

THE UPC A.I. HUB!



IDEAI-UPC

Intelligent Data Science & Artificial Intelligence
Research Center
founded October 2017





Intelligent Data Science and Artificial Intelligence Research Center

IDEAI-UPC*SGR17-



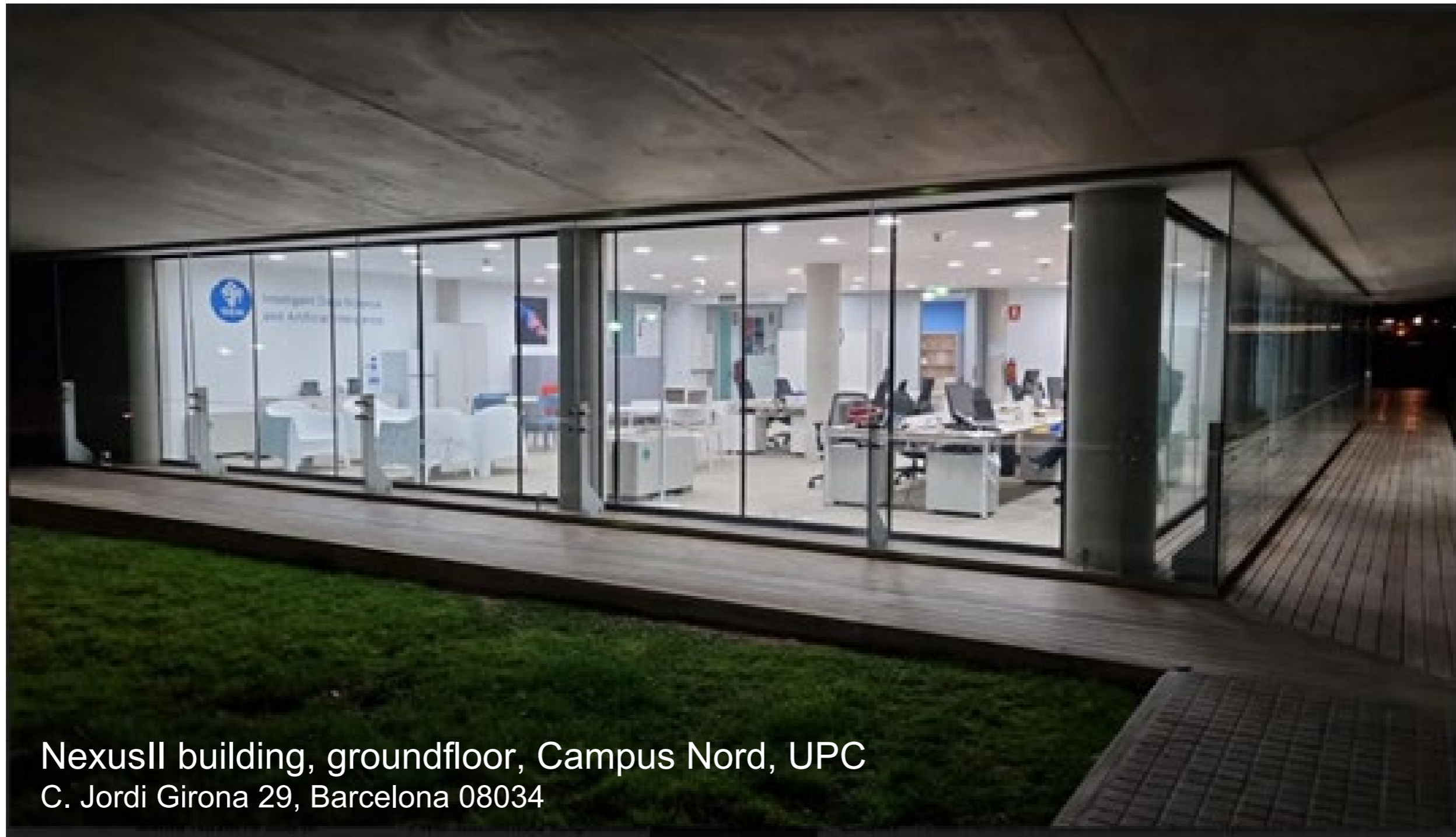
<https://ideai.upc.edu/en>,



@IDEAIUPC, mail: ideai

574

-upc@upc.edu



NexusII building, groundfloor, Campus Nord, UPC
C. Jordi Girona 29, Barcelona 08034





IDEAI-UPC

Highlights and structure

71
Senior
researchers

>480
Projects
in 30 years

26M€
Competitive
from 2017



Comissions Consultives



Digital Society



Health, Wellness
& inclusion



Education



Industry4.0



Economia



Innovation



Efficient
Resources



Ethics



Talent

Who we are?

Members

- Abadal Cavallè, Sergi
- Ageno Pulido, Alicia María
- Aguado Chao, Juan Carlos
- Alarcón Cot, Eduardo Jose
- Almasan Puscas, Felician Paul
- Álvarez Napagao, Sergi
- Angerri Torredelot, Xavier
- Angulo Bahón, Cecilio
- Arratia Quesada, Argimiro
- Baherzade Ghazvini, Mina
- Barlet-Ros, Pere
- Béjar Alonso, Javier
- Belanche Muñoz, Luis Antonio
- Buxons Vives, Miquel
- Cabellos, Albert
- Caminal, Ivan
- Careglio, Davide
- Casas Pla, Josep Ramon
- Català Roig, Neus
- Conti, Dante
- Cortés García, Ulises
- Costa, Federico
- Cruellas Ibarz, Juan Carlos
- Delgado Pin, Jordi
- de Castro Cros, Martí
- Domingo, Jordi
- Escudero Bakx, Gerard
- Esquerra Llucià, Ignasi
- Farreres De La Morena, Javier
- Ferrando Monsonís, Javier
- Ferriol Galmes, Miquel
- Gallego Olsina, Gerard Ion
- Garcia Domínguez, Víctor
- Garcia Esteban, Sònia
- Garcia Gasulla, Dario
- Gatus Vila, Marta
- Gibert Oliveras, Karina
- Gutiérrez Mondragón, Mario Alberto
- Hernández Carnero, Alvar
- Hernández Potiomkin, Yaroslav
- Hernando Pericas, Francisco Javier
- Houégnigan, Ludwig
- India Massana, Miquel
- Karna, Ashutosh
- König, Caroline
- López Cardona, Àngela
- Marqués Acosta, Fernando
- Martín Muñoz, Mario
- Monte Moreno, Enric
- Morros Rubió, Josep Ramon
- Mugica Álvarez, Francisco José
- Nadeu Camprubí, Climent
- Nebot Castells, Àngela
- Nogueiras Rodríguez, Albino
- Oliva Felipe, Luis Javier
- Oliveras Vergés, Albert
- Padró Cirera, Lluís
- Paillissé Vilanova, Jordi
- Palomino, Artur
- Pardàs Feliu, Montserrat
- Parra Pastor, Esther
- Perelló, Jordi
- Ramírez Mitjans, Sergi
- Raya Giner, Cristóbal
- Rodríguez Fonollosa, José Adrián
- Romero Merino, Enrique
- Ruiz Hidalgo, Javier
- Ruiz Vegas, Francisco Javier
- Salavedra Molí, Josep
- Salembier Clairon, Philippe
- Sànchez Marrè, Miquel
- Sánchez Sancho, Kevin
- Sánchez Soler, Mónica
- Sangüesa Solé, Ramon
- Santos Boada, German
- Serracanta Pujol, Berta
- Shafqat, Hasnain
- Solé-Pareta, Josep
- Thomas Crusells, Gemma
- Turmo Borrás, Jordi
- Tsiamas, Ioannis
- Tsintsadze, Sulkhan
- Umbert Bosch, Miquel
- Vallverdú Bayés, Sisco
- Varela Agrelo, Jordi
- Vázquez Salceda, Javier
- Vellido Alcacena, Alfredo
- Vilaplana Besler, Verónica
- Wang, Mengxue

Board

- ▶ Gibert Oliveras, Karina, **Head**, KEMLG
- ▶ Angulo Bahón, Cecilio, GREC
- ▶ Català Roig, Neus, GPLN
- ▶ Nebot Castells, Àngela, SOCO
- ▶ Hernando Pericas, Francisco Javier, VEU
- ▶ Marqués Acosta, Fernando, GPI
- ▶ Cabellos, Albert, CBA

71 permanent researchers

>150 PhD + Master students

SGR 2021-01532, SGR2017-574 i SGR2021-01532 AGAUR certification of excellence



Our Vision



“A connecting space for AI development to solve problems in complex processes, from close context, while respecting an ethical code that puts person in the center”



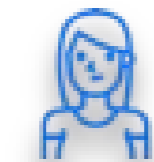
Our Mission



Visualize IDS & IA from the UPC to the **World**

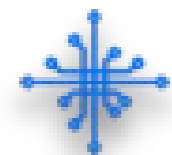


Grow up in the research lines towards **Excellence**



Training, innovation and entrepreneurship for

Youngers



A new agent in the industrial and business **Ecosystem**



Research for and with the **Society**



Our Skills

IDS & AI wide spectrum

Distributed AI

Normative Systems

Machine Learning

Soft Computing

Natural Language Processing

Speech recognition

Computer Vision

Knowledge management

Intelligent Data Science

Robotics

Assistive Technologies

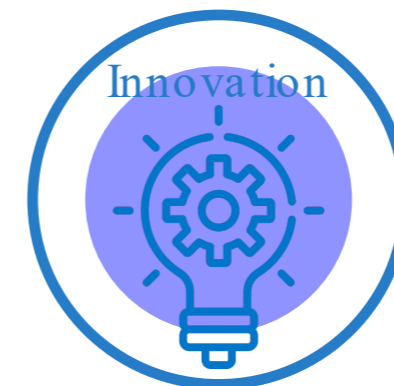
Intelligent Decision Support Systems

Computational Linguistics

Cibersecurity



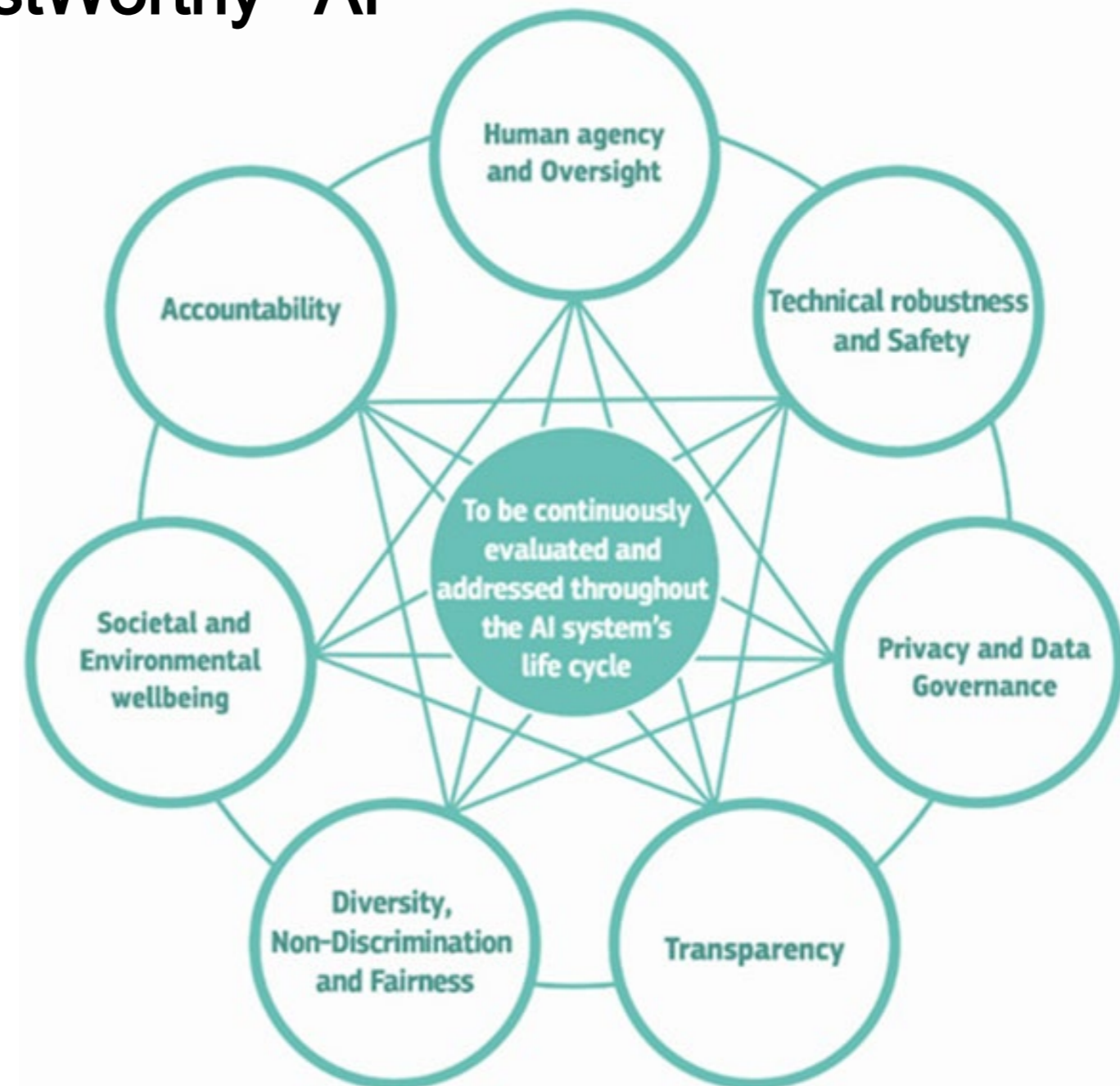
Our Strategy





Ethic & Trustworthy AI

Ethics guidelines of TrustWorthy AI





Ethic & Trustworthy AI

Trustworthy AI (TAI)

based on 3 components:

Lawful (comply with all applicable laws and regulations)

Ethical (guarantees respect for the ethical principles and values of society)

Robust (from a technical and social point of view, avoid accidental damage).

Responsible AI (RAI)

AI developed with practices (design, development and implementation) that

Help positively to companies and employees

Have a **fair impact** on customers and society

to find out more:

<https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>





Ethic & Trustworthy AI



IDEAI's main lines of work :

Ethical Assessment of AI systems

(during design & development, already deployed)

Trustworthy AI guided design & development

(Responsible AI practices)

Providing/improving Explainability to AI algorithms and methods

Creating AI technology guided by social values and norms

computational models of values

computational models of norms

Education on Ethical principles of AI





Ethical Assessment

IDEAI's members involved in many Ethical Committees

Catalan Observatoire for Ethics in AI (Dic 1st, 2020)

Observatori d'Ètica en Intel·ligència Artificial

Per una IA ètica i centrada en les persones

- Impacts
- Good Practices
- Knowledge Transfer
- To influence



Ethical Assessment



From Reactive to proactive public administrations



Inclusive

AI-enhanced social services for vulnerable people:

Proactive service (determine their needs and appropriate aids)

Digital service

Ethical Team: Simona Levy, Ulises Cortés, Karina Gibert

Ethical challenges

Accessibility (digital identity)

Minimal data



Trustworthy AI Model



Finalista
Premis
ESSA2021

INSESS-COVID19

Identification of emergent social needs as a consequence of COVID-19 and impact on Social Services in the territory
inseess-covid19.upc.edu



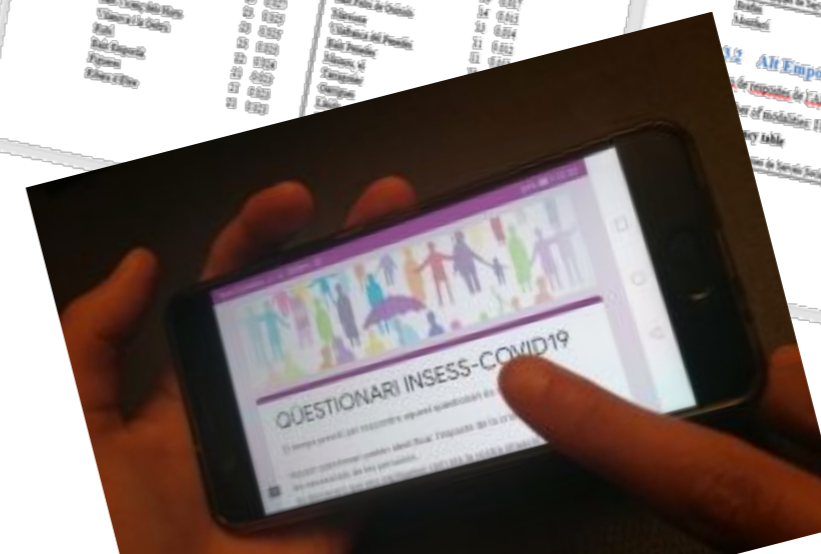
Experts + Citizens
Knowledge + Data



A methodology for the data acquisition and automatic analysis is on the impact of COVID-19 for vulnerable people

A Knowledge component selects best analysis for each variable

Trustworthy AI principles introduced in the KD process





Trustworthy AI Model

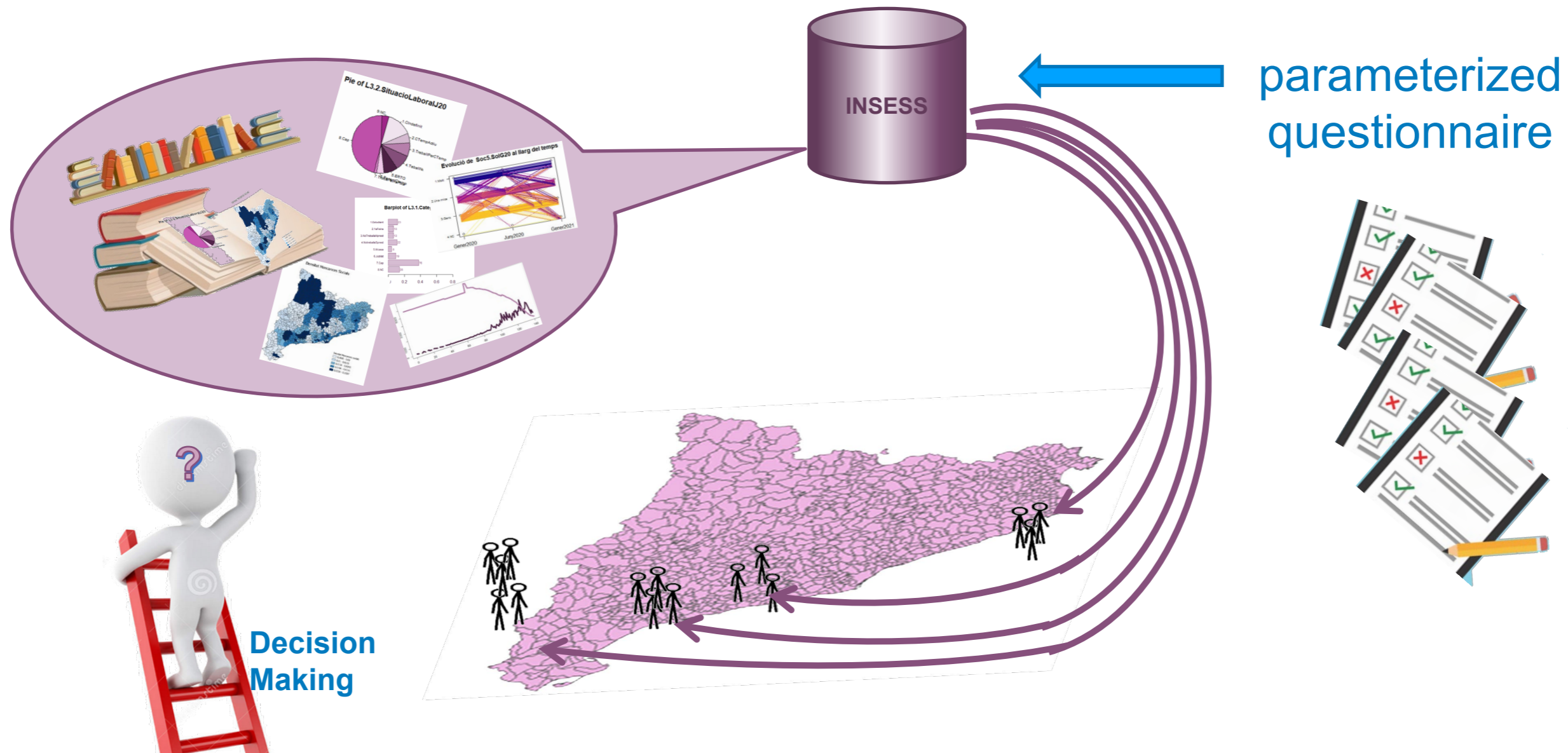


INSESS-COVID19

Identification of emergent social needs as a consequence of COVID-19 and impact on Social Services in the territory



Fundació **iSocial**
innovació en l'acció social





Trustworthy AI Model



INSESS-COVID19

Identification of emergent social needs as a consequence of COVID-19 and impact on Social Services in the territory



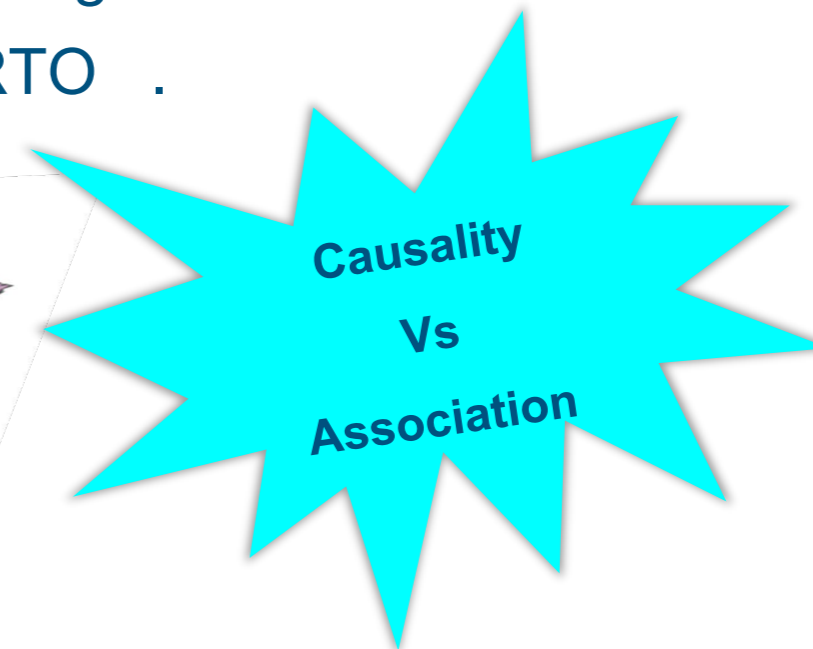
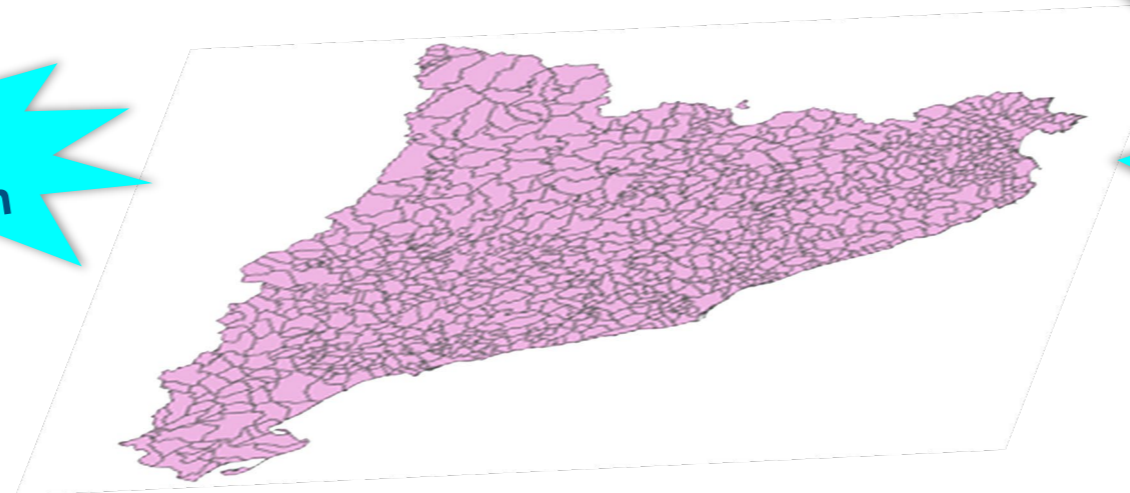
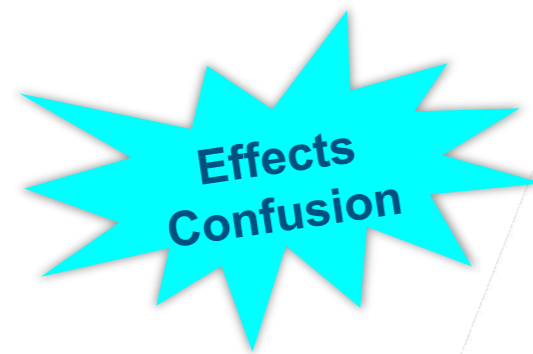
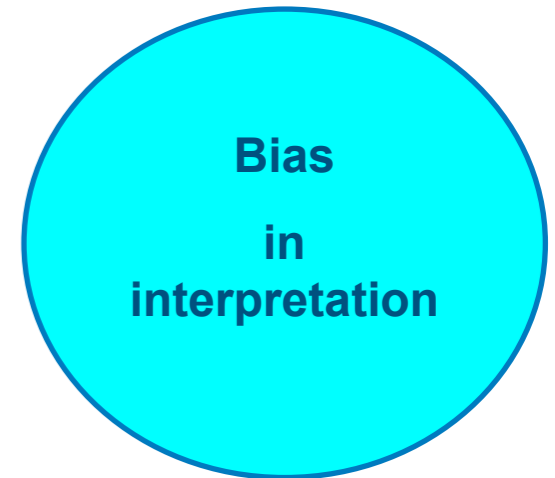
Diversity

Gender biased in access

INSESS-COVID19: Women less ERTO in pandemics
Less vulnerable?

Women → More irregular work

Precarious contract → No ERTO





Trustworthy AI Model



ReDivIAcat



UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Intelligent Data Science and
Artificial Intelligence Research Center



Generalitat de Catalunya
**Departament d'Igualtat
i Feminismes**

Analysis of 90+ services from the Catalan Digital Administration to detect potential bias.

Applies the INSESS Methodology





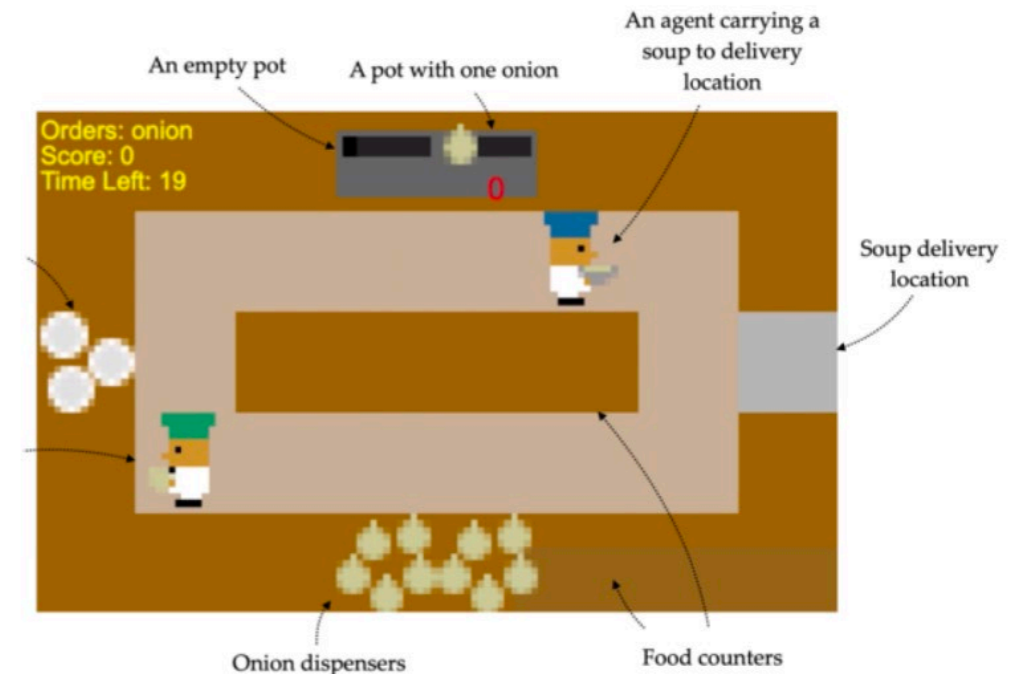
Explainable AI

Explaining opaque agents behaviour via Policy Graph generation

We observe the agent in many random scenarios and record states and actions

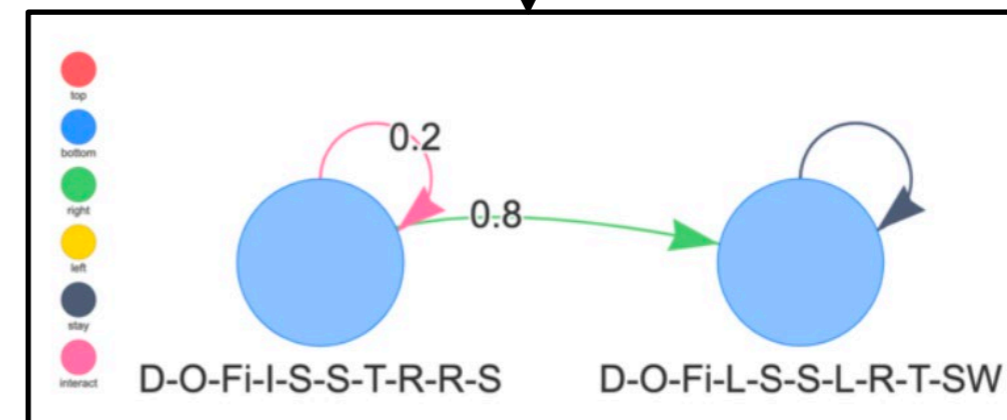
By reducing state and action spaces to predicates (via a *summarizer*) we produce a policy graph for the agent

- This policy graph can then be used to explain its behaviour in natural language
 - *Why did you choose a certain action in a certain state?*
 - *Why did you choose not to do a certain action in a certain state?*
 - *Under which conditions would you choose a certain action?*



domain dependent!

N simulations





Social Values & Norms

Computational model of norms

- Unconditional norms about predicates

- the norms on the value of P are active at all times:

OBLIGED(a, P) PERMITTED(a, P) FORBIDDEN(a, P)

- Unconditional norms about actions

- the norms on the execution of A are active at all times:

PERMITTED(a DO A) FORBIDDEN(a DO A)

- Conditional norms

- the activation of the norms is conditional under C
- C may be a predicate about the system or the state of an action:

OBLIGED((a, P) IF C)	OBLIGED($(a$ DO $A)$ IF C)
PERMITTED((a, P) IF C)	PERMITTED($(a$ DO $A)$ IF C)
FORBIDDEN((a, P) IF C)	FORBIDDEN($(a$ DO $A)$ IF C)

- Conditional norms with Deadlines

- the activation of norms is defined by a deadline

OBLIGED((a, P) BEFORE D)
PERMITTED($(a$ DO $A)$ AFTER D)
FORBIDDEN((a, P) BEFORE D)

- absolute and relative deadlines:

23:59:00 09/05/2004

$time(done(assign(organ, recipient))) + 5min$

- Examples:

OBLIGED($(allocator$ DO $assign(heart, recipient)$)
BEFORE $(time(done(extraction(heart, donor))) + 6hours)$)

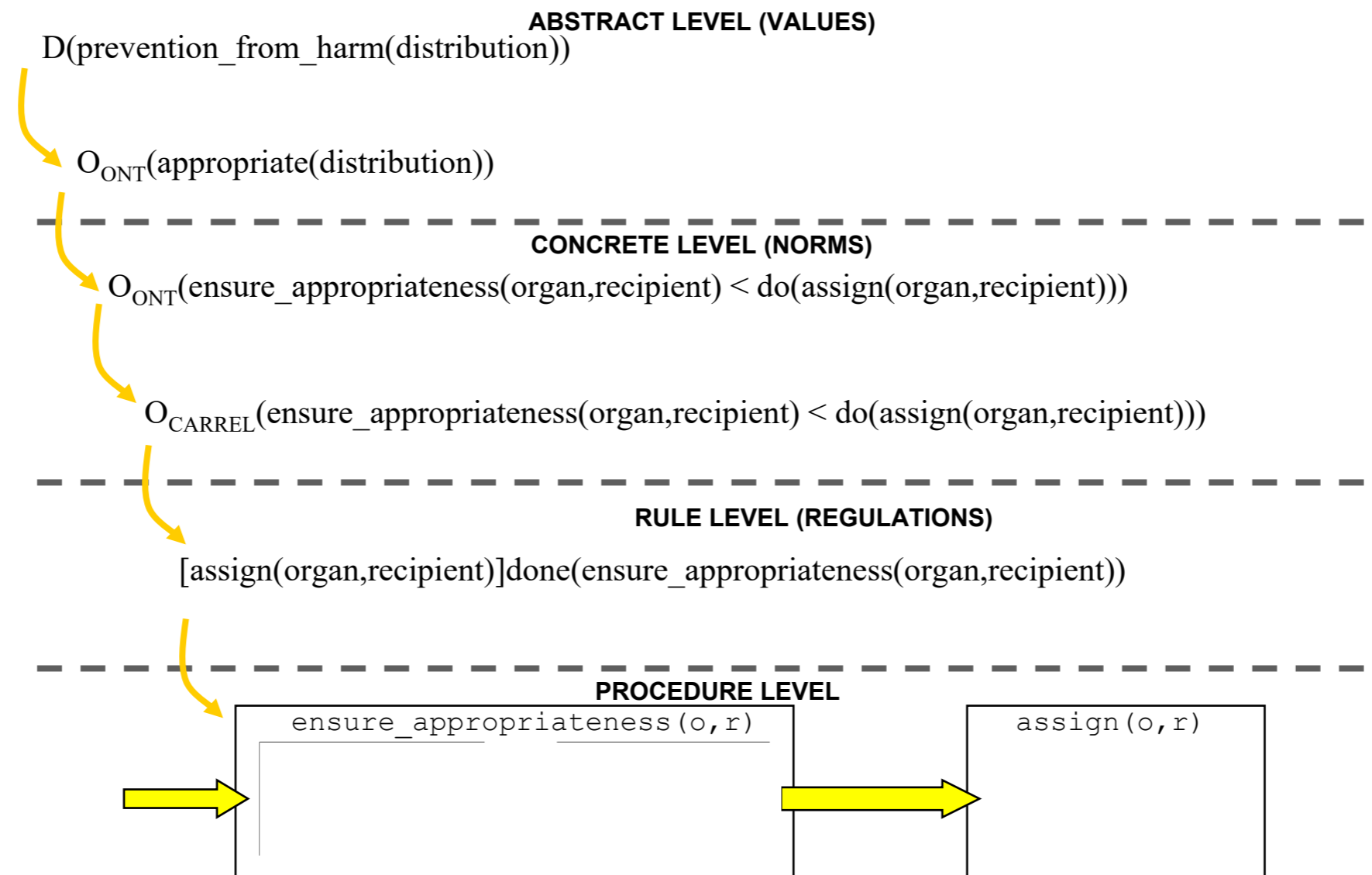
FORBIDDEN($(allocator$ DO $assign(organ, recipient)$)
IF NOT($hospital$ DONE $ensure_quality(organ)$))





Social Values & Norms

Computational model of norms





Social Values & Norms

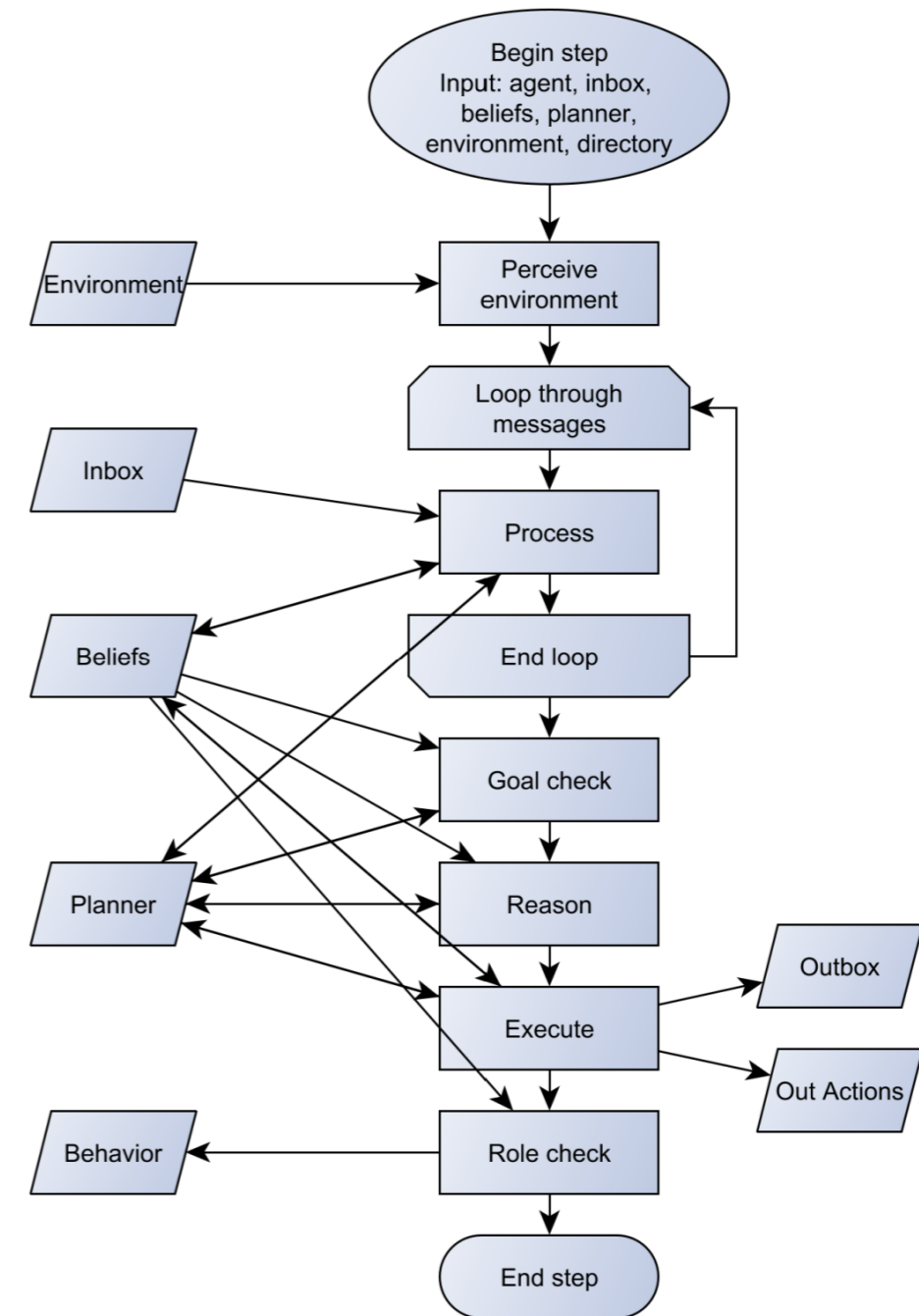
Social Values guiding AI's behaviour

$$A_i = \{ \underset{\text{identity}}{ID}, \overset{\text{message queues}}{msgQs}, \underset{\text{role behaviour}}{Bh}, \overset{\text{beliefs set}}{\mathbb{B}}, \underset{\text{own goals set}}{\mathbb{G}}, \overset{\text{current plan}}{\mathcal{P}}, \underset{\text{external actions}}{outAcs}, \overset{\text{current goal}}{g_c}, \overset{\text{meta planner}}{\mathcal{MP}}, \overset{\text{goal preferences}}{\mathbb{P}_g}, \underset{\text{plan preferences}}{\mathbb{P}_p} \}$$

$$\{dGP, cGP_1, cGP_2, \dots, cGP_n\}$$

$$\{gP_1, gP_2, \dots, gP_n\}$$

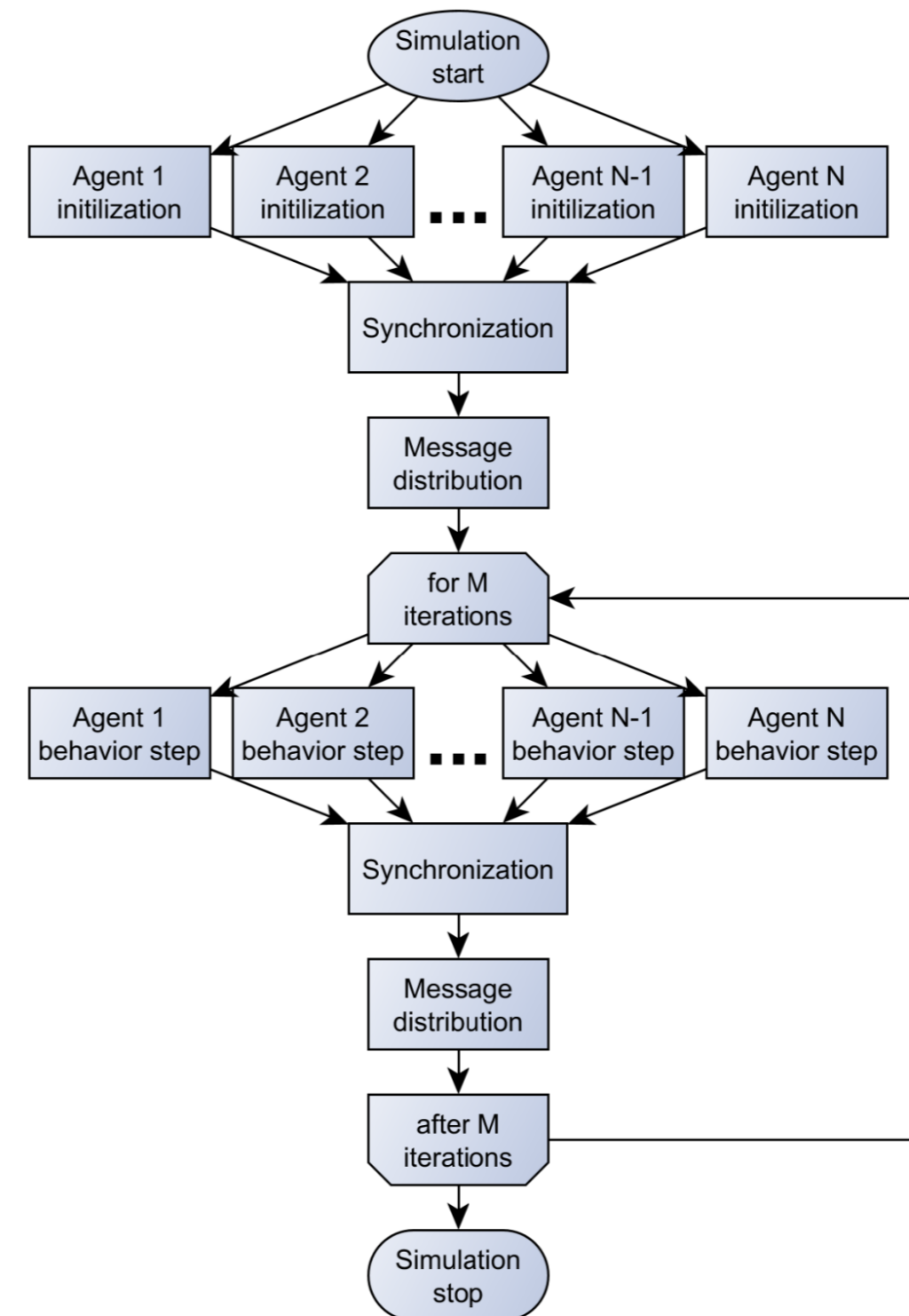
$$\{g_2 \rightarrow g_0, g_1 \rightarrow g_0, \dots\}$$





Social Values & Norms

Value-based Social Simulation in HPC





Ethics & Trustworthy AI

First Official Bachelor Degree on Artificial Intelligence in Catalonia

Aproved by Ministry 17 sept 2020. Started Sept 2021

Agreement with PDA Gencat-UPC.

240 ECTS (180 mandatory; 42 optative; 18 TFG)

4 years, 50 places

First promotion: 45,7% women; top students (mark >12,8)

FIB



<https://fib.upc.edu>



<https://www.fib.upc.edu/es/noticias/la-fib-presenta-el-primer-grado-en-inteligencia-artificial-de-catalun>

UPC

Pioneer
Unique

AI
Bachelor + Máster + PhD

Impulsed by

KEMLG -> IDEAI

FIB

4 QUALITY
EDUCATION



ciutadanIA

<https://ciutadanIA.cat>

 #ciutadanIAcat



Ethics & Trustworthy AI

1285 participants
154 egressats
26 certificats
>5800 visites

1.6.2023



ciutadanIA 
Formació en Intel·ligència Artificial
per a tothom!

 UNIVERSITAT POLITÈCNICA DE CATALUNYA
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Intelligent Data Science and
Artificial Intelligence Research Center



Amb el suport de:  Generalitat de Catalunya
Departament de la Vicepresidència
i de Polítiques Digitals i Territori 

Includes a module on Ethical aspects of AI .

Contact us



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IDEAI-UPC. Intelligent Data Science and Artificial Intelligence Research Center

Team Catalonia AI DIH Publications Projects Opportunities News

You are here: [Home](#)

THE UPC AI HUB!

IDEAI-UPC Research Center is the common place at the Universitat Politècnica de Catalunya - BarcelonaTech (UPC) for both, long-experienced and excellence-background newbies research groups in AI and Intelligent Data Science.

- Digital Society
- Health, Wellness & Inclusion
- Education
- Industry 4.0
- Economy
- Innovation
- Efficient Resources
- Ethics
- Talent

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News

INAUGURATION

Apr 12, 2019 - 11:00 AM
Aula Màster - Campus Nord UPC

Official inauguration of IDEAI-UPC

On Wednesday 3rd of April, the IDEAI-UPC Research Center will be inaugurated. The ceremony will be held at 11a.m. in the Aula Màster of Campus Nord, UPC and will be free and open to the public.

Mar 27, 2019

Google AI

An IDEAI researcher has received a 2018 Google Faculty Research Award

Our Team



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