AI FLANDERS

Challenge-Based Research with Demand-Driven Impact

Sabine Demey, Program Director

June 12th, 2020

Ensuring Flanders' leadership and attractiveness for future investments in AI technology and applications

by focusing on selected AI disciplines that are strategically important for Flanders and in which Flanders has internationally recognized leadership

The ‘triple helix-model’

UNIVERSITIES

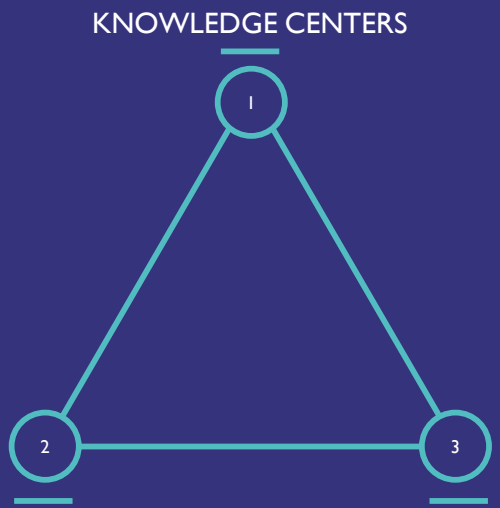
VUB VRIJE UNIVERSITEIT BRUSSEL

KU LEUVEN

Universiteit Antwerpen

UNIVERSITEIT GENT

UHASSELT KNOWLEDGE IN ACTION



STRATEGIC RESEARCH CENTERS

imec embracing a better life

FLANDERS MAKE

VIB

vito

sirris driving industry by technology

.AGORIA

vka Vlaams netwerk van ondernemingen

sirris driving industry by technology

AGENTSCHAP INNOVEREN & ONDERNEMEN

DEPARTEMENT ECONOMIE WETENSCHAP & INNOVATIE

AI Flanders

Program Structure as Approved by the Flemish Government

1. TOP RESEARCH
2. IMPLEMENTATION IN INDUSTRY
3. ETHICS, EDUCATION AND TRAINING

AI Flanders

Program Structure as Approved by the Flemish Government

1 TOP RESEARCH

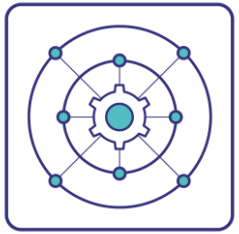
Challenge-Based Research with Demand-Driven Impact

CHALLENGE BASED RESEARCH

RESEARCH CHALLENGES

PROOF-OF-CONCEPTS (POCS)

WITH DEMAND-DRIVEN IMPACT

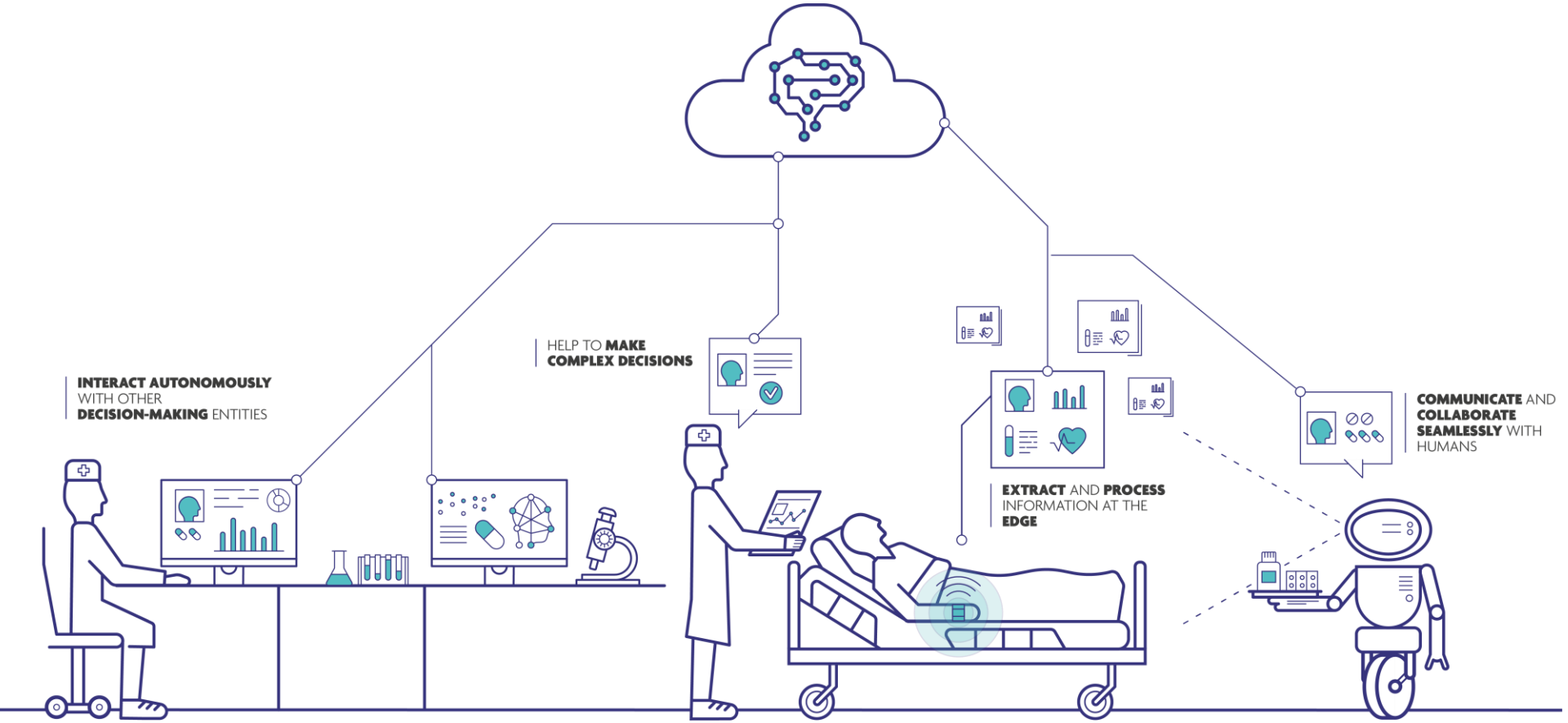


FOCUS DOMAINS and USE CASES

DEMAND from Focus Domains, Applications, Use Cases

3 Domains in Focus of the AI Research Program

AI in Health


INTERACT AUTONOMOUSLY WITH OTHER DECISION-MAKING ENTITIES
HELP TO MAKE COMPLEX DECISIONS
EXTRACT AND PROCESS INFORMATION AT THE EDGE
COMMUNICATE AND COLLABORATE SEAMLESSLY WITH HUMANS

Selected Applications in Health

PRECISION MEDICINE

- Single Cell Technologies
- Multiple Sclerosis

CLINICAL DECISION SUPPORT

- Epilepsy
- Medical Imaging *Radiation Oncology and Radiology*

HOSPITAL DECISION SUPPORT

- Hospital Treatment Decisions

Selected Applications in Health

PRECISION MEDICINE

Single Cell Technologies	Multiple Sclerosis
Visualisation of single cell data & Segmentation of 3D electron microscopy images	Improve MS treatment

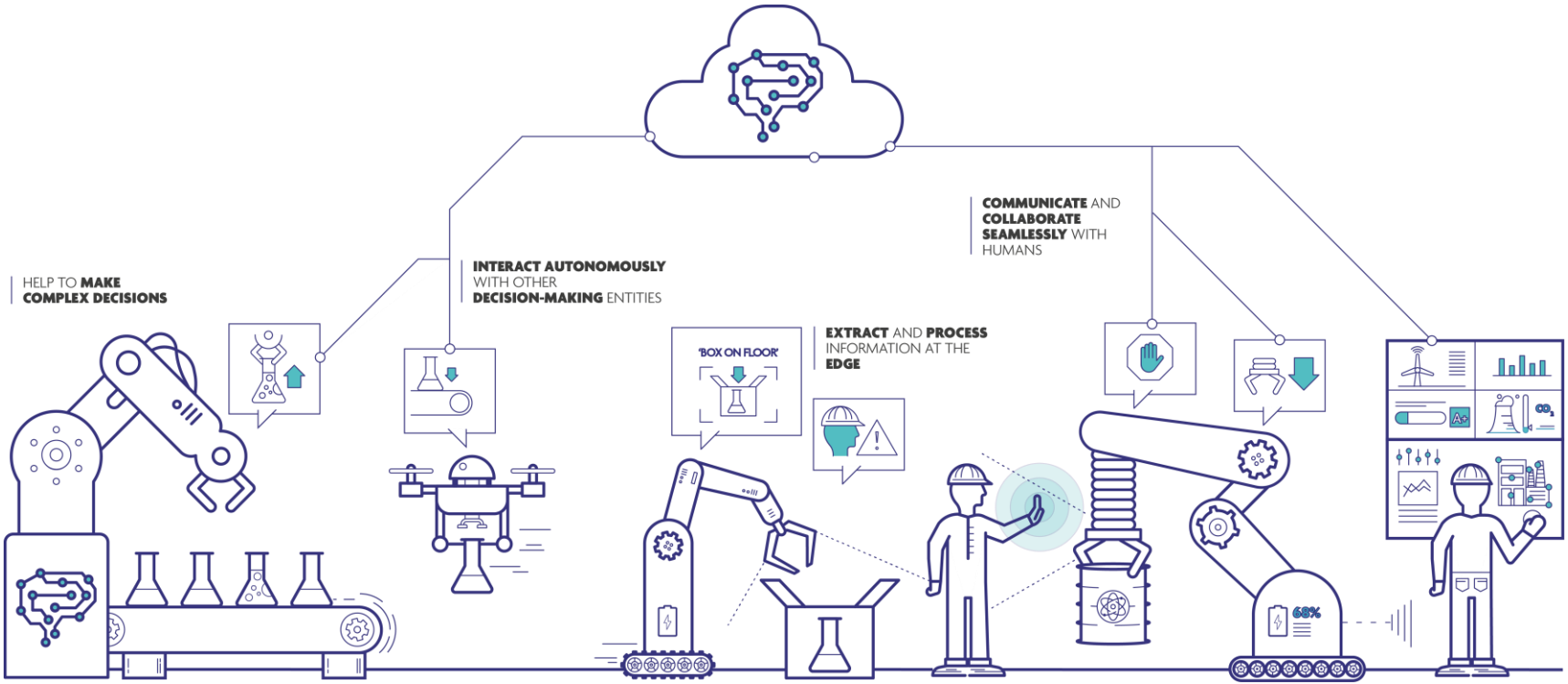
CLINICAL DECISION SUPPORT

Epilepsy	Medical Imaging *Radiation Oncology and Radiology*
Automated detection of epileptic seizures	Segmentation & classification for radiation oncology and radiology

HOSPITAL DECISION SUPPORT

Hospital Treatment Decisions
Prediction of length of stay in hospitals

AI in Industry 4.0



Selected Applications in Industry 4.0

SMART MACHINES

SMART FACTORIES

SMART ENERGY

Smart Monitoring

Smart Control

Smart Industrial Spaces

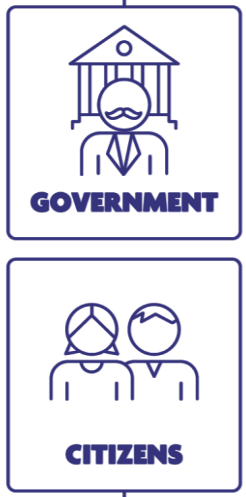
Selected Applications in Government & Citizens

PUBLIC EMPLOYMENT SERVICES

Employment services for citizens, employers and government (policy advice)

PERSONAL DATA

Exchanging data and knowledge in a healthcare setting



Common Concept: Smart Spaces

CONVERSATIONAL AGENTS

RECOMMENDER SYSTEMS

Domains and Applications

HEALTH

PRECISION MEDICINE

CLINICAL DECISION SUPPORT

HOSPITAL DECISION SUPPORT

…

INDUSTRY 4.0

SMART MACHINES

SMART FACTORIES

SMART ENERGY

…

GOVERNMENT

PUBLIC EMPLOYMENT SERVICES

…

CITIZENS

PERSONAL DATA

…

SMART SPACES

CHALLENGE-BASED RESEARCH

Making Data Science Hybrid, Automated, Trusted and Actionable

Challenge 1 AI-driven Data Science

Making Data Science Hybrid, Automated, Trusted and Actionable

Challenge 1 AI-driven Data Science

1. AI-ssisted Data-Acquisition and Pre-Processing
2. Integrating Learning and Reasoning
3. AI-Assisted Data Exploration
4. Automated Learning
5. Trustworthy and Explainable AI
6. Decision Support Systems

Real-Time and Power-Efficient AI in the Edge

Challenge 2 AI in the Edge

Real-Time and Power-Efficient AI in the Edge

Challenge 2 AI in the Edge

1. Edge Learning
2. Sensor Fusion
3. Extreme Edge Hardware

Interact Autonomously with other Decision-Making Entities

Challenge 3 Multi-agent Collaborative AI

Interact Autonomously with other Decision-Making Entities

Challenge 3 Multi-agent Collaborative AI

1. Mult-Agent Control Systems
2. Human Agents
3. Distributed Data Intelligence

Communicate and Collaborate Seamlessly with Humans

Challenge 4 Human-Like AI

Communicate and Collaborate Seamlessly with Humans

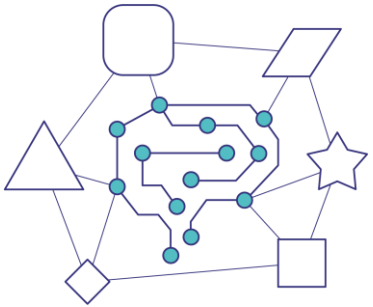
Challenge 4 Human-Like AI

1. Audio-Visual Perception and Multimodal Representations
2. Conversational Agents
3. Interaction, Personalisation and Recommendation
4. Cognitive Architectures and Human-Like Learning

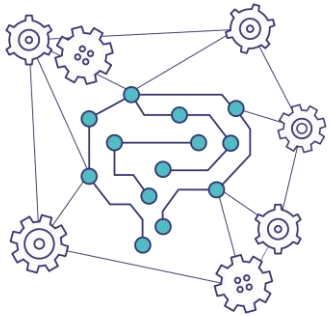
Flanders AI Program

4 Research Challenges

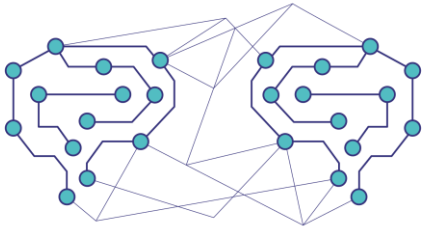
AI-DRIVEN DATA SCIENCE



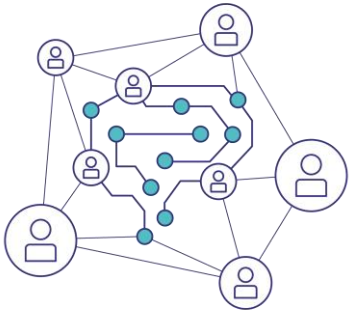
AI IN THE EDGE



MULTI-AGENT
COLLABORATIVE AI



HUMAN-LIKE AI



Flanders AI Research

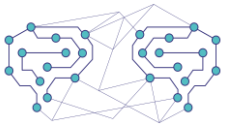
Sabine Demey
Program Director Flanders AI Research
imec

AI-driven Data Science

Prof. Bart De Moor
ESAT, KULeuven

Prof. Piet Demeester
IDLab, Ghent University-imec

Multi-agent Collaborative AI



Ann Nowé
Professor AI Lab, VUB

AI in the Edge

Mieke De Ketelaere
Program Director AI, imec

Human-Like AI

Prof. Steven Latré
IDLab, University of Antwerp - imec

Challenge-Based Research with Demand-Driven Impact

CHALLENGE
BASED
RESEARCH

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(POCS)

WITH
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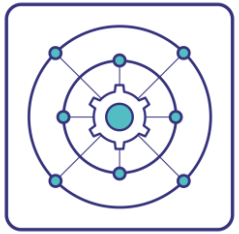

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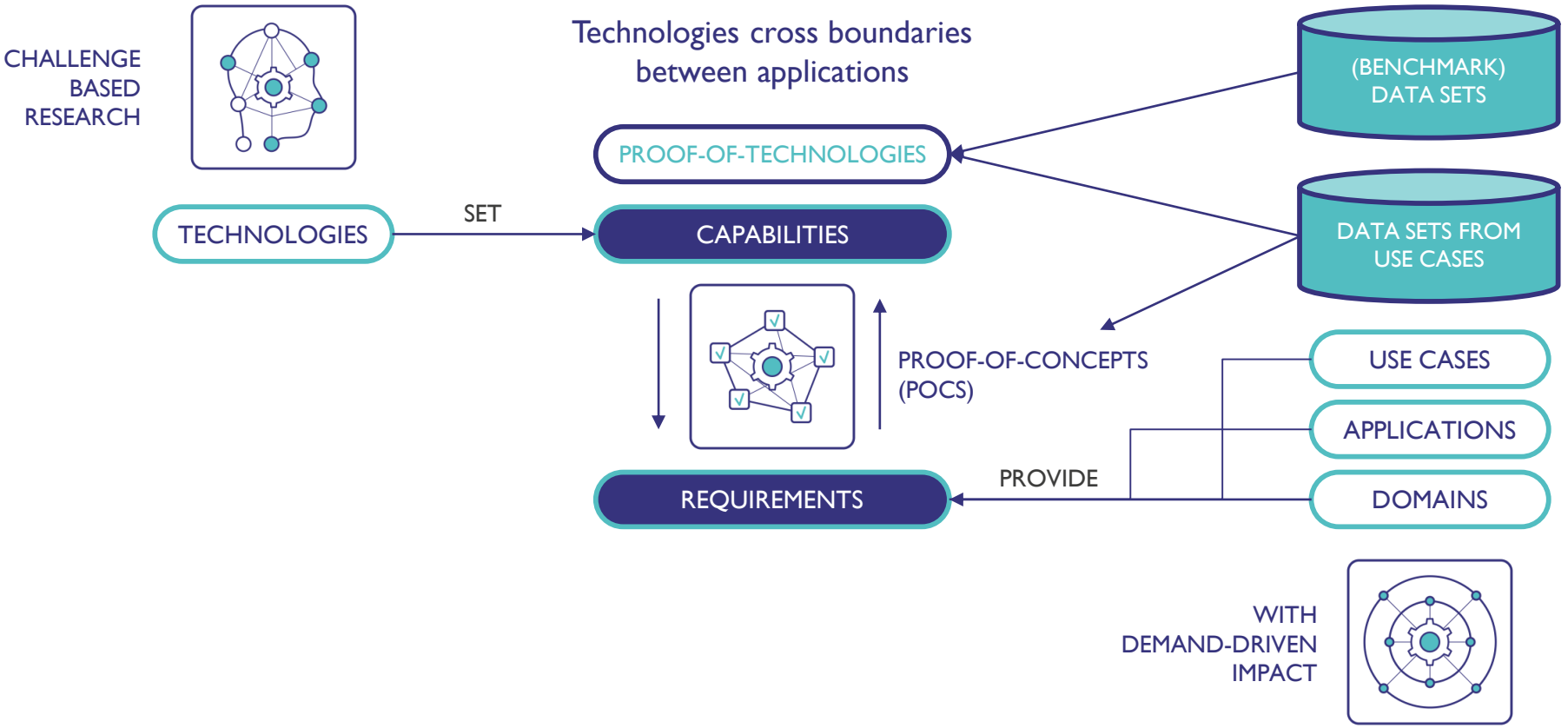

Domains, Applications, Use Cases and 4 Research Challenges

3 domains	Applications		Use Cases
Health	Precision Medicine	Single Cell Technologies	Visualisation of Single Cell Data and Segmentation of 3D Electron Microscopy Images
		Multiple Sclerosis	Improving MS Treatments
	Clinical Decision Support	Epilepsy	Automated Detection of Epileptic Seizures
		Medical Imaging	Segmentation and Classification for Radiation Oncology and Radiology
	Hospital Decision Support	Hospital Treatment Decisions	Prediction of Length of Stay in Hospitals
Industry 4.0	Smart Machines	Smart Monitoring	Smart Monitoring: Prognostic Health Management
			Smart Monitoring: Power-Efficient Anomaly Detection on High-Frequency Sensor Data
		Smart Control	Smart Control: Closed-Loop Robotic Control
			Smart Control of Machine Fleet
			Smart Control: Optimisation of Manufacturing Processes
	Smart Factories		Smart Control of Cooperating Robots/Robot Arms
			Smart Control: Optimisation of Flexible Production Lines
		Smart Industrial Spaces	Smart Spaces: AI-Assisted Operator
			Smart Spaces: People Detection and Tracking
			Smart Spaces: Embodied Agent (Industrial AGV) Performing Tasks Assisted by Operator
	Smart Energy	Smart Energy Distribution	Smart Energy Distribution
			Self-Sustainable Micro-Grids
Government &Citizens	Public Employment Services	Public Employment Services	Employment services for Citizens and for Employers and Policy Advice
	Medical & Personal Data	Personal Data	Exchanging Data and Knowledge in a Healthcare Setting
Smart Spaces		Conversational Agents & Recommender Systems	Conversational Agents
			Recommender Systems

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