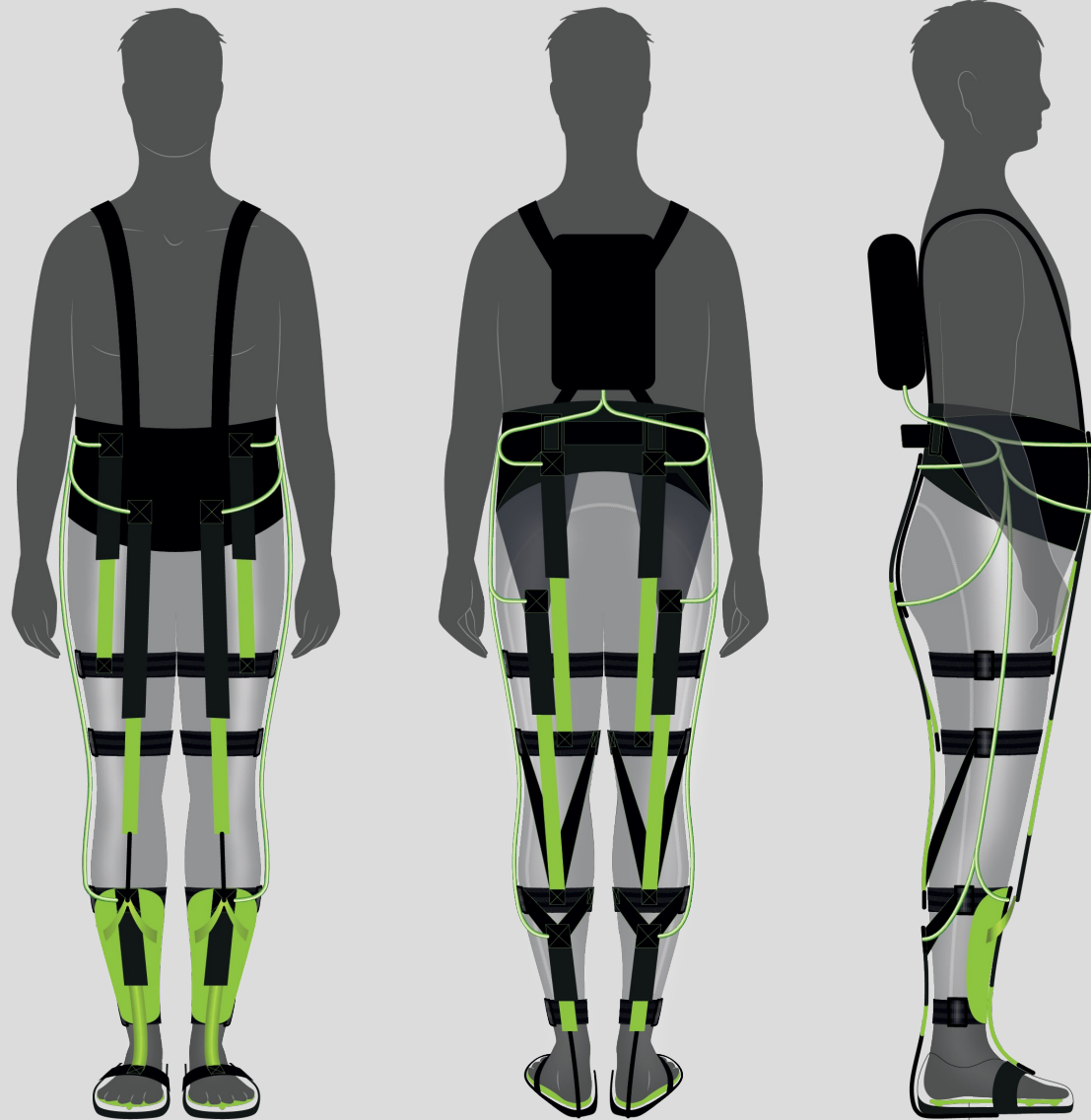# Key Outcomes

Adam de Eyto / Tjaša Kermavnar. Design Factors, University of Limerick
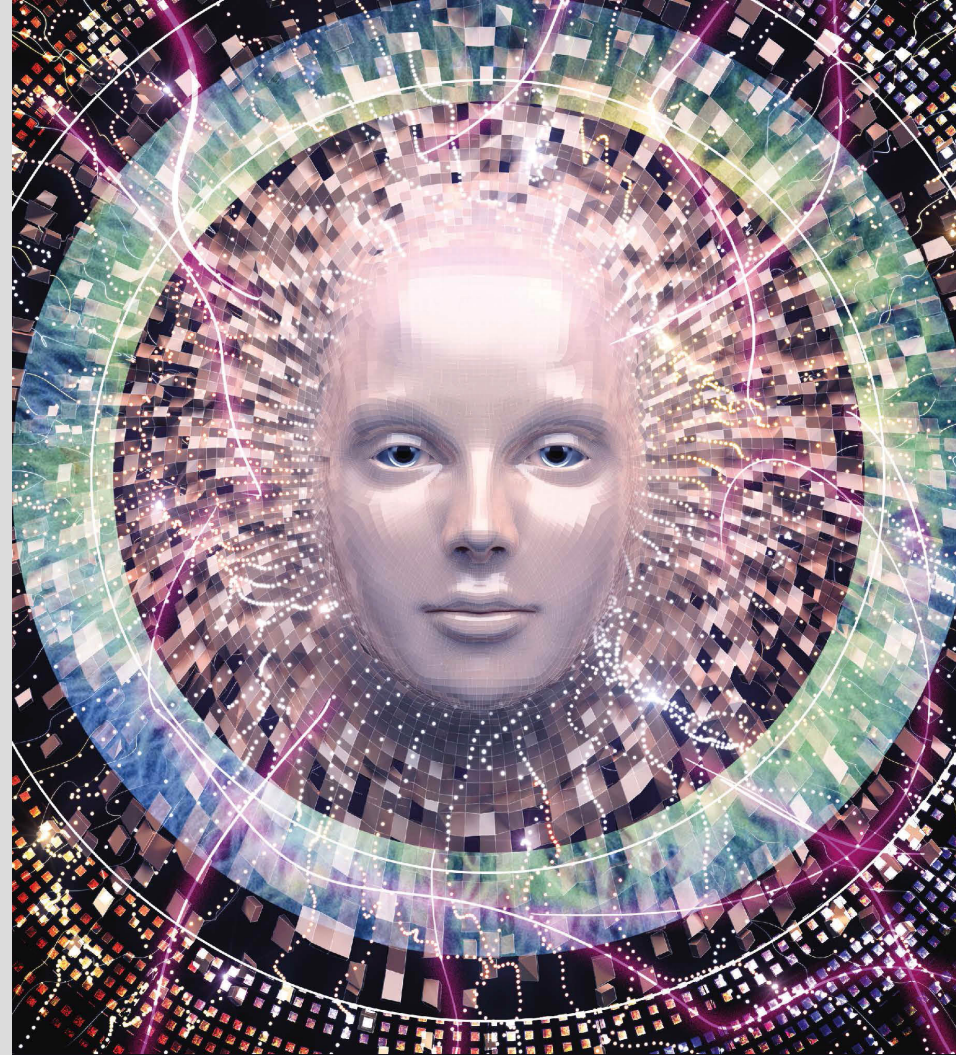
Challenges

Currently….

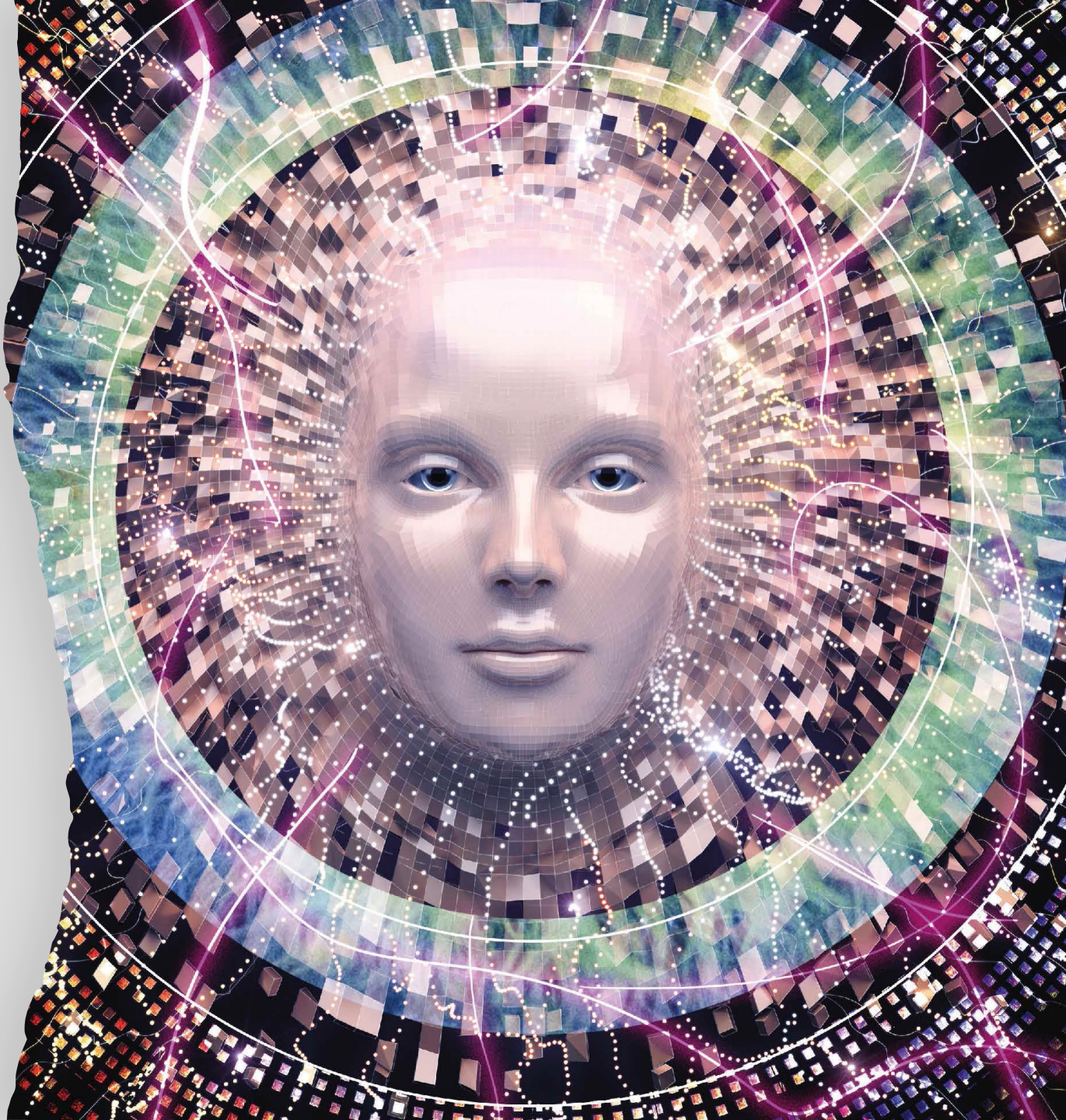TRANSGENERATIONAL TECHNOLOGY AND INTERACTIONS FOR THE 21ST CENTURY

Perspectives and Narratives

Hannah R. Marston • Linda Shore • Laura Stoops • Robbie S. Turner

Transgenerational Technology (TT)

Optimises use, adoption, autonomy, and acceptance of
technology to assist and enhance the lived experience
across the generations

Marston, Shore, Stoops & Turner, 2022

Transgenerational Assistive/Accessible Technology (TAT)

Refers to Assistive Technologies designed to be adaptive and supportive to people across the generations who experience physical and/or cognitive limitation

Transgenerational Assistive Robotic Technology (TART)

Refers to powered robotic orthosis/prosthetics that enhance, augment ability and body connective awareness - embodiment which are adaptive across the life course and to user needs requirements

Marston, Shore, Stoops & Turner, 2022
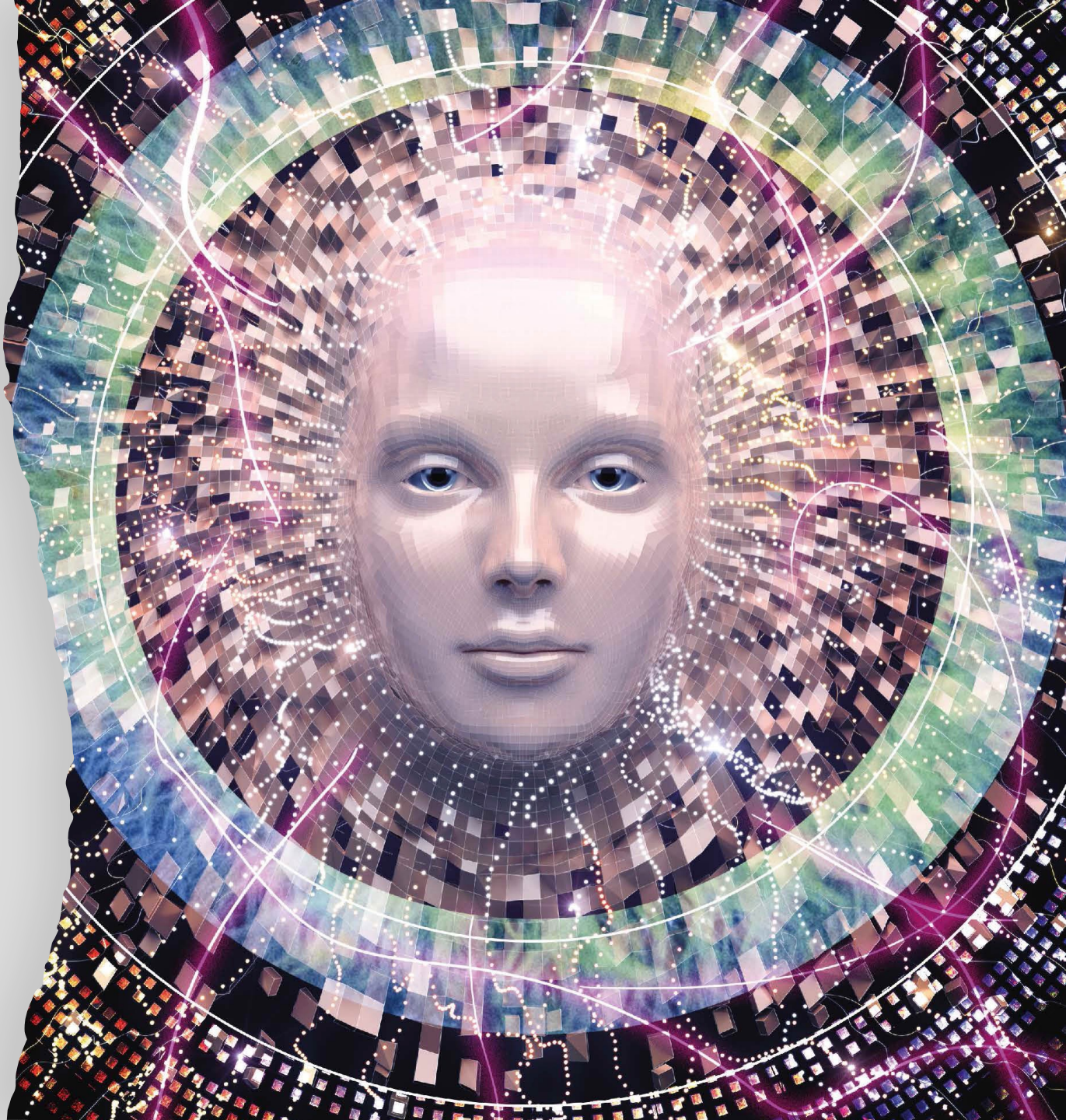
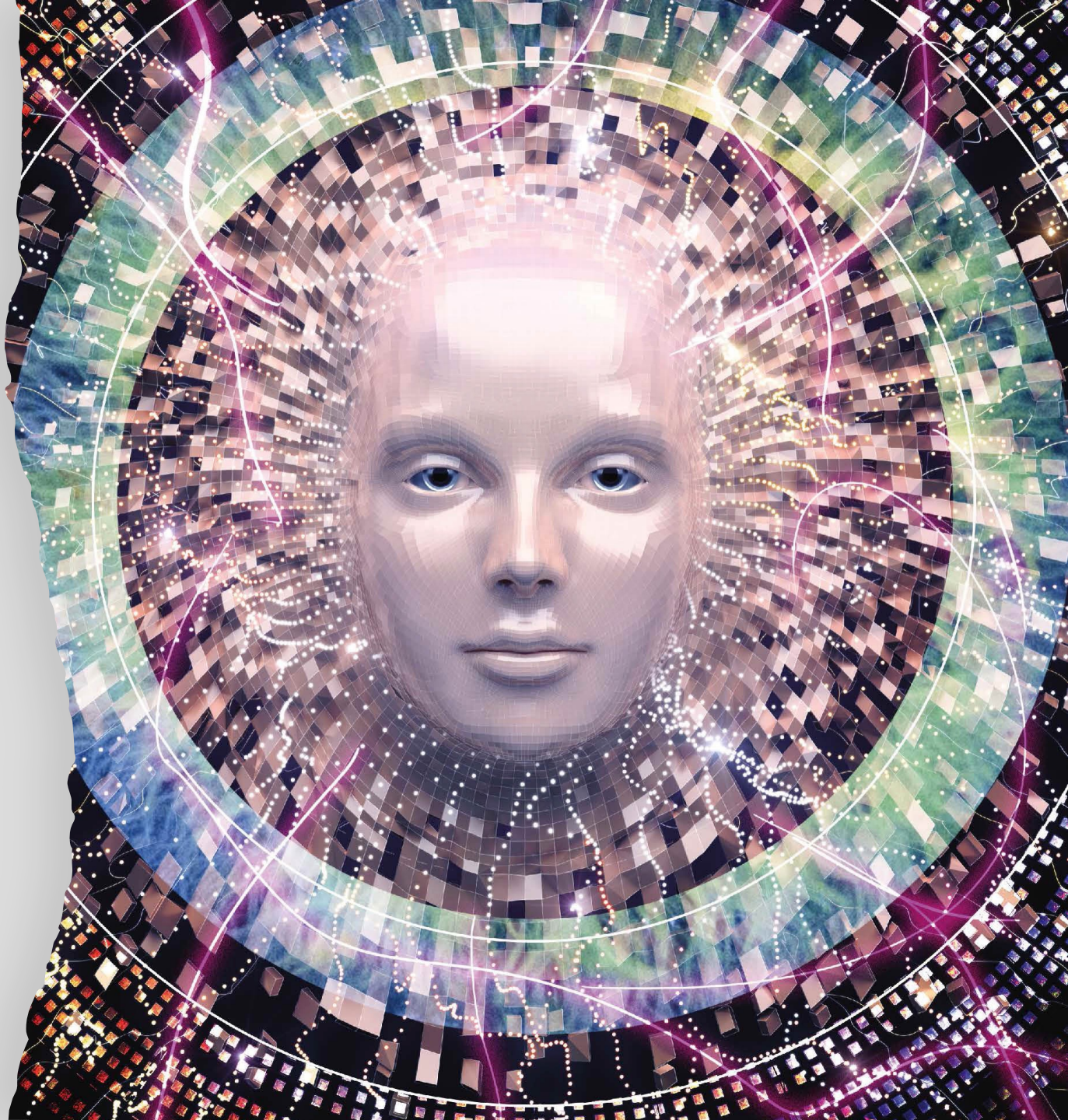**Transgenerational Living Communities & Cities (TLCC)**

Posits that all generations in a community experience and feel part of inclusive and autonomous ecosystems

Transgenerational Gaming (TG)

Encourages optimized digital game experiences irrespective of the age or ability of the player

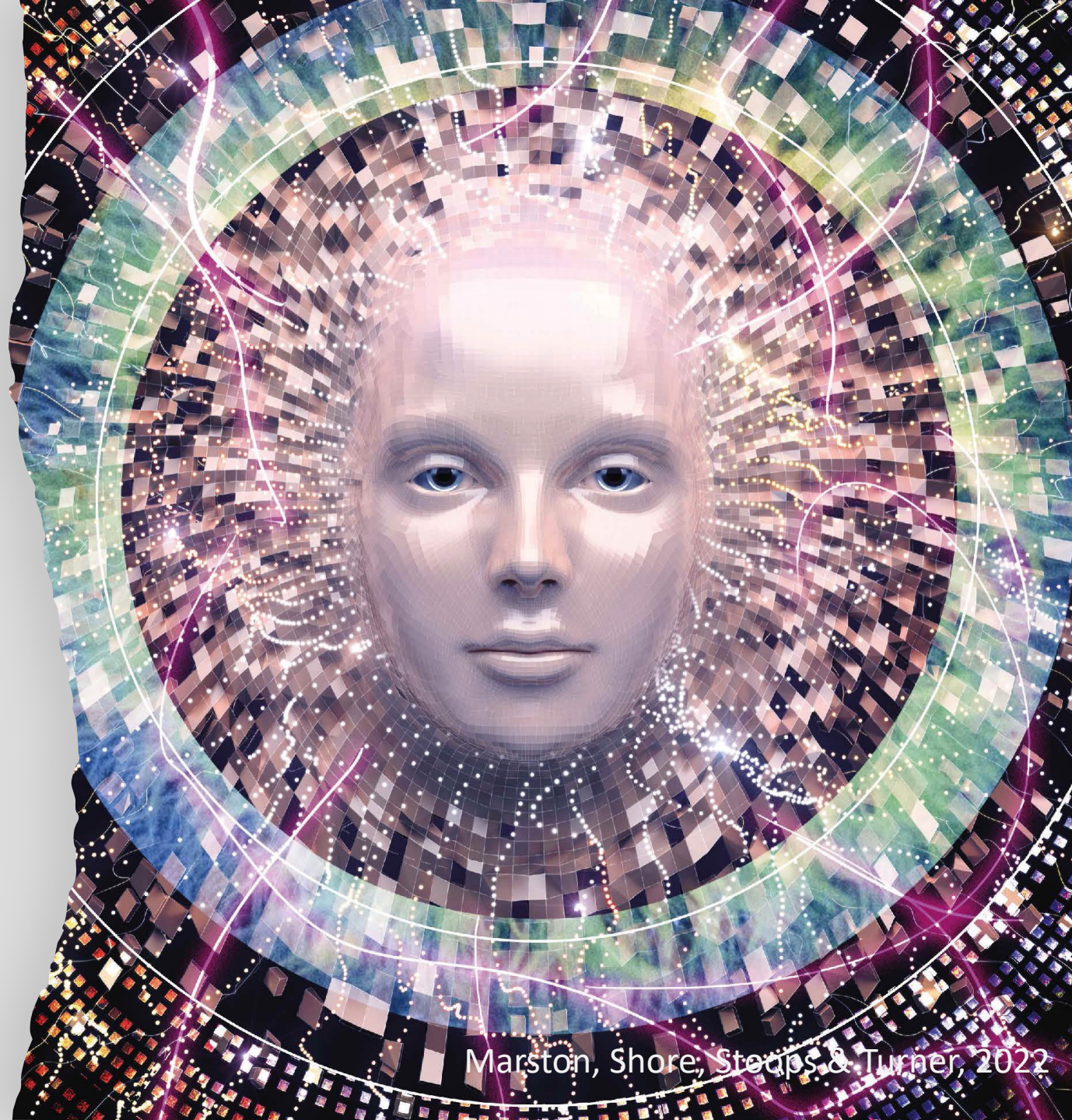Marston, Shore, Stoops & Turner, 2022

Transgenerational Technology: Well-Being & Innovation Opportunity for the 21st Century - A Manifesto

We are an Interdisciplinary team that share a common focus – the value and quality of peoples' interactions and experiences with technologies should be enhanced, supported and unhindered. Commercial gain, hurried assumptions or lack of enquiry to human concern should remain secondary to the primary intent and value of defining the user needs requirements identified during research. Empathic and purposeful design approaches offers inclusive and human centred focus defining the 'how' and positive augmentation of abilities, experience and activity of not just the person & context of use, but also of their network of stakeholders.

1) We believe that chronological age should not determine vulnerability, for we are aware, vulnerability and age/longevity is not always mutually exclusive.

2) People should not be discriminated upon because of their beliefs, who they are, identify as, or what role they partake in society, and their voices should be expressed freely and listened to.

3) As a follow to Point 2, the expressive commentary voiced and expressed freely should not harm or hurt others by malicious criticism or attack.

4) Research and recruitment of participants who are perceived to be and/or are marginalized in society should not result in discrimination or biased research outputs.

5) We believe that a citizen continues to learn and gain life experiences and can offer contribution to society across their lifespan.

6) Innovation and research practices must consider democratised voices and user experiences as valuable catalysts to creativity and technology well-being for all.

7) Interdisciplinary research must be recognised across all disciplines as a vital contributor to societal growth and documented interactions

8) Inter & multi-disciplinary and unique language and terminology is recognised across disciplines through collaborative research providing a rich embrace and appreciation as we co-design, innovative research approaches and create new technologies, services and systems that benefit all.

9) We believe cognitive and physical limitations can be supported, and dignity is always offered and placed central to the person.

10) To reflect on digital legacies, emerging and future technologies should not harm or injure and should obey the instruction as directed by the human.

11) At all times the intervention of future technologies should not place any person in a position of feeling stigmatised or excluded by society.

12) The data that effectively is created and stored by actors (e.g., stakeholders) will be done collectively and offers the person (including guardian, next of kin) autonomy in voicing their agreement or dissatisfaction to this activity.

Signed.......Hannah R. Marston, Linda Shore, Laura Stoops, Robbie S. Turner I 2022 ©

Marston, Shore, Stoops & Turner, 2022

Current work....

The future of healthcare is NOT in clinical settings

Menopause – a pathway to successful ageing, or not?

Menopause & the sound effect

References:

Shore, L., Kiernan, L., de Eyto, A., Bhaird, D.N.A., Connolly, A., White, P.J., Fahey, T. and Moane, S., 2018. Older Adult Insights for Age Friendly Environments, Products and Service Systems. Design and Technology Education, 23(2), p.n2. (https://ojs.lboro.ac.uk/DATE/issue/view/201/pdf)

Shore, L., Power, V., de Eyto, A. and O'Sullivan, L., 2018. Technology acceptance and user-centred design of assistive exoskeletons for older adults: A commentary. Robotics, 7(1), p.3. (https://www.mdpi.com/2218-6581/7/1/3)

Shore, L., Power, V., Hartigan, B., Schülein, S., Graf, E., de Eyto, A. and O'Sullivan, L., 2020. Exoscore: a design tool to evaluate factors associated with technology acceptance of soft lower limb exosuits by older adults. *Human Factors*, *62*(3), pp.391-410.

Shore, L., de Eyto, A. and O'Sullivan, L., 2022. Technology acceptance and perceptions of robotic assistive devices by older adults–implications for exoskeleton design. *Disability and Rehabilitation: Assistive Technology*, *17*(7), pp.782-790.

Marston, H.R., Shore, L., Stoops, L. and Turner, R.S., 2022. *Transgenerational Technology and Interactions for the 21st Century: Perspectives and Narratives*. Emerald Group Publishing.

Thank you

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