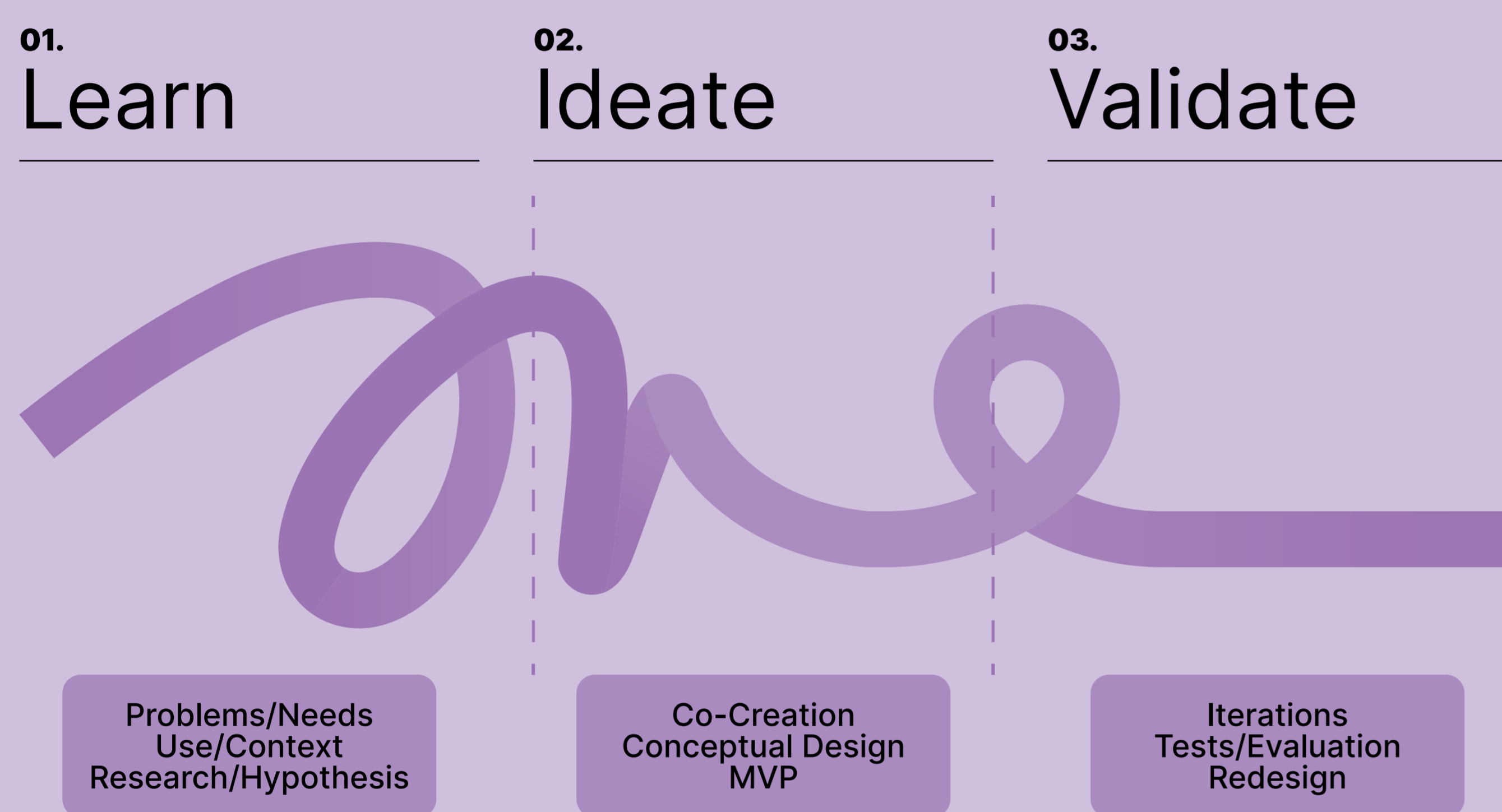


How Human Factors and User Experience can improve Socio-Health Care products and service development

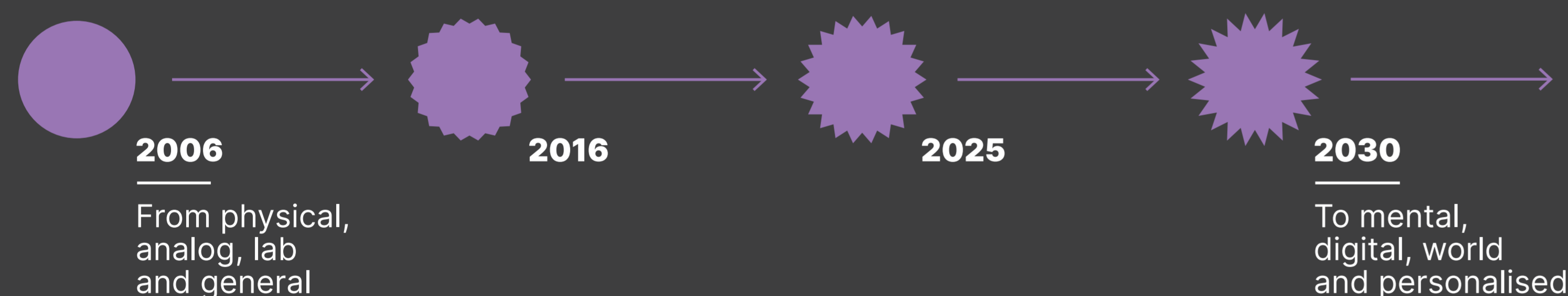
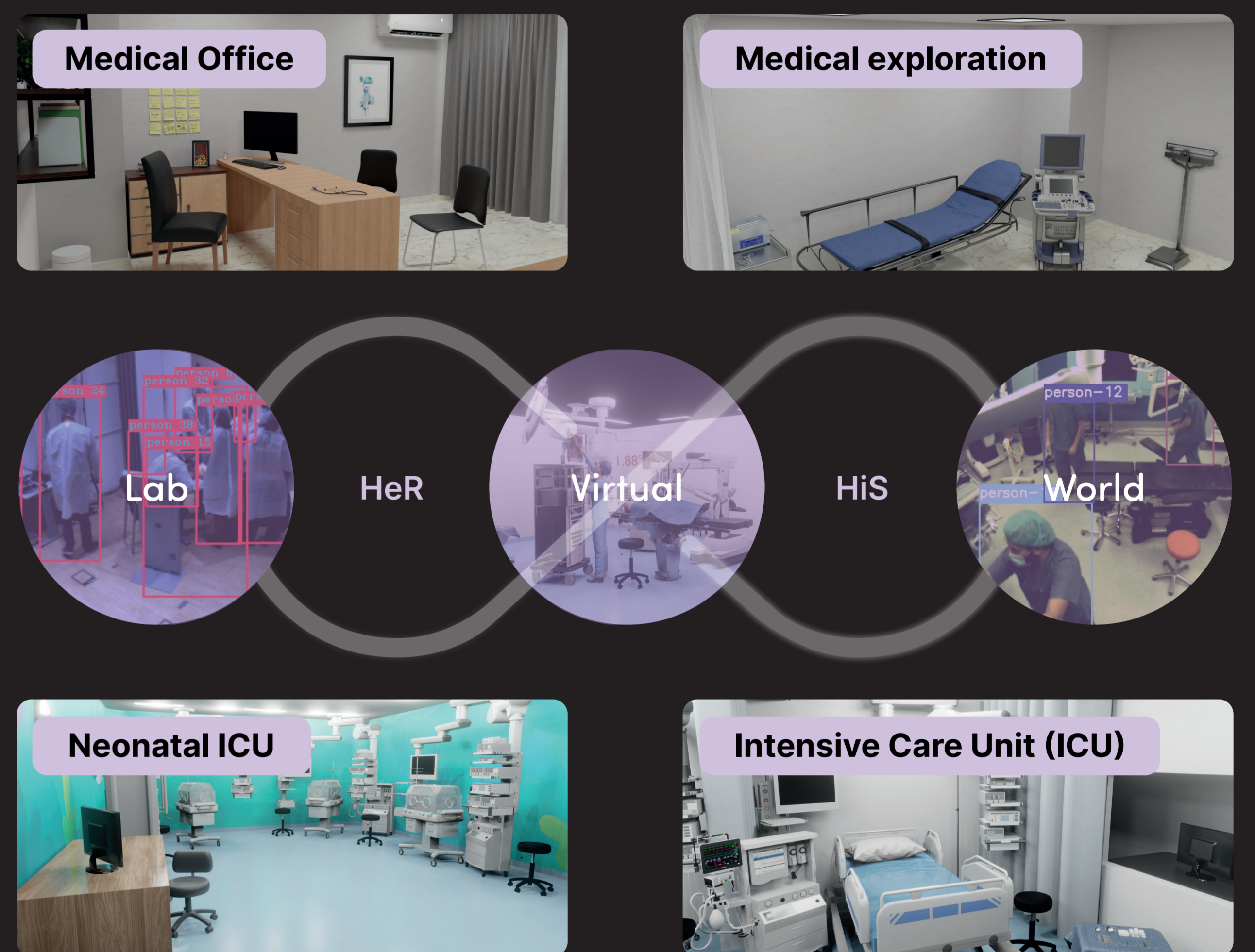
Adrián Morales-Casas, Amparo López Vicente, Carlos Atienza Vicente, Raquel Marzo Roselló, José Laparra-Hernández

The expectation was for **Health and Social care** services to collaborate closely, capitalizing on evident synergies to reduce economic costs to society and enhance overall well-being and quality of life. However, in the past decades, these efforts have fallen short in several European countries, encompassing various social and healthcare models from Nordic nations to Southern counterparts like Spain, as well as initiatives from countries such as Germany, the UK, and the Netherlands, among others. Likewise, **Human Factors and User Experience** can provide complementary and valuable insights, integrating objective quantitative data with subjective qualitative perspectives, tailored to specific aims, target users, contexts, and stages of product/service development. Nevertheless, achieving coherent and effective combinations of both remains challenging, especially in the healthcare sector, hindering the delivery of personalized socio-healthcare services for ALL populations and the efforts to minimize risks of exclusion.



We have more than **20 years of experience** in combining both approaches, specially focusing on **older persons** (colours and emotions in social care centers, Bank4Elder); **people with disabilities** (stroke, TREMOR project, BETTER project; Cerebral Palsy; ABC project, X-Ray Sitting; Support Spinal Cord Injury, PUMA project, etc.) and gender inclusive (workplace design, humanize births). Over the past five years, we have embarked on a journey integrating a set of methodologies aimed at **supporting the development of groundbreaking technologies** with a positive influence on society (IA, robotics, XR, etc. such as Suaave, Diamond, BERTHA, DA VINCI ROBOT, exoskeletons and POPULAR). Our efforts have been directed towards amplifying human capabilities and performance, advancing health across physical, sensory, and mental domains, **promoting overall well-being, and optimizing the quality of life.**

eXtended Reality (XR): Breaking physical and digital barriers



Belda. 2007 EMG Control for Domotics. Patent WO2009068720A1	Laparra. 2015 PU risk and healthy strategies. WO201703239A1	Laparra. 2015 Drowsiness Detector. Patent WO2019145580A1	Belda-Lois, et al. 2020 Cognitive & Emotional Model. AHFE 2019	Morales. 2023 Non Contact Vital Signs. AHFE
Belda-Lois, et al. 2006 Mouse based on EMG	Daly, et al. 2013 BCI multimodal interface & cerebral palsy	Laparra. 2015 Thesis mental load with physiological & eye tracking	Palomares, et al. 2022 Empathetic autonomous vehicle	7 PhD ongoing AHFE24 papers*

*See the use cases at Session "Enhancing Healthcare Experiences: A Focus on User-Centred Medical Device Design" of the 2nd International Conference on Health Informatics and Biomedical Engineering Applications (AHFE, 2024).



The poster shows our ability to **combine Human Factors and User Experience**, supported by **Lean approaches**, to **reduce time and cost of medical devices and services development**; involving patients, clinicians, family and key stakeholders to enhance user satisfaction, market deployment and society acceptance. These examples will cover several innovative initiatives, including **non-contact real time monitoring devices**, support people in risk of exclusion with groundbreaking solutions based on **AI and robotics** (walking support Robot3 for SCI patients) even widespread **eXtended Reality applications**. Finally, it is key to align it with the **Medical Device Regulation (MDR)** process; we have implemented a quality management system following **UNE-EN ISO13485**, for our products and also for third parties of SW, electromedical equipment, implants & medical instruments.



UX-HF Labs are useful along the 3 Lean Design phases: **LEARN PHASE**: UX (<https://ux.ibv.org/>) has a key role, complemented with a HF as expert support and with Lab tests; **IDEATE PHASE**: UX with co-creation and HF with simulation and modelling; and **VALIDATE PHASE**: High Tech HF Labs are key in this phase, as well as UX approaches for Field Operational Test with HF support with wearables and non-contact technologies.

Our **Inclusive eXtended Reality (XR)** breaks physical and digital barriers, looking for a) enhancing Social and Health Care Management; and b) moving from general to personalized medical support, and c) democratizing new technologies to improve the well being of society; relying on **HeR** (Human Extended Reality) and **HiS** (Human Interaction Simulation) **Labs** (Laparra-Hernández et al., AHFE 2024, Poster).

