Petra Ritter

*Director of the Brain Simulation Section at
Charité University Medicine Berlin,
Director International Affairs at
Charité University Medicine Berlin
TEF-Health Lead and Coordinator*

Testing and Experimentation Facility for Health AI and Robotics

TEF-Health

www.tefhealth.eu

November 29 2023

Professor Petra Ritter
Charité University Medicine
Berlin, Germany

Berlin Institute of Health

- Director of Brain Simulation Section
- Director for International Affairs, Charité
- Lead Testing and Experimentation Facility for Health AI and Robotics (€60 Million funding)
- Lead eBRAIN-Health – Actionable Multilevel Health Data (€13 Million funding)
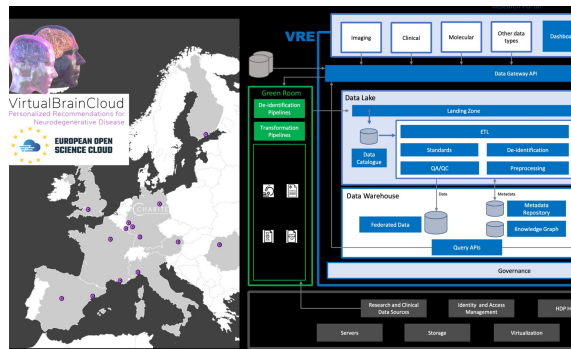
EU Service for Sensitive Data

Horizon Europe 2021-2027

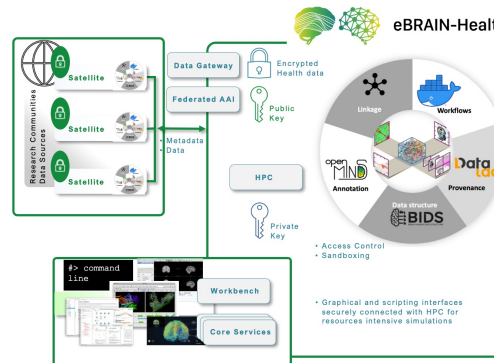The DIGITAL EUROPE Programme #DigitalEU

EOSC Virtual Brain Cloud

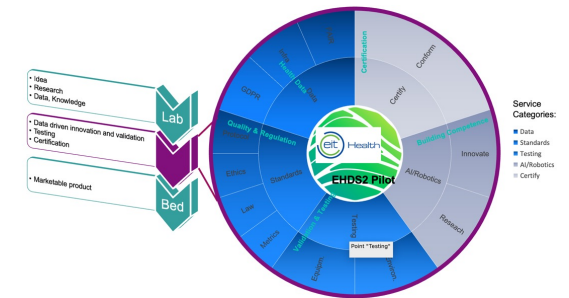
Lead: Charité
€15Mill 2018-2023

eBRAIN-Health
Actionalble Multilevel Health Data

Lead: Charité
€13Mil 2022-2026

TEF-Health
Testing and Experimentation Facility
Health AI and Robotics

Lead: Charité
€60Mill 2023-2027

https://cordis.europa.eu/project/id/826421
https://eosc-portal.eu/about/eosc-projects?page=5

https://cordis.europa.eu/project/id/101058516

www.tefhealth.eu

VRE Federation – Health Data Cloud Architecture

TEF-Health

VRE Virtual Research Environment

Nodes generally share a common system architecture
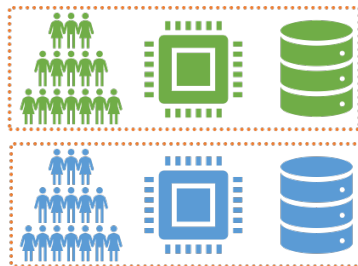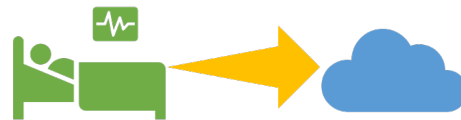
https://www.healthdatacloud.eu/

GDPR-compliant governance and data protection framework

GDPR READY

Technical and organisational measures for lawful processing of sensitive data

Supervisory Authorities
EU, Federal, State

Processor
Maintains the Data Platform.
Implements Technical and Organizational Measures
Processes data on behalf of the controller.

Data Platform
A secure data processing environment

Data Protection Officer
Designated by the controller and processor
Involved in issues relating to protection of personal data.

Controller
Determines the purpose and means of processing
Prepares a data protection impact assessment for the research study

Research Ethics Board
Ethical evaluation of the research project

Derivative Datasets
Dataset use terms
Data Processing Agreement with receiving data controller

Data Subject
An identified or identifiable natural person whose personal data is the subject of processing.
Consents to their data being used and shared for research

Private cloud computing

P2P Interoperability and automated ingestion of research data

Findable **A**ccessible **I**nteroperable **R**eusable
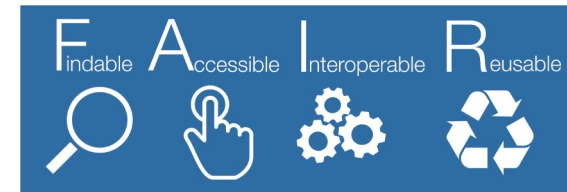
Metadata, standardization, provenance tracking, version control

VRE **V**irtual **R**esearch **E**nvironment

Encryption at rest and in transit

Container orchestration & load balancing

Open Source Ecosystem Integration

Interoperable standardized API

KnowledgeGraph (global, public)

High availability & Backup

Scalability

Platform development, maintenance & delivery

External identity providers

authentication federation

Charité identity provider

Keycloak

VRE User

Single sing-on

GDPR-compliant onboarding and governance

Command-line client

Web GUI

JupyterLab

Apache Superset

Project-specific sub-wiki

VRE Project

Graphical frontend

Audit logging

federated repository

KnowledgeGraph (local, private)

Upload

Download

Versioning

Controlled exposure to sensitive data

Data organization and structuring

Metadata annotation

Access and permission management

Search and query

Project-specific worker VM

dedicated VM storage

Project-specific NFS share (storage)

Project-specific compute VM#1

dedicated VM storage #1

Project-specific compute VM#2 ...

dedicated VM storage #2 ...

storage   compute

Project-specific HPC resources

Remote Desktop

Remote Commandline

Project-specific remote interfaces

Apache Guacamole

Edge VM

VRE HPC

VRE Platform

TEF-Health

GERMANY

Berlin	**CHARITÉ***, BPWT°, VdTÜV˙, KI Park˙
Braunschweig	PTB*
Erlangen	FAU*
Heidelberg	EIT H SI GmbH°
München	TUM*, FHG˙, EIT HEALTH EV°

BELGIUM

Charleroi	**ISPPC**°, CETIC˙, BIOWIN˙
Liège	WSL°
Mol	VITO˙
Mons	MULTITEL˙
Namur	UNamur˙, POLEM˙

FRANCE

Grenoble	CHUGA*, UGA*
Lyon	HCL*
Paris	**LNE*** CEA*, EIT Health Fr˙, HDH*
Rennes	CHU RENNES*
Strasbourg	IHUS˙

ITALY

Genova	IGG*, IIT˙
Lecce	INNOVAAL˙
Milano	POLIMI*
Pavia	UNIPV*
Povo	FBK˙
Roma	**ISS***

PORTUGAL

Coimbra	IPN˙, CHUC EPE*
Lisboa	SPMS*, InnoStars ˙
Porto	CHSJ*, HCP˙

SLOVAKIA

Bratislava	UK BA*, STUBA*
Martin	UHM*
Zilina	UNIZA*

SWEDEN

Boras	RISE˙
Stockholm	KI*

PAN-UE

Brussels	EBRAINS˙

CZECHIA

BRNO	MU*

FINLAND

Helsinki	HELSINGFORS*, HUS*, METROPOLIA˙
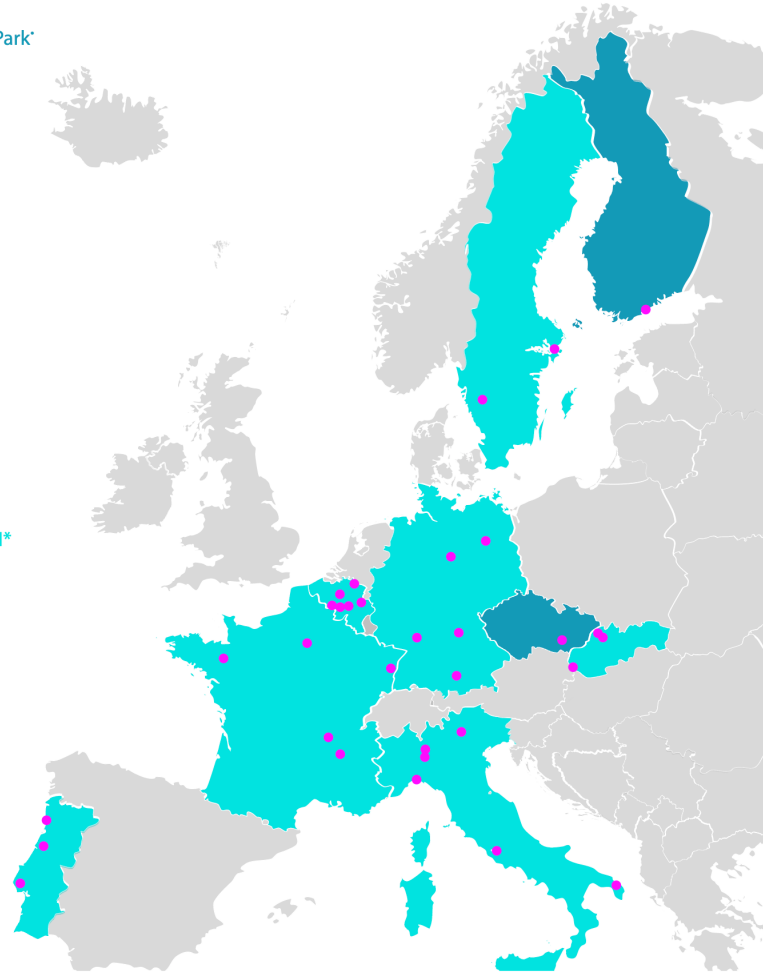
Node & Node Lead

Associated & Associated Lead

* Public, Non-profit
˙ Private, Non-profit
° Private, Profit

**European Union
Data related measures**

Timeline 2016–2023

Measure
2016 - General Data Protection Regulation (GDPR)
2018 – Regulation on the free flow of non personal data
2018 - Digital Health Strategy
2019 - Open Data Directive
2019 - Cybersecurity Act
2020 - Data Strategy
2020 - Data Governance Act (DGA)
2021 – 2030 Digital Compass
2021 - Artificial Intelligence Act
2021 - Digital Services Act
2021 - Digital Markets Act
2021 - Data Act
2022 – Chips Act
2022 – EHDS

GDPR enters in force May 2018

27.10.2021/22.3.2022

Source: Markus Kalliola June-5-2023

TEF-Health

EU wide one-stop shop

- Idea
- Research
- Data, Knowledge

Lab

- Data driven innovation and validation
- Testing
- Certification

- Marketable product

Bed

Closing the Gap in the Innovation Chain for Health-AI & Robotics
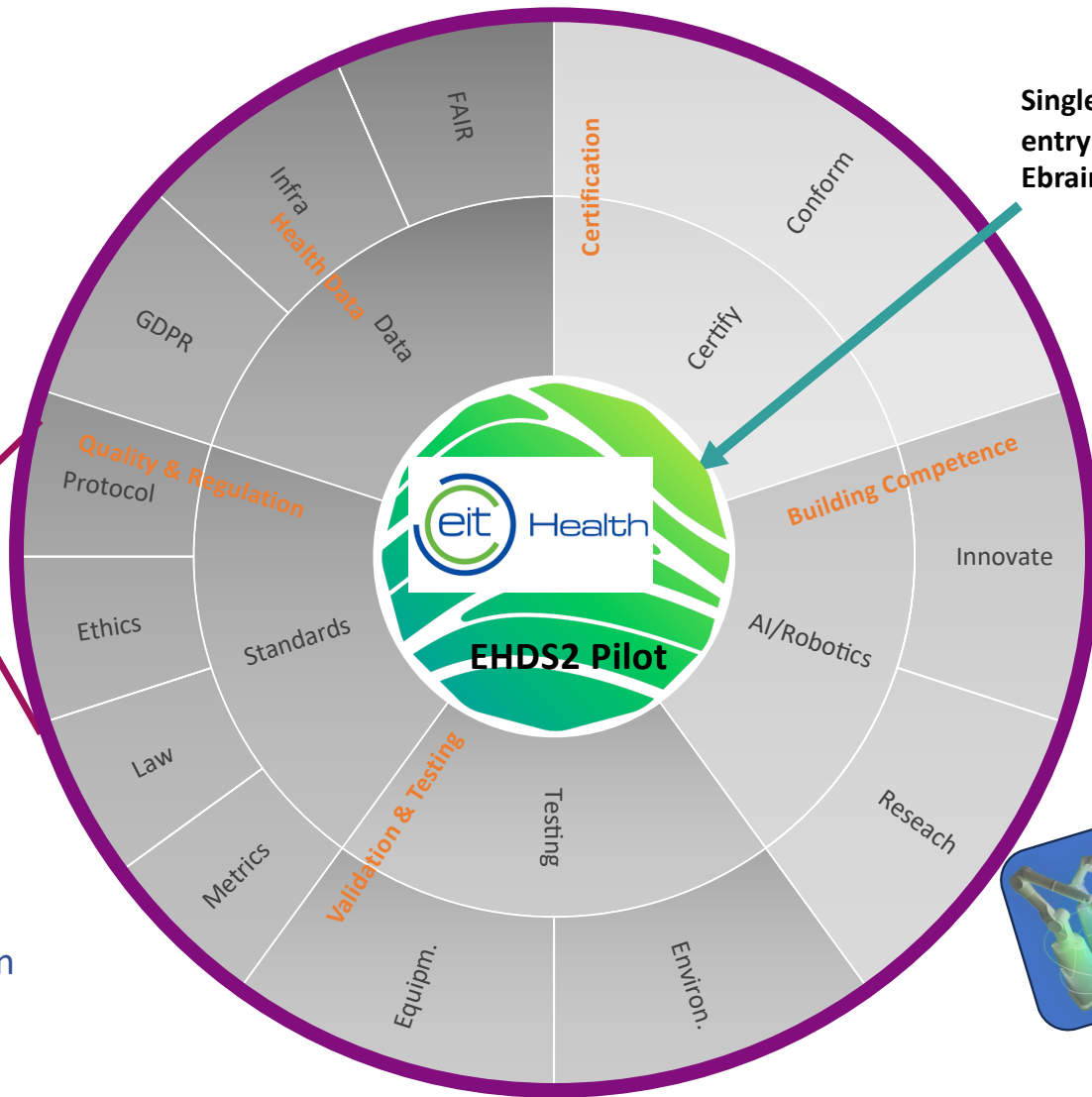
Single EU-wide entry point through Ebrains.eu (ESFRI RI)

Service Categories:
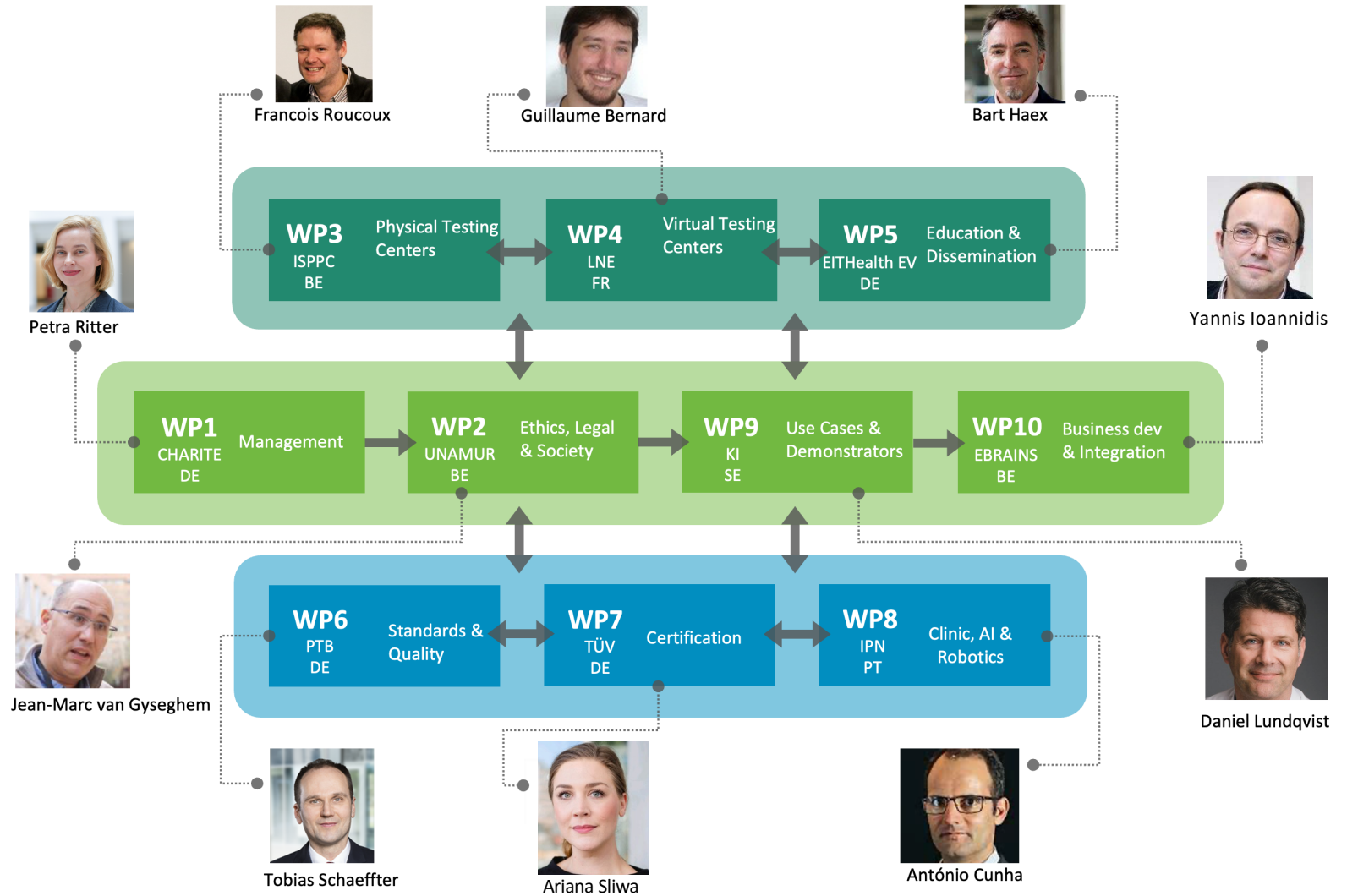- Data
- Standards
- Testing
- AI/Robotics
- Certify

Certification

Health Data Data

FAIR

Infra

GDPR

Quality & Regulation

Protocol

Ethics

Standards

Law

Metrics

Validation & Testing

Testing

Equipm.

Environ.

Conform

Certify

Building Competence

Innovate

AI/Robotics

Reseach

EHDS2 Pilot

eit Health

TEF-Health

51 parties across Europe: node partners & associates

LOI from more than 40 SMEs and organizations
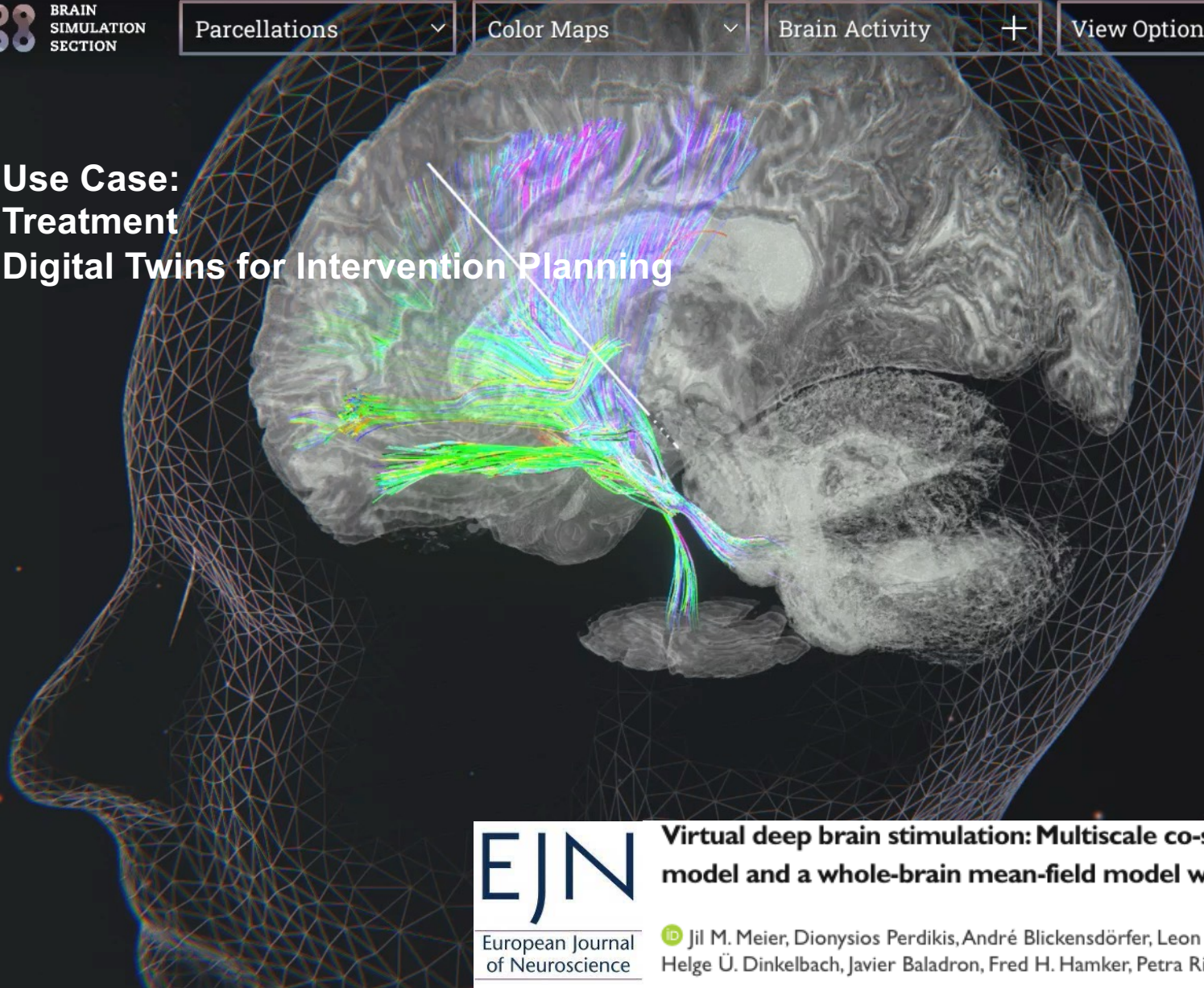
TEF-Health

10 Work Package demonstrations in the atrium

Francois Roucoux

Guillaume Bernard

Bart Haex

Petra Ritter

Yannis Ioannidis

WP3 Physical Testing Centers
ISPPC
BE

WP4 Virtual Testing Centers
LNE
FR

WP5 Education & Dissemination
EITHealth EV
DE

WP1 Management
CHARITE
DE

WP2 Ethics, Legal & Society
UNAMUR
BE

WP9 Use Cases & Demonstrators
KI
SE

WP10 Business dev & Integration
EBRAINS
BE

WP6 Standards & Quality
PTB
DE

WP7 Certification
TÜV
DE

WP8 Clinic, AI & Robotics
IPN
PT

Jean-Marc van Gyseghem

Daniel Lundqvist

Tobias Schaeffter

Ariana Sliwa

António Cunha

Cross-cutting technology domains - bridging borders
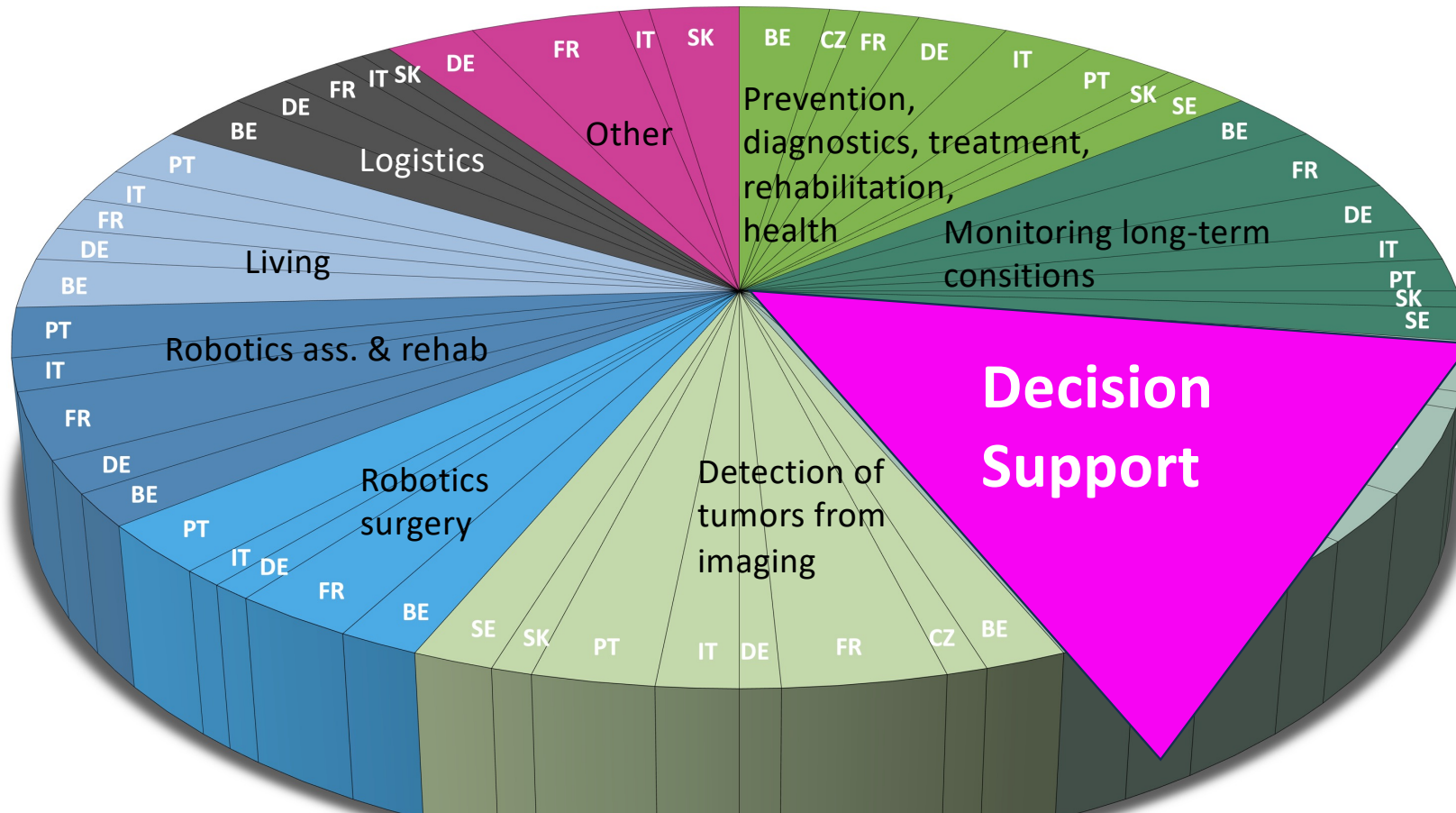
Use Case:
Treatment
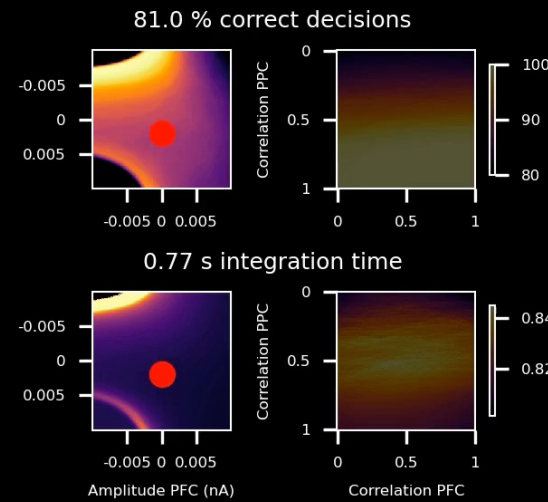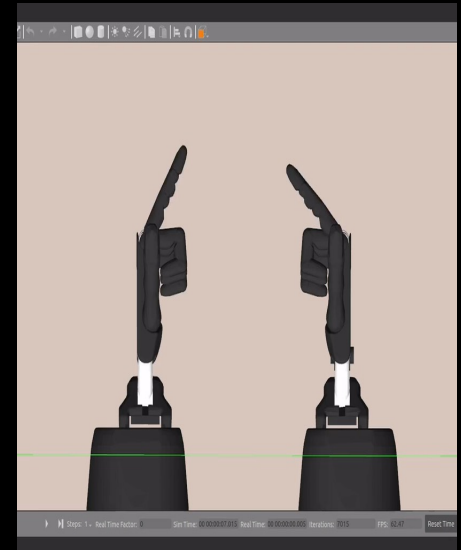Digital Twins for Intervention Planning

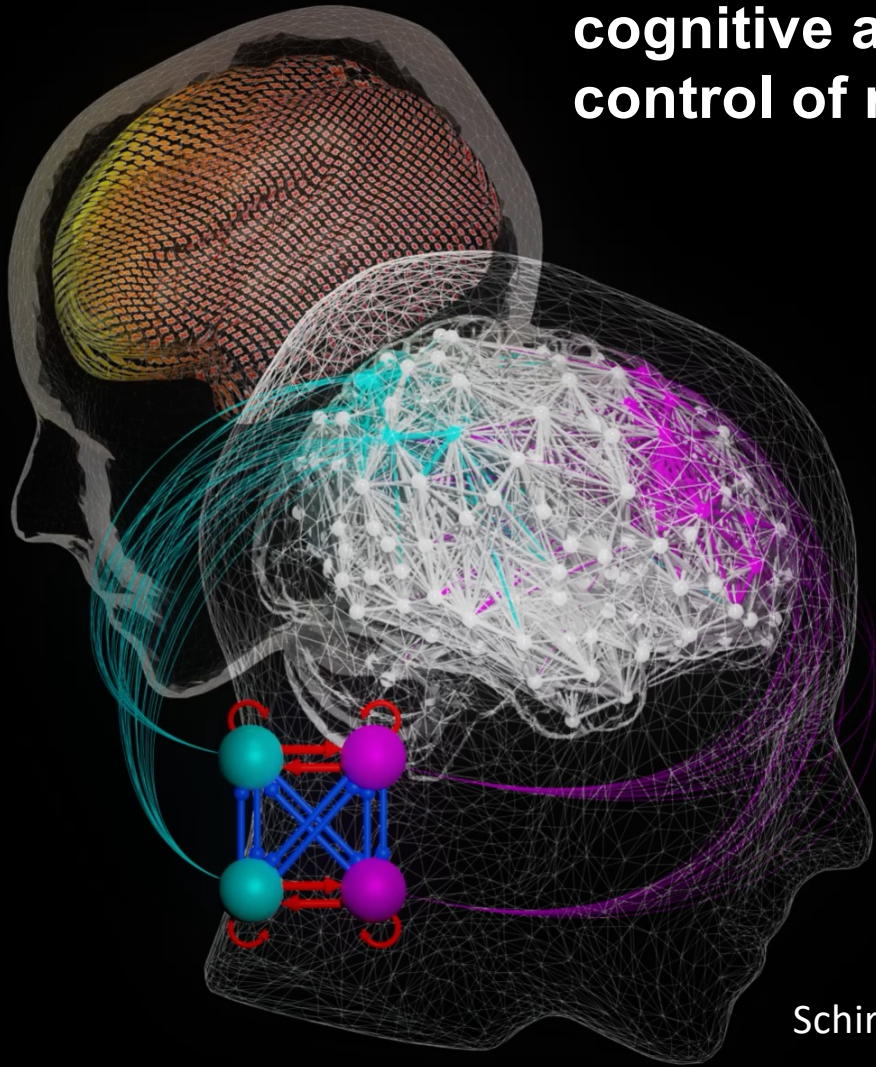Parcellations | Color Maps | Brain Activity + | View Options +

Virtual deep brain stimulation: Multiscale co-simulation of a spiking basal ganglia model and a whole-brain mean-field model with The Virtual Brain

Jil M. Meier, Dionysios Perdikis, André Blickensdörfer, Leon Stefanovski, Qin Liu, Oliver Maith, Helge Ü. Dinkelbach, Javier Baladron, Fred H. Hamker, Petra Ritter

European Journal of Neuroscience

Use Case:
Digital Twin simulation inferred cognitive architectures & control of robotic exosceletons

81.0 % correct decisions

0.77 s integration time

Amplitude PFC (nA)

Correlation PFC

Correlation PPC

Phase space

Population A (PPC)

Population B (PPC)
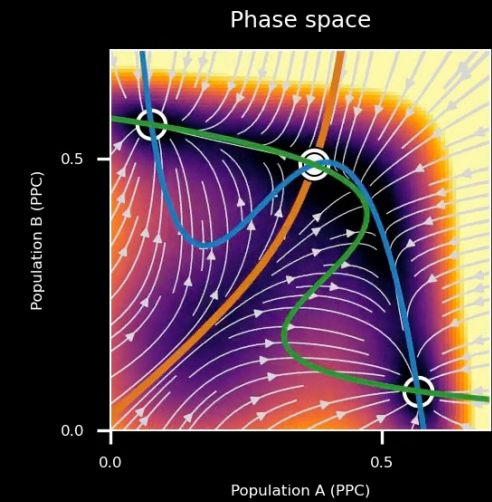
Schirner, Deco, Ritter (2023) Nature Communication

Regulatory Sandboxes:
Promote Trust and Excellence in AI and Robotics
Art. 53 Artificial Intelligence Act (EU)
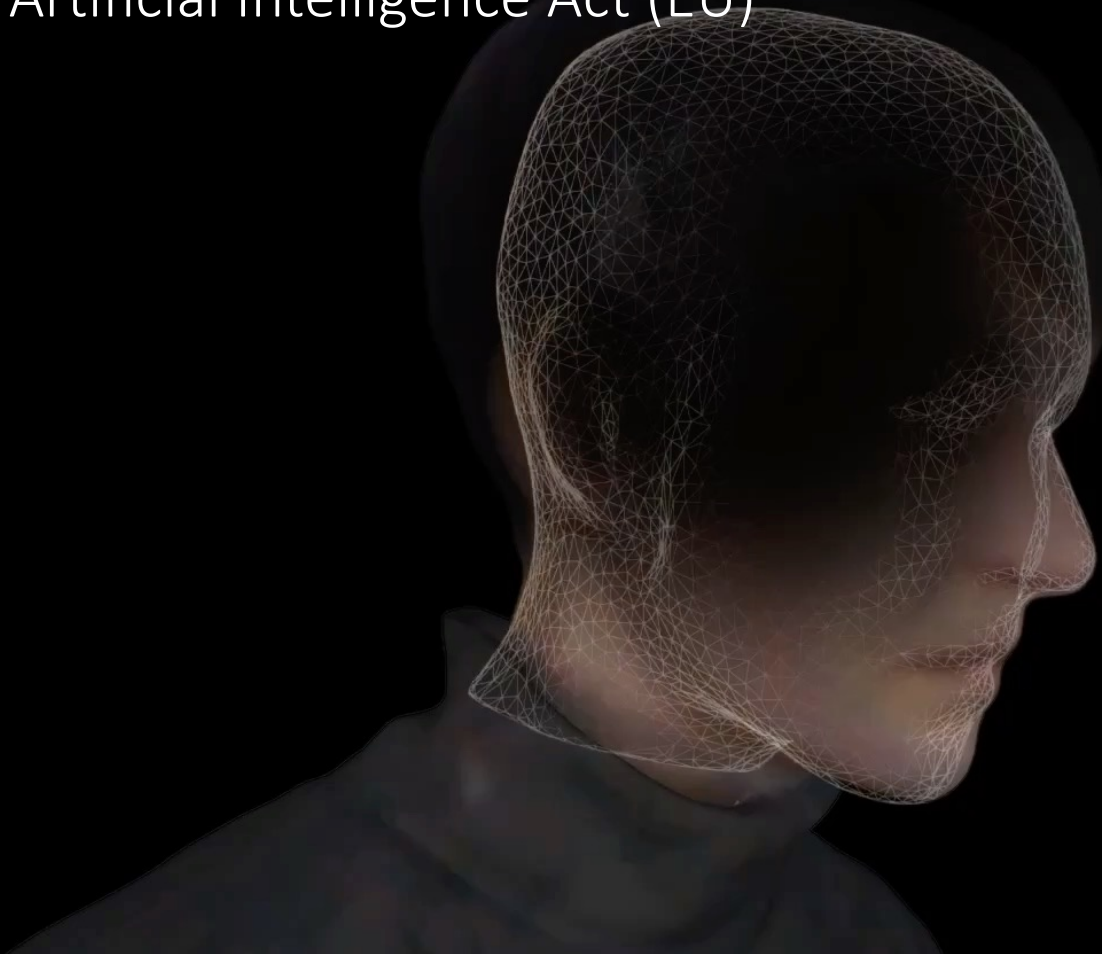
Provide controlled environment that facilitates the development, testing and validation of innovative AI systems for a limited time before their placement on the market.
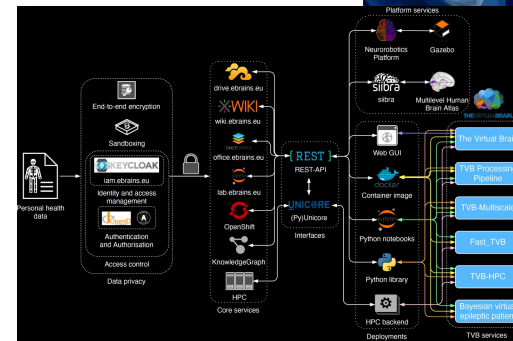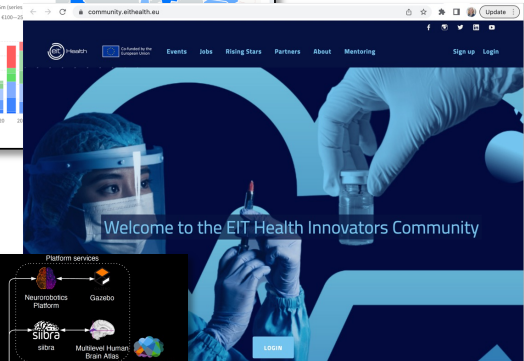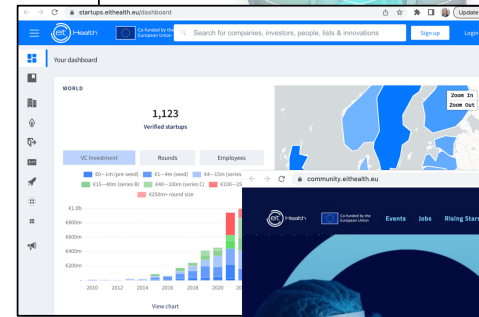
TEF-Health

TEF "Front End"

Webpage (public)
Landing page, news, events, …

Community (stakeholders)
User-generated content, profiles of start-ups, facilities ..
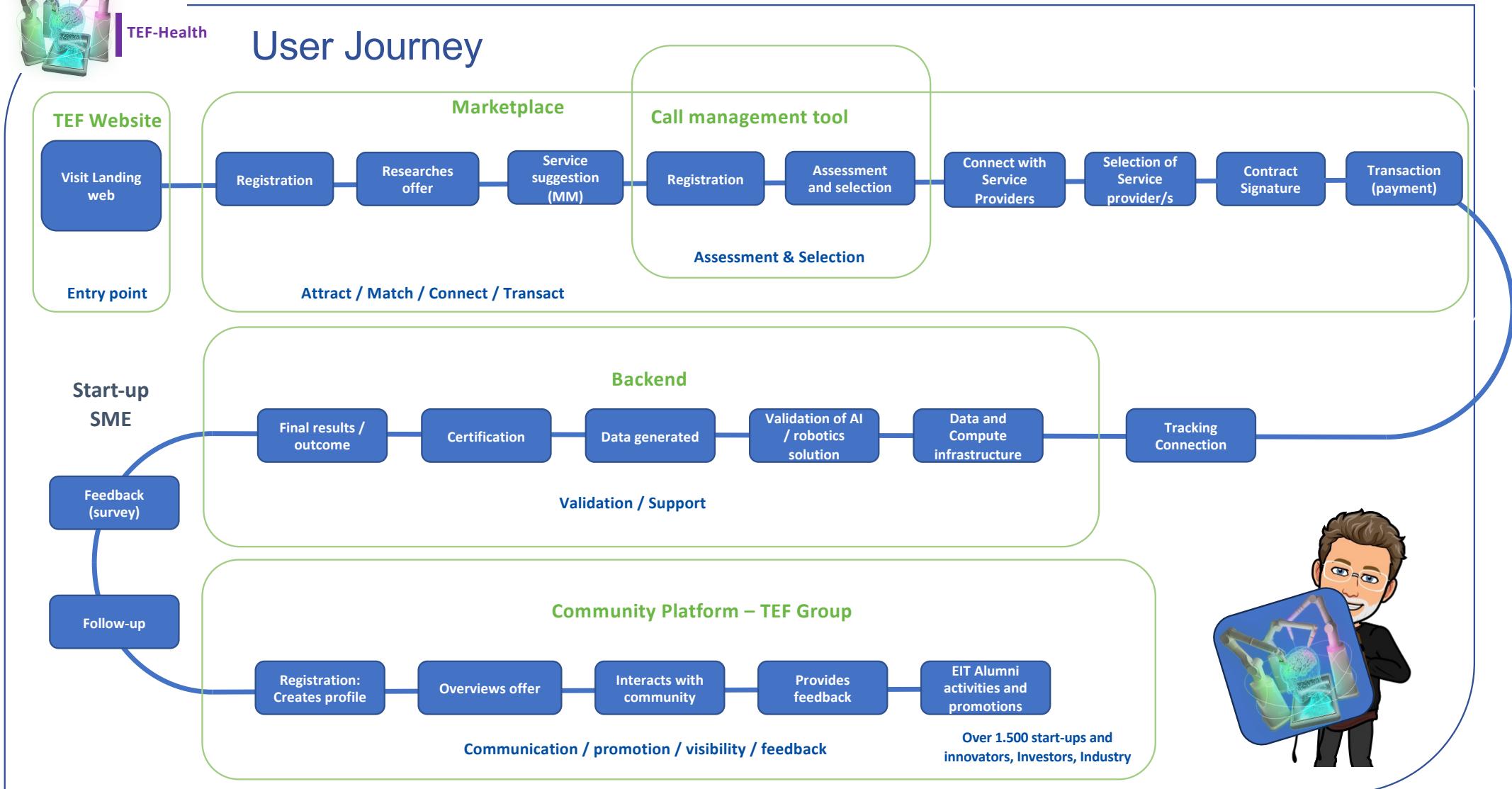
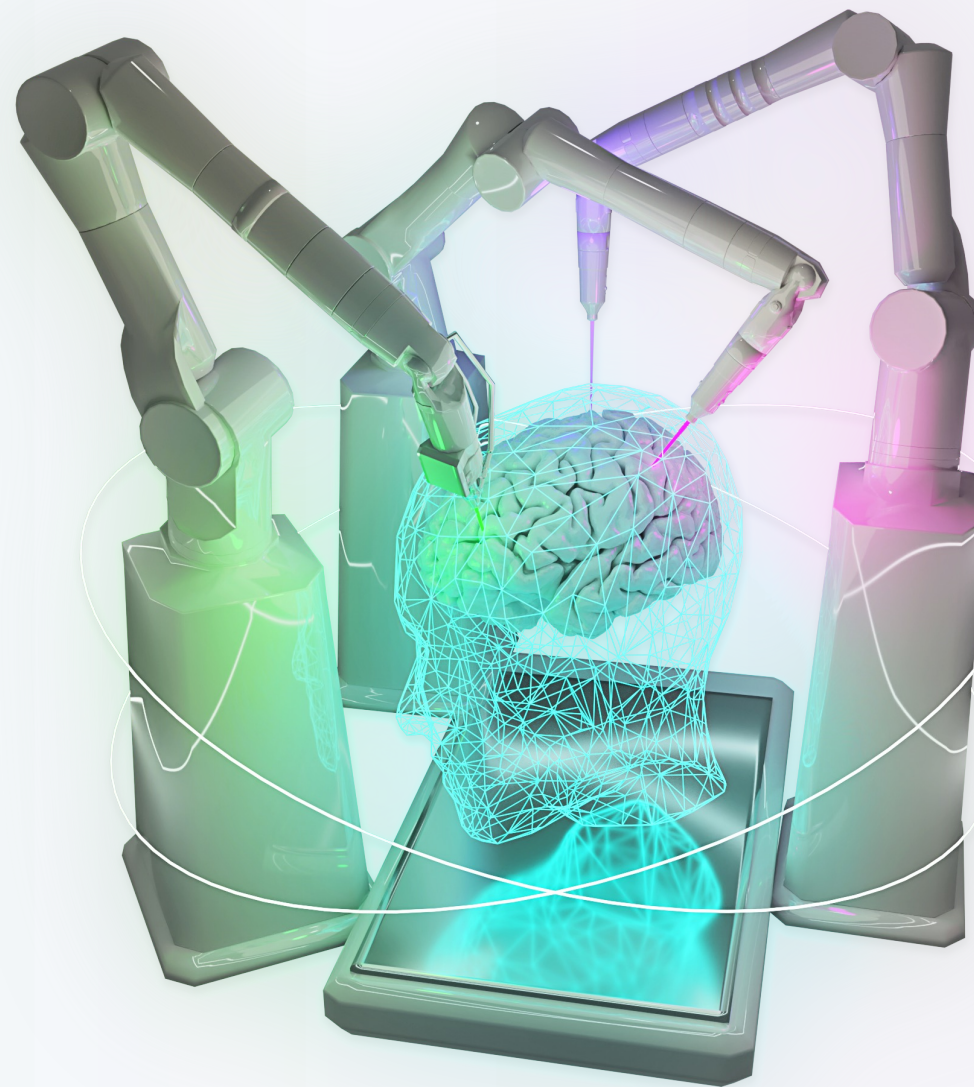**Marketplace (stakeholders)**
Match, connect, transact

TEF "Back End"

Infrastructures & TEF services

TEF-Health

User Journey

TEF Website

Marketplace

Call management tool

| Visit Landing web | Registration | Researches offer | Service suggestion (MM) | Registration | Assessment and selection | Connect with Service Providers | Selection of Service provider/s | Contract Signature | Transaction (payment) |

Assessment & Selection

Entry point

Attract / Match / Connect / Transact

Start-up SME

Backend

| Final results / outcome | Certification | Data generated | Validation of AI / robotics solution | Data and Compute infrastructure | Tracking Connection |

Validation / Support

Feedback (survey)

Follow-up

Community Platform – TEF Group

| Registration: Creates profile | Overviews offer | Interacts with community | Provides feedback | EIT Alumni activities and promotions |

Communication / promotion / visibility / feedback

Over 1.500 start-ups and innovators, Investors, Industry

Thank you!