

# COMFORTage

Prediction, monitoring and personalized recommendations  
for prevention and relief of dementia and frailty



Funded by  
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# Virtual Assistants & Digital Twins

Athens Digital Health Week

28/01/2025

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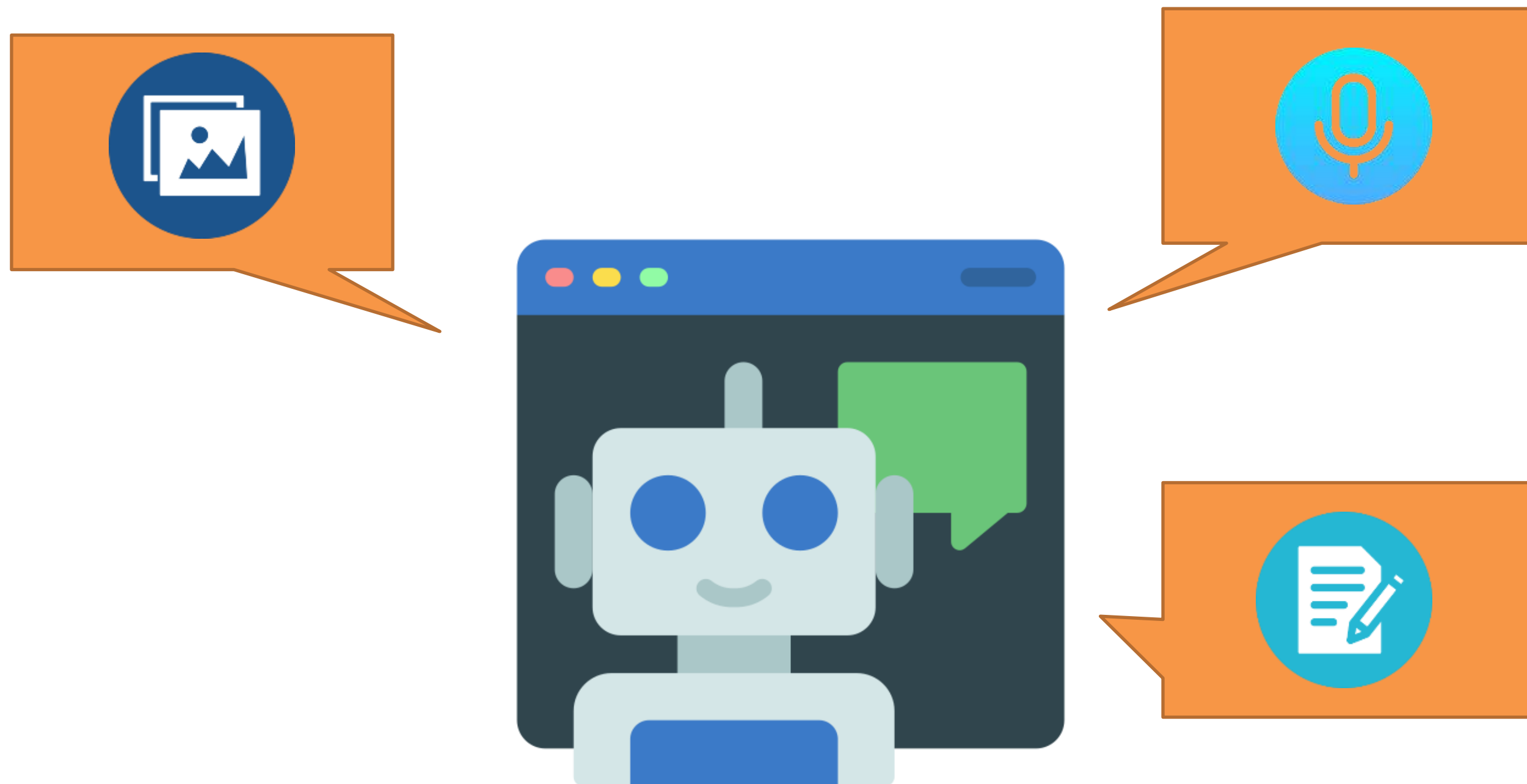


# What is a Virtual Assistant?



## What is a Virtual Assistant?

*A Virtual Assistant (VA) is an AI-driven software application designed to understand natural language (written or spoken) and images and perform tasks or services for an individual.*





# AI-Driven Virtual Assistants

## Core technologies:

- Natural Language Processing (NLP):
  1. Enables VAs to interpret and respond to human language effectively.
  2. Large Language Models to the rise.
- Machine Learning (ML):
  1. Allows VAs to learn from user interactions, refine responses, and deliver personalized support.
- Voice Recognition and Speech Synthesis:
  1. Empowers the VA to communicate using spoken language (e.g., Google Assistant, Amazon Alexa).





## Key Functionalities

- Information retrieval:

VAs can search internal databases or the web to provide relevant information.

- Task Automation:

Routine tasks (scheduling appointments, sending reminders, etc.) are streamlined by a VA.

- Personalization:

Learning user behaviors and preferences to offer context-specific recommendations.

- Accessibility Support:

Particularly important in healthcare, VAs can provide assistance through simple voice or text interfaces, benefitting those with mobility or cognitive challenges.






# How VAs altered healthcare domain?





# New Healthcare Domain

- 1. Enhancing patient engagement**
- 2. Improved care for chronic conditions**
- 3. Reduced administrative burden**
- 4. Personalized and continuous monitoring**
- 5. Empowering self-management**

- 
- 1. Data privacy and security**
  - 2. Regulatory compliance**
  - 3. Ethical Use and Bias**
  - 4. User Adoption and Trust**





# COMFORTAGE VAs





# Virtual Assistants



Neuropsychological  
VA



Daily Assisted Living  
VA



# Neuropsychological Virtual Assistant







# Neuropsychological VA

## 1. Cognitive-based:

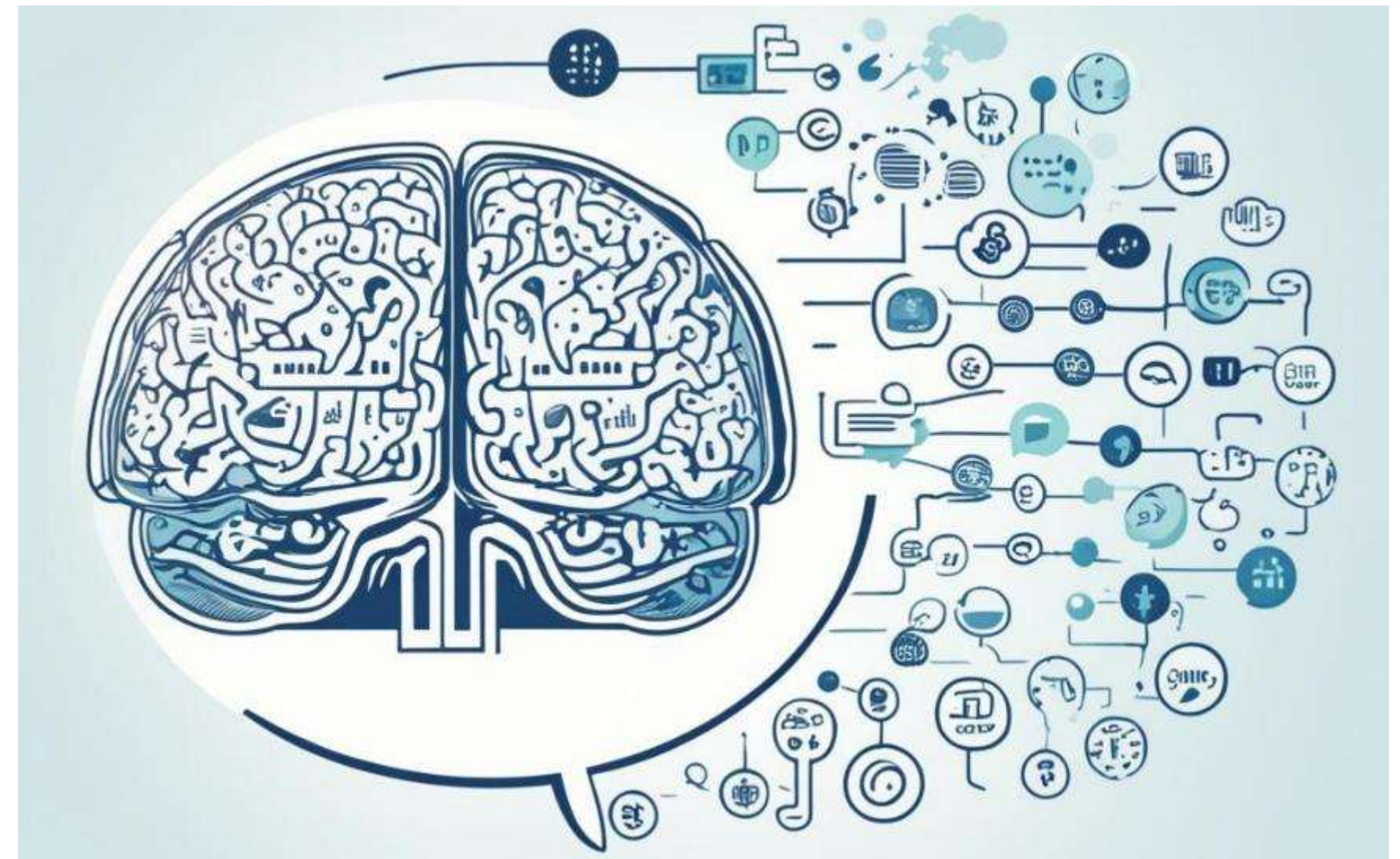
- Generative AI focused on neuropsychological medical context.

## 2. Neuropsychologist's Assistant:

- Performs Neuropsychological Battery tests providing more hidden insights.

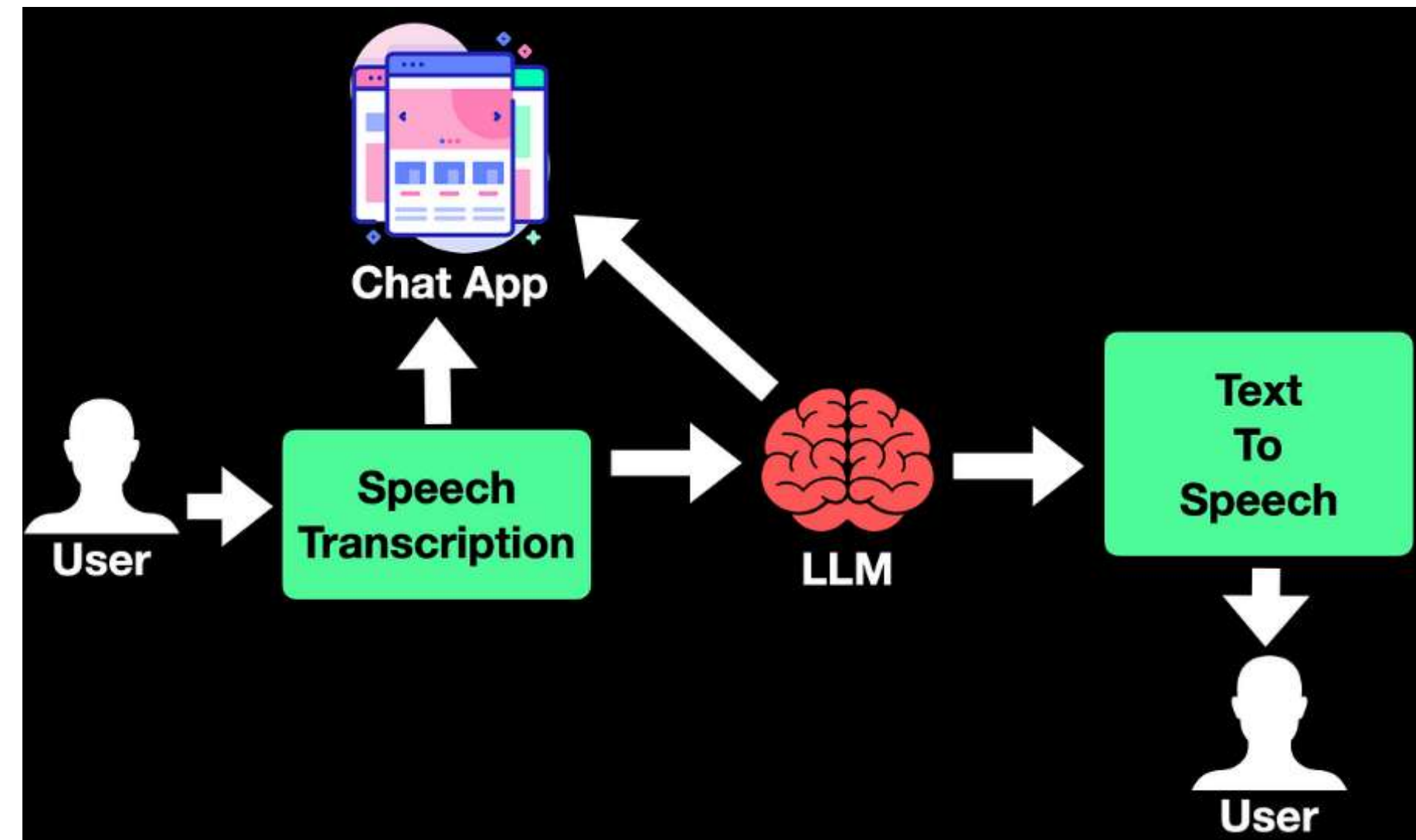
### 3. Reaction detection:

- Emotionally aligned and taking advantage of spontaneous speech and emotion detection



# Methodologies and Tools

- Large Language Models (LLMs): Powers natural language understanding and generates human-like responses.
- Text-to-Speech (TTS): Converts text-based responses into spoken language for better engagement.
- Speech-to-Text (STT): Transcribes spoken input into text for processing and analysis.
- Emotion Recognition: Analyzes voice tone or facial expressions to assess emotional states.





# Basic Setup

- Microphone: Captures user speech for STT.
- Speakers: Delivers TTS audio output.
- Camera: For user emotion recognition.
- Avatar-UI: A user-friendly UI with Emotionally Aligned Avatar.







# Virtual Assistants



Neuropsychological  
VA



Daily Assisted Living  
VA



# Daily Assisted Living VA

Voice Interaction

Augmented Reality



Continuous Learning

Caregiver Connectivity

Quality of Life Improvement

Emergency Detection



# COMFORTage Daily Assisted Living VA

## 1. Voice-Based Smart Home Control

- Seamless Command Execution, Simplified Command Structures, Hands-Free Operation.

## 2. Navigational Guidance with AR

- Location Awareness, Contextual Overlays, Safety Assistance.

## 3. Emergency Detection and Assistance

- Passive Monitoring, Automatic Alerts, Voice-Activated SOS.

## 4. Adaptive Communication and Cognitive Support

- Conversational Memory, Multi-Modal Cues, Gradual Prompting.

## 5. Personalization and Learning

- Preference Profiling, Adaptive Reminders, Language Flexibility

## 6. Security and Privacy Features

- Data Protection, Consent Management, Role-Based Access



**CERTH/ITI nZEB Smart Home**

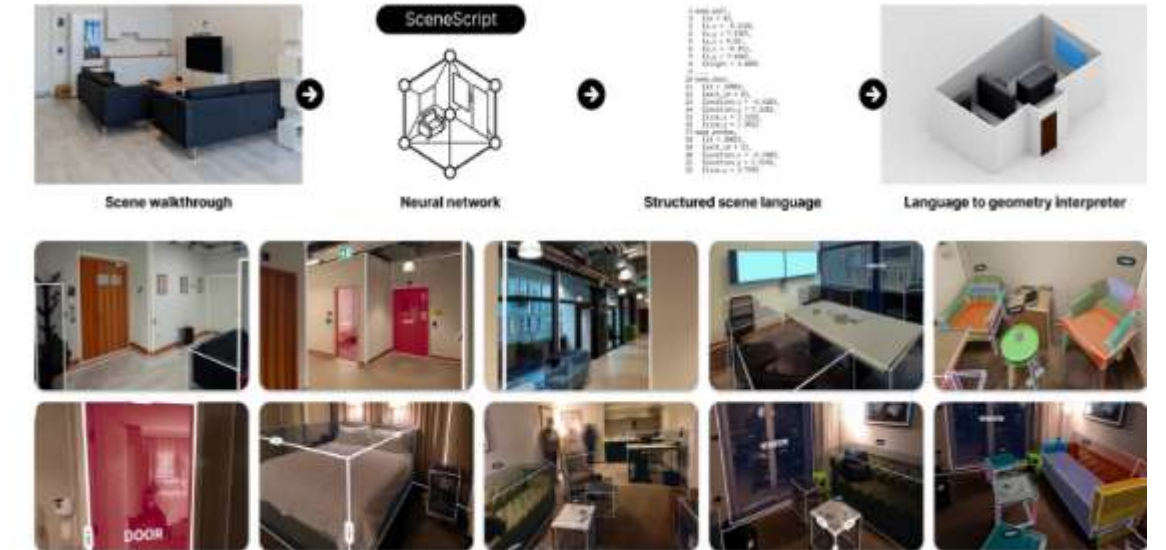
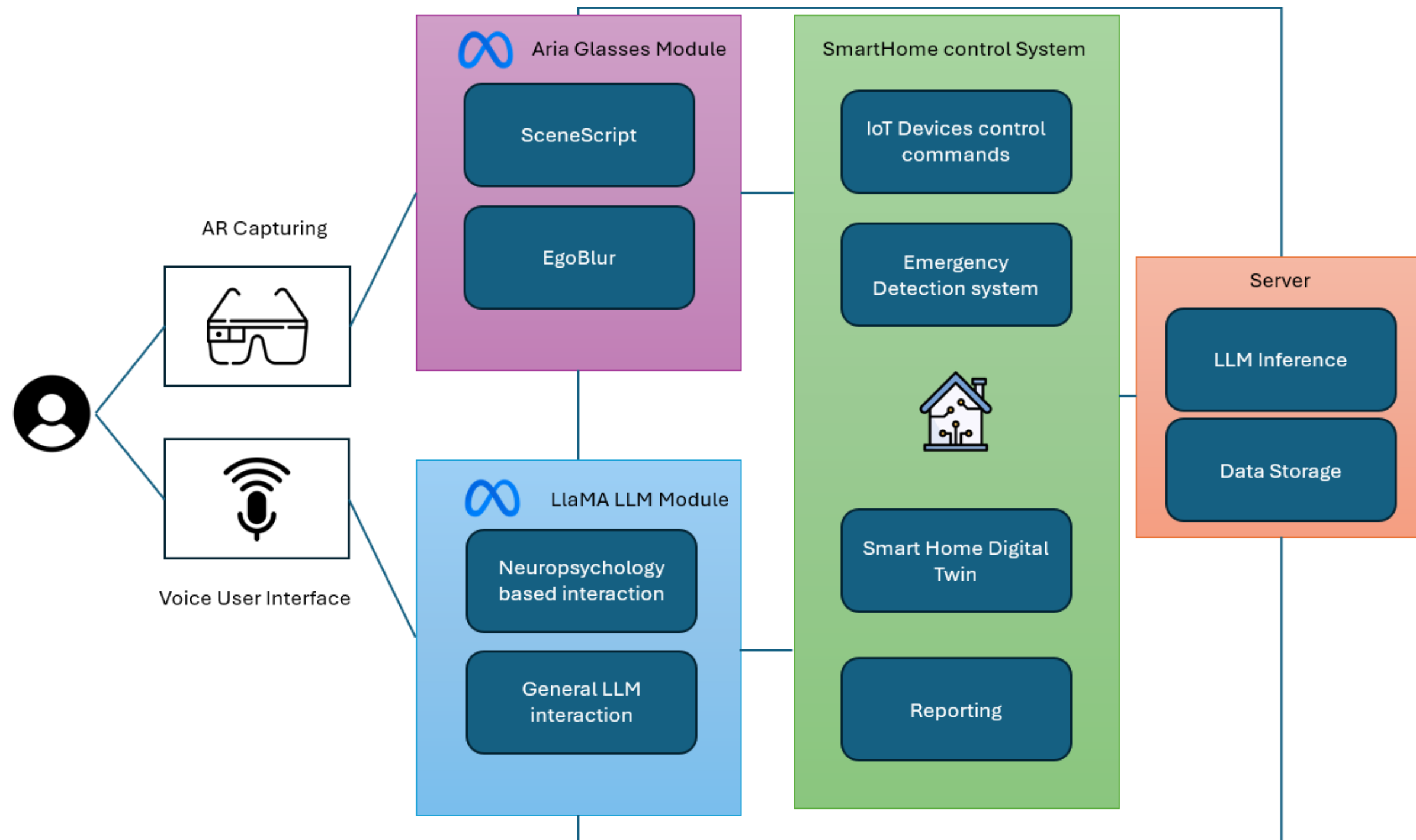


**Meta Aria Glasses**



# COMFORTage

## Daily Assisted Living VA



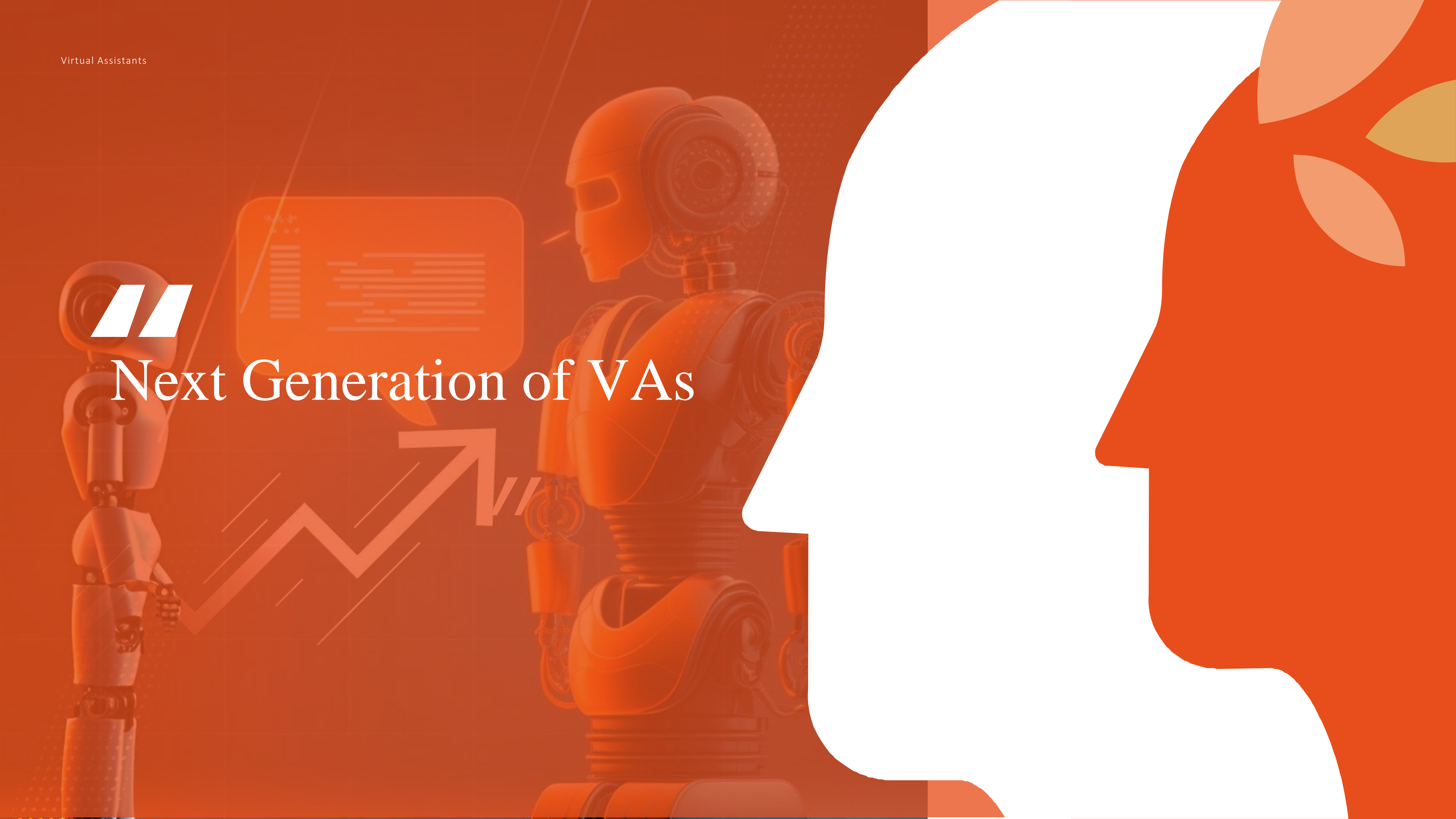
Meta Aria Project Scenescrypt



Meta Aria Project EgoBlur



# Next Generation of VAs





# Key concepts of the future

Hyper-personalization  
and context  
awareness

Advanced Emotional  
and Cognitive  
Intelligence

Seamless Multimodal  
Interaction

Healthcare integration  
and Proactive care



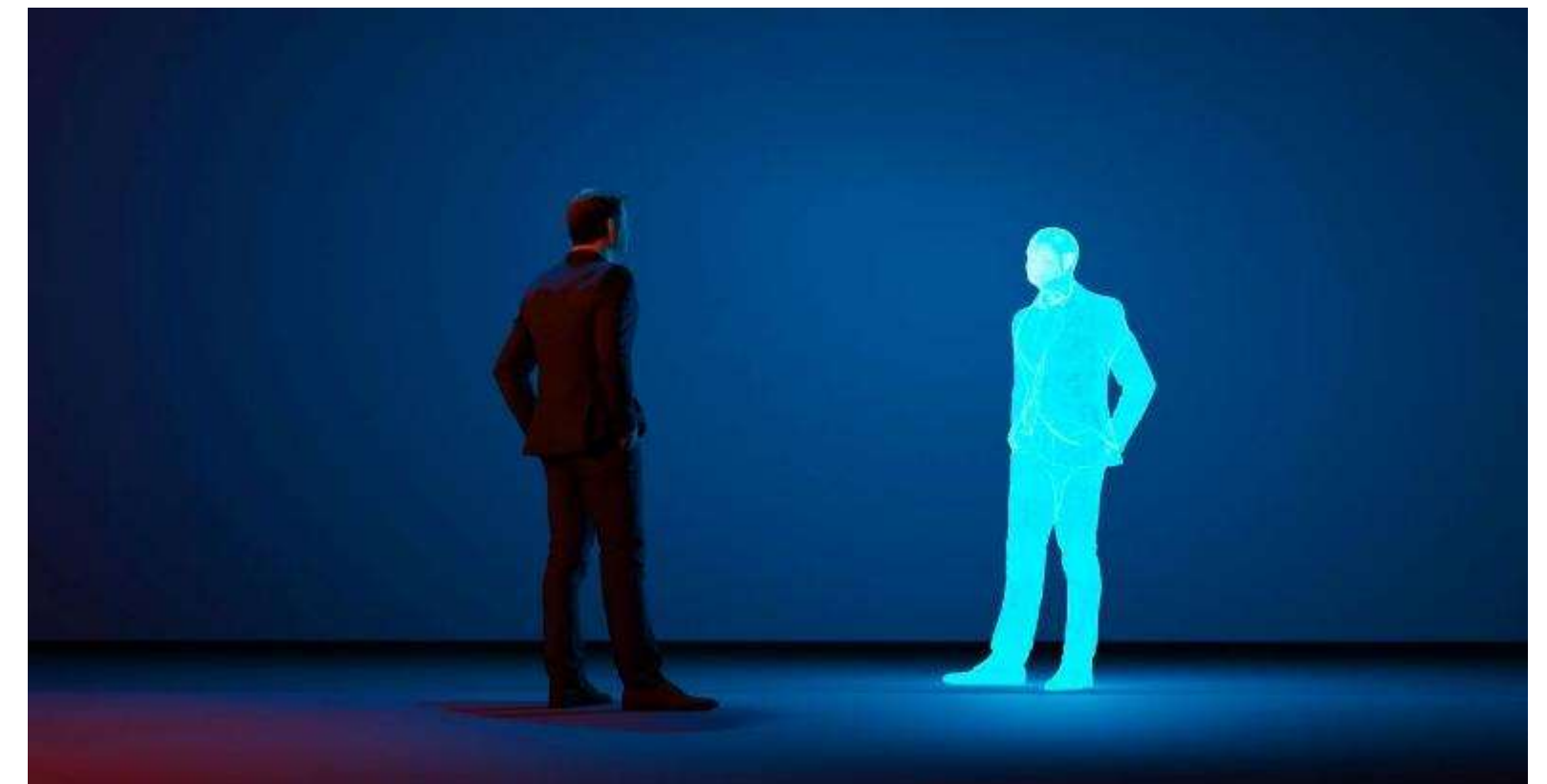


# Health Digital Twins

*“A human digital twin is a highly detailed virtual model of an individual, designed to mirror their physical and physiological characteristics.”*



1. Data Aggregation and Integration
2. Advanced Modeling and Simulation
3. Artificial Intelligence and Machine Learning
4. Real-Time Data Processing
5. Visualization Tools





# Health Digital Twins

Twin Health's whole body Digital Twin:

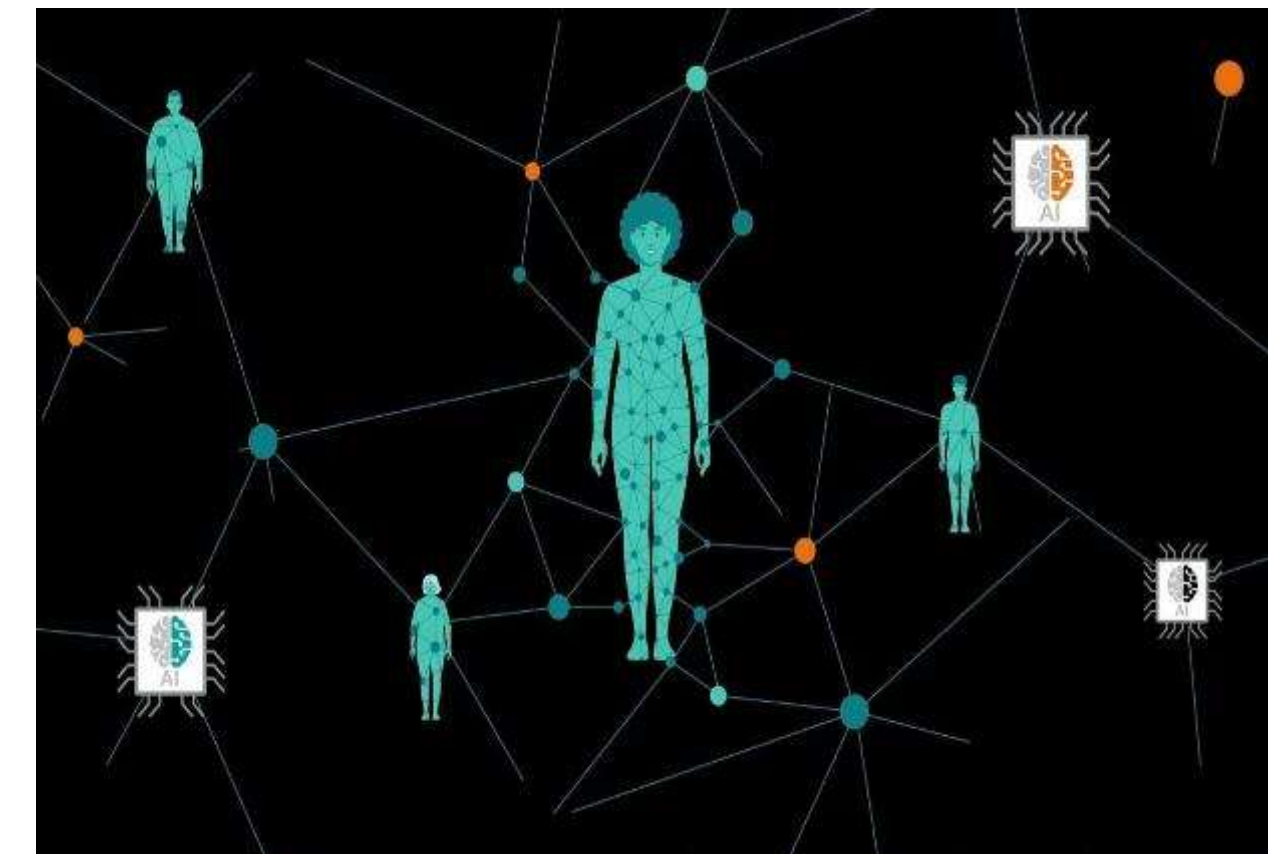
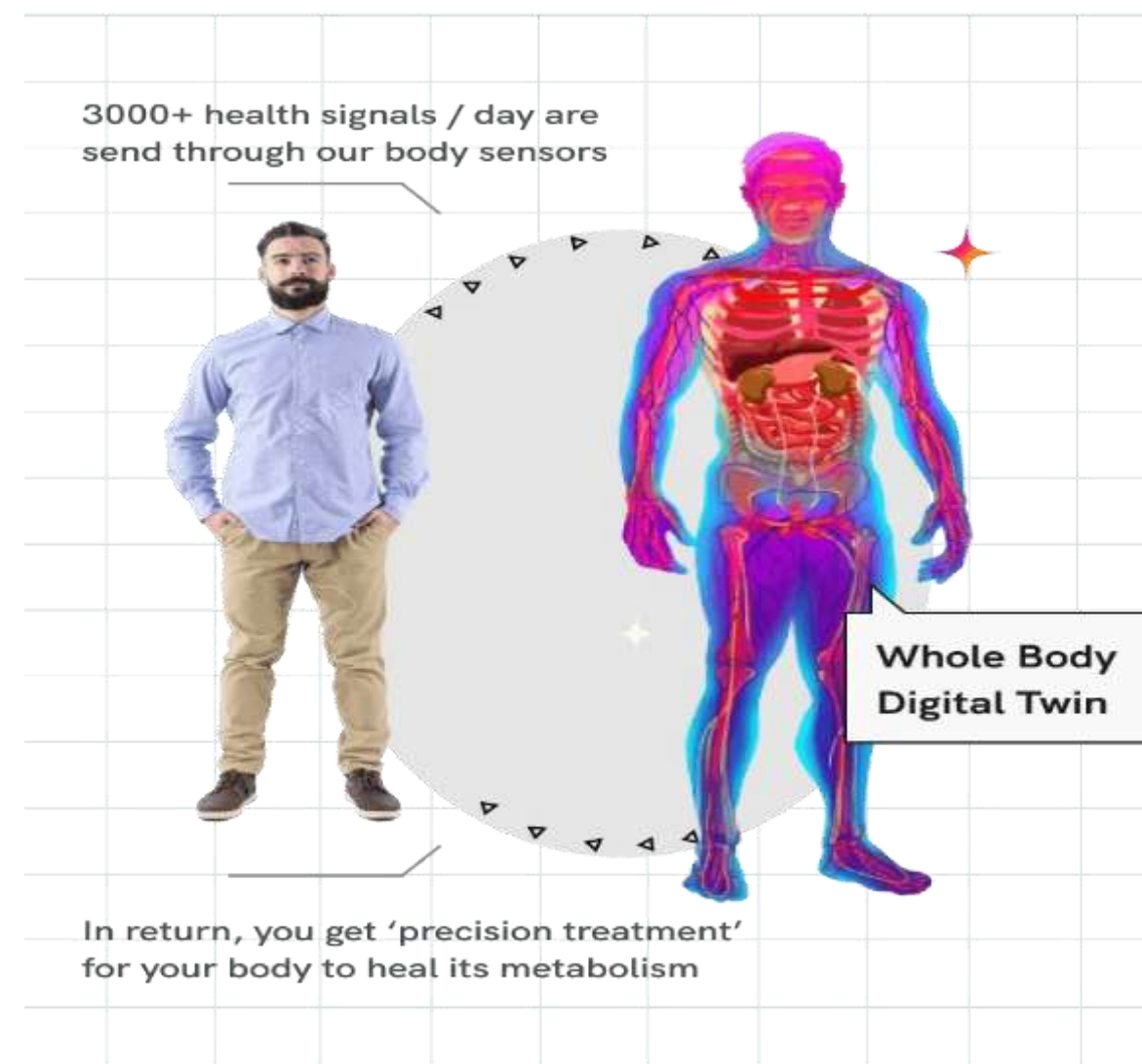
- ☐ Nutrition
- ☐ Breathing
- ☐ Activity
- ☐ Sleep

European Virtual Human Twins:

- ☐ Personalized care
- ☐ Fundamental AI models
- ☐ Health Data space

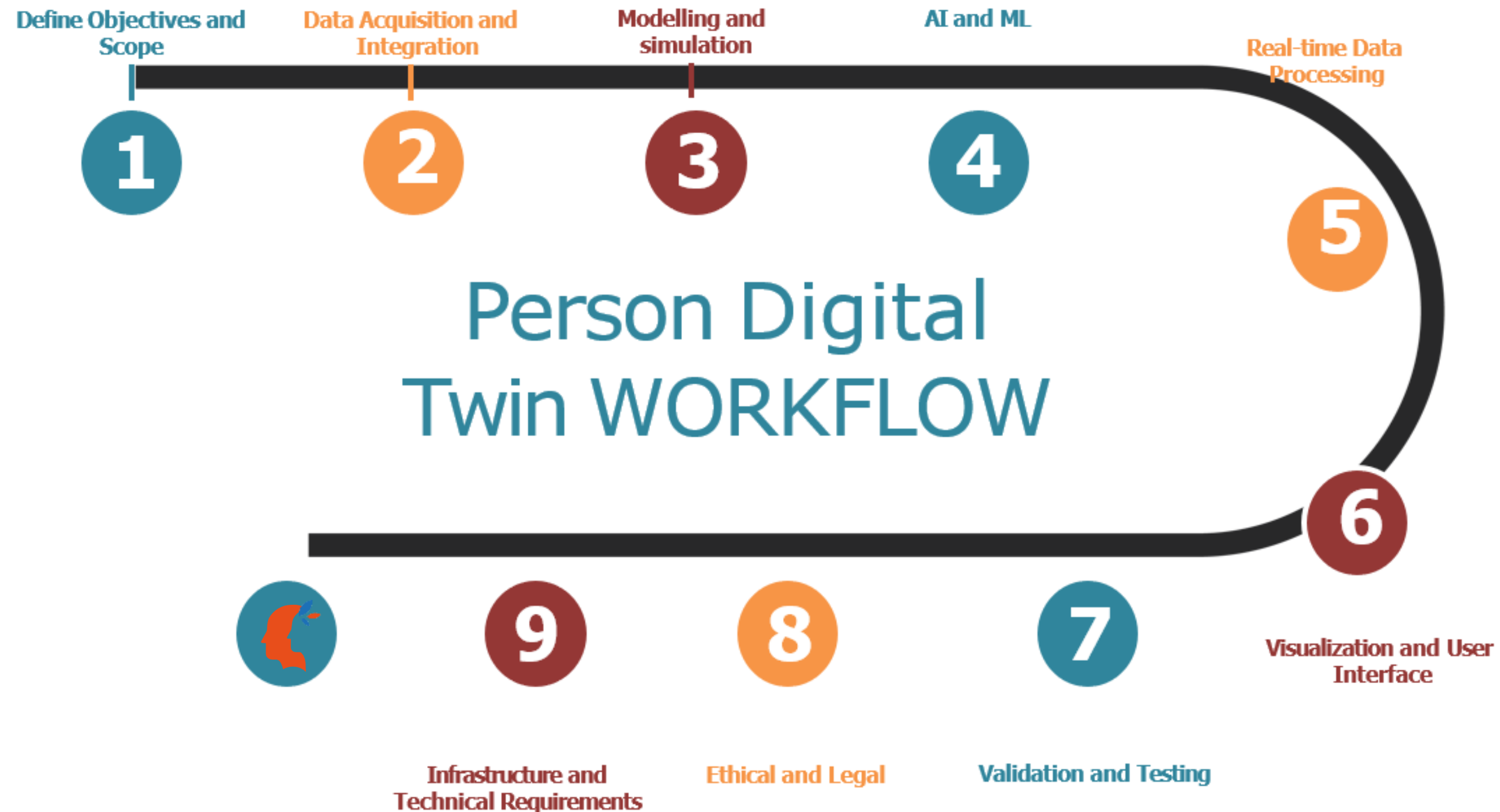
Siemens Healthineers Digital Twin

- ☐ Real World
- ☐ Test most impactful changes
- ☐ Implement findings



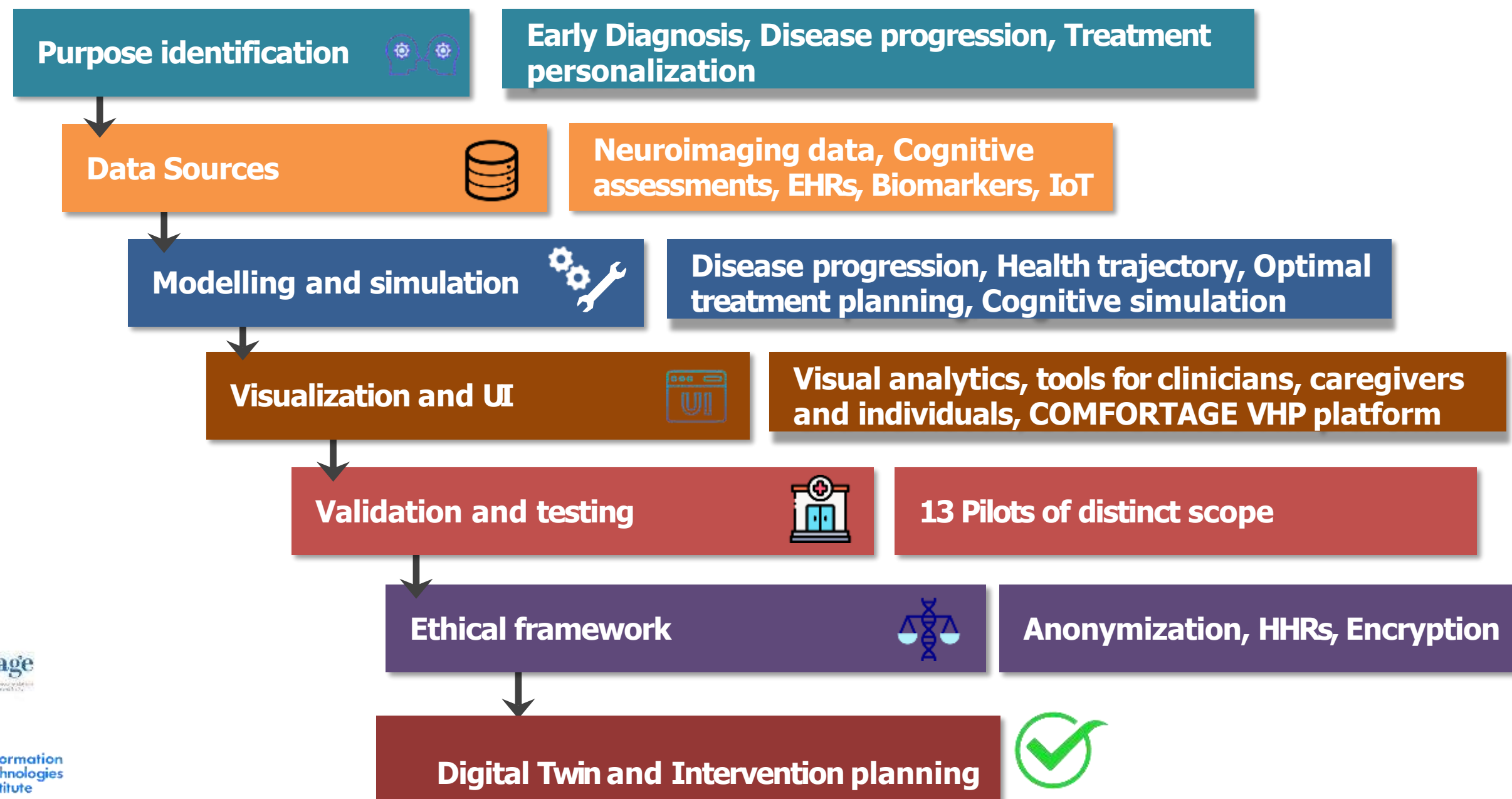


# COMFORTAGE Patient Digital Twin





# COMFORTAGE Patient Digital Twin





COMFORTage

THANKS

For your attention



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