Politecnico di Torino | PIC4SeR

# PIC4SeR

PRECISION AGRICULTURE

SMART CITY SEARCH & RESCUE

SERVICE ROBOTICS FOR WELLBEING

CULTURAL HERITAGE

UNDERWATER

SPACE

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**Centre Coordinator**

**Service robots** assist human beings, typically by performing a job that is dirty, dull, distant, dangerous or repetitive, including household chores. They typically are autonomous and/or operated by a built-in control system, with manual override options. The term "service robot" does not have a strict technical definition. The International Organization for Standardization defines a “service robot” as a robot “that performs useful tasks for humans or equipment excluding industrial automation applications”

# PIC4SeR – Service robotics

Industrial Robots

Key technologies shaping

PERCEPTION

COGNITION

ACTION

Future capabilities of robots

Service Robots

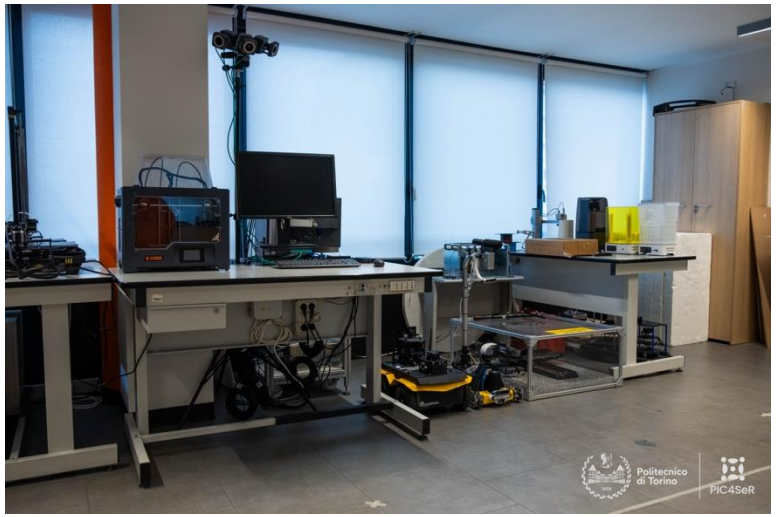
# PIC4SeR – Why?

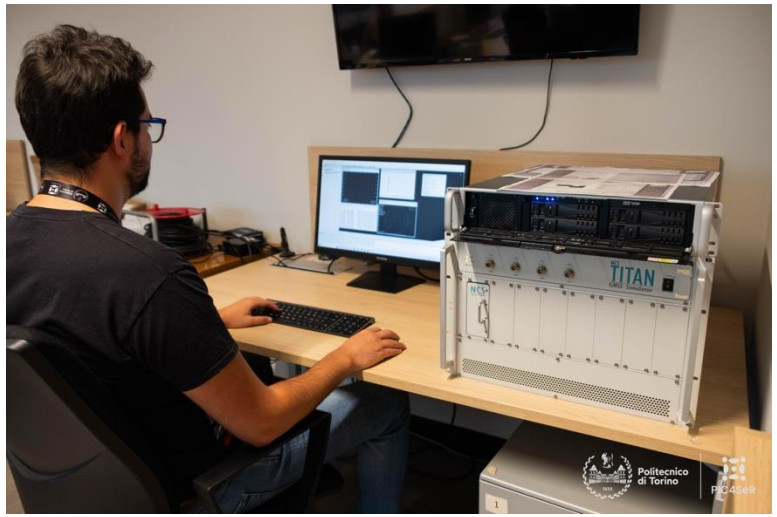
- Many of the current research, innovation and development in the service robotic field, can be classified as **disruptive technologies**
- Several uncorrelated research projects and industrial partnerships **must be harmonized** and coordinated to optimize the results
- To start a **common workplace**, a common knowledge and a common language
- To develop an **integrated approach** and technology development process in this booming area
- To help PoliTO reaching a **critical mass** in this sector (instead of several scattered initiatives)
- To **link together** technology needs coming from several industrial partners
- To start **interdisciplinary didactic activities** in this area
- To join several international research communities **with a unique "face"** and coordinated research proposals

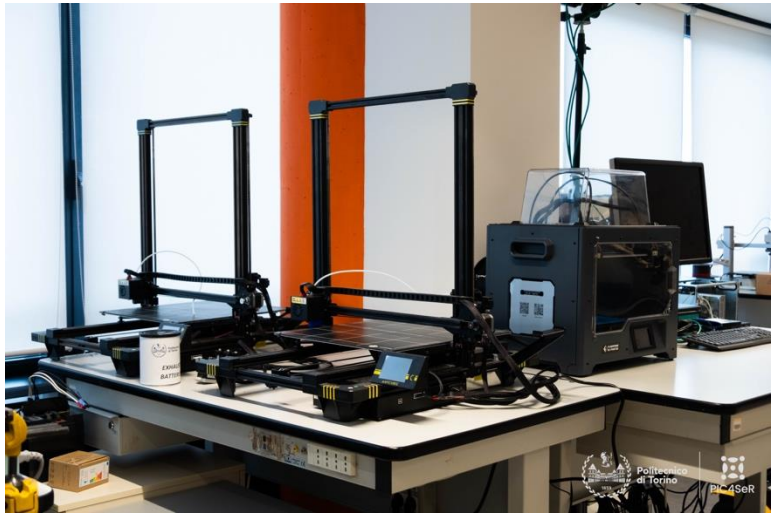
# **PIC4SeR** in pills

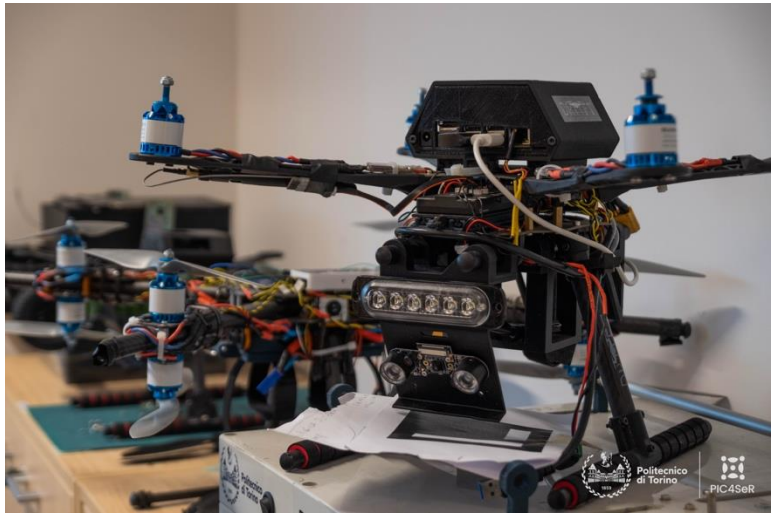
- **5 PoliTO departments**
  - DET (Electronics & Telecoms)
  - DAUIN (Informatics & Control)
  - DIMEAS (Mechanics & Aerospace)
  - DIATI (Geomatics & Photogrammetry)
  - DAD (Design & Cultural Heritage)
- **56 people** involved
  - 31 staff
  - 10 researcher
  - 15 PhD students
- **Location**: c/o COVIVIO building
  - C.so Ferrucci 112 - Torino
  - 580mq of labs and offices
  - indoor & outdoor **facilities** available for testing

# **PIC4SeR** indoor facilities





# **PIC4SeR** outdoor facilities

# PIC4SeR - Enabling technologies

/Energy optimization

/GNSS navigation

/4G and 5G Networks

/Path planning

/Cooperative positioning

/SDR receivers

/Sensor integration

/Locomotion platforms

/Soft robotics

/ROS2

/Multimedia communication

/Control

/Coding

/Human Machine Interaction

/Internet of Things

/Machine Learning

/Interaction visualitazion

/Artificial Intelligence

/Data fusion

/Interaction design

/System Co-Design

/Edge-Fog-Cloud Computing

/Ethics

/Co-living Design

/Embedded Computing

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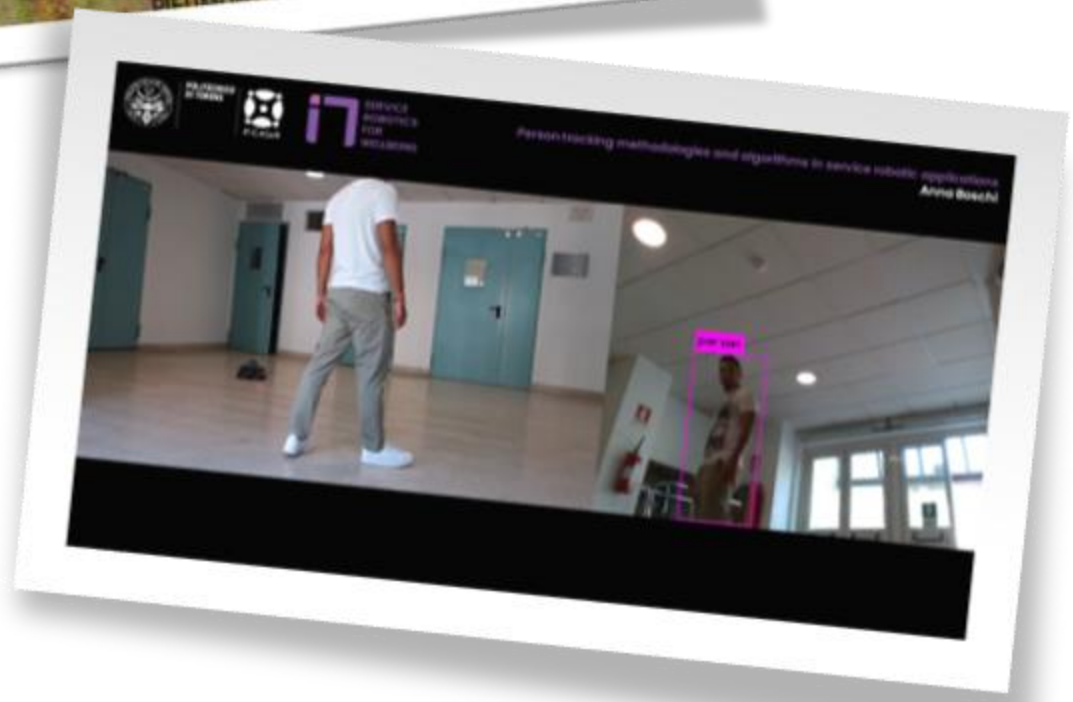
# **PIC4SeR** – key application areas

## PRECISION AGRICULTURE

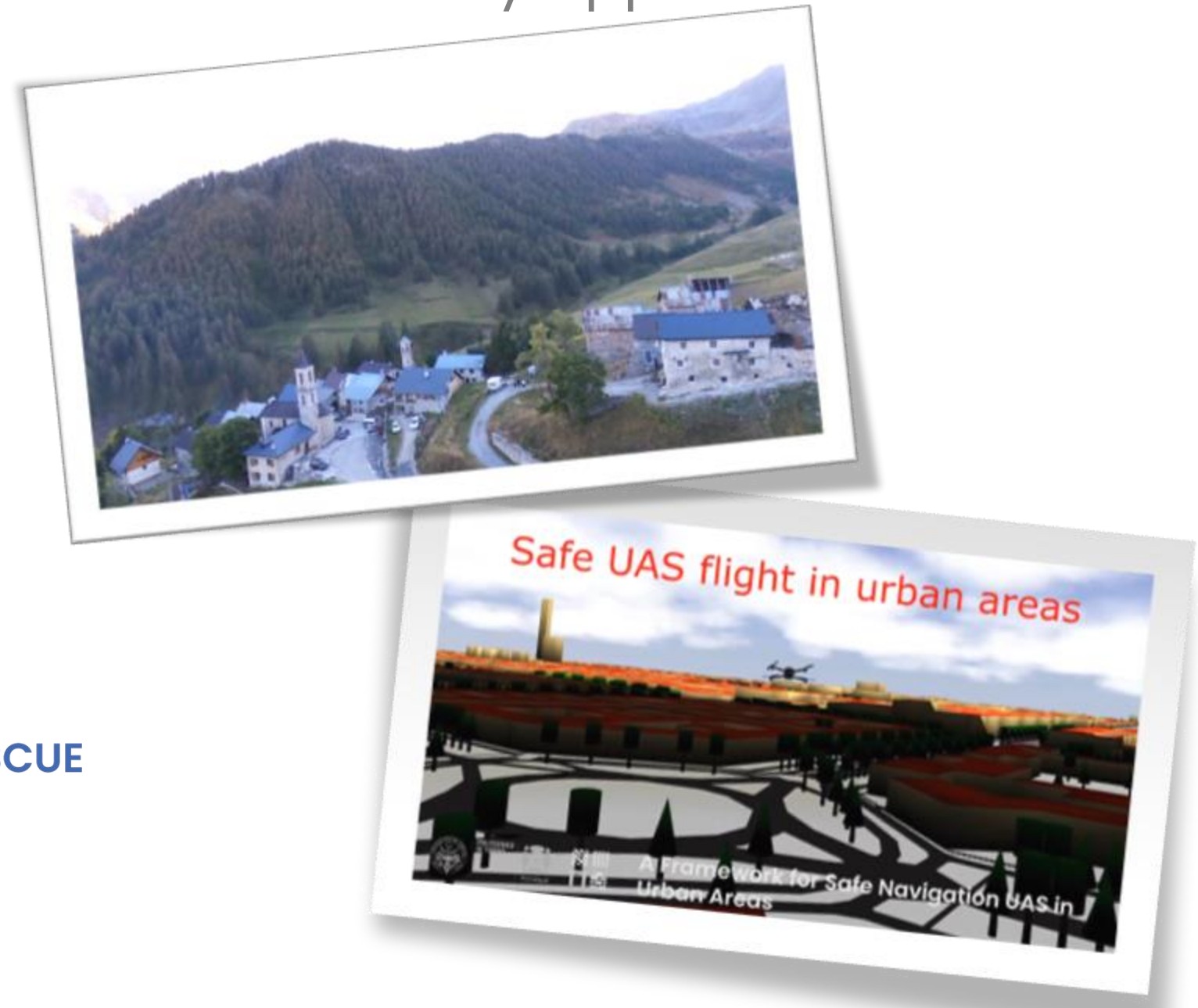
## SERVICE ROBOTICS FOR WELLBEING



# **PIC4SeR** – key application areas

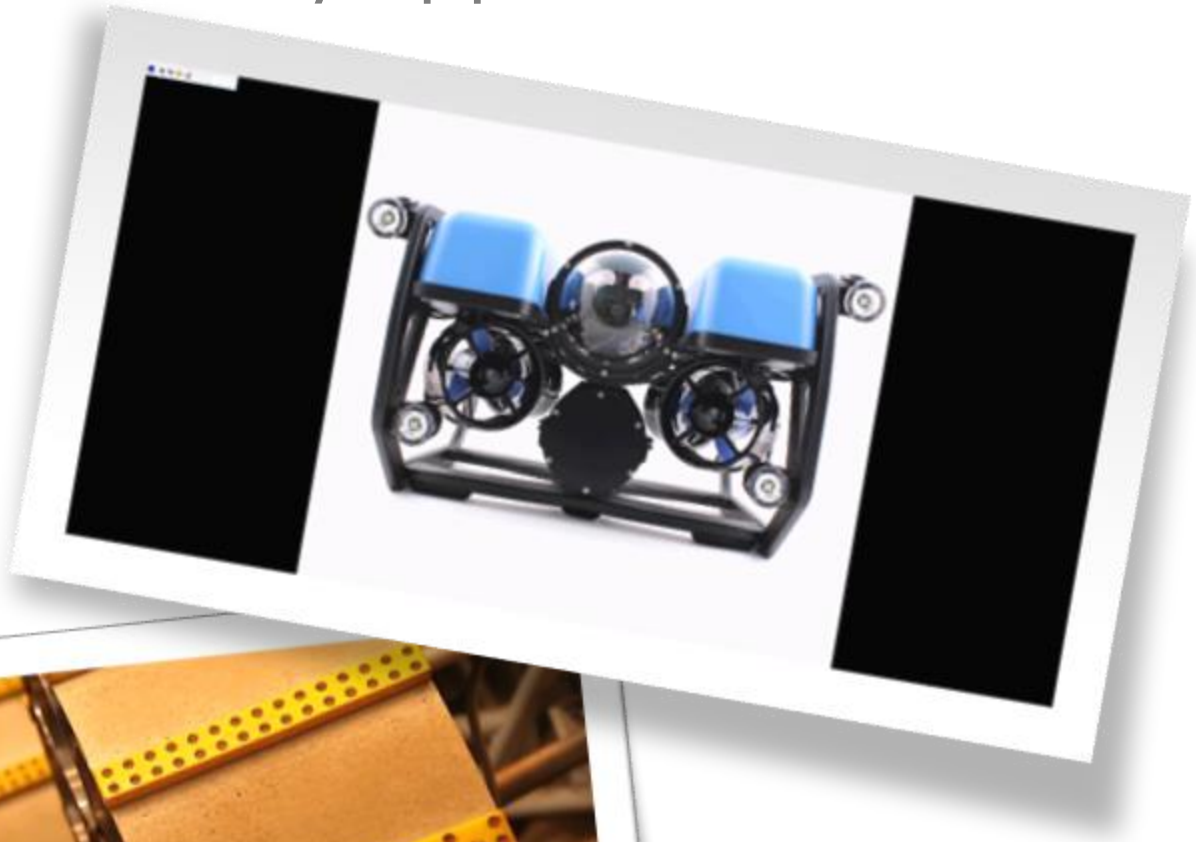
CULTURAL HERITAGE

SMART CITY
SEARCH & RESCUE

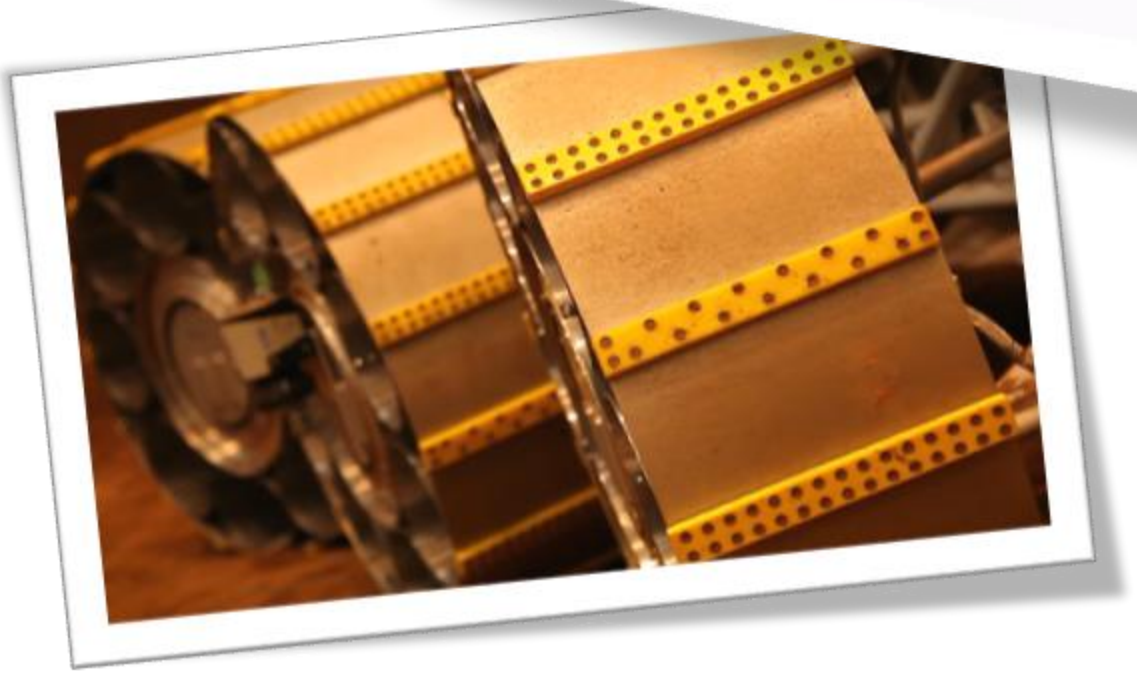


# **PIC4SeR** – key application areas

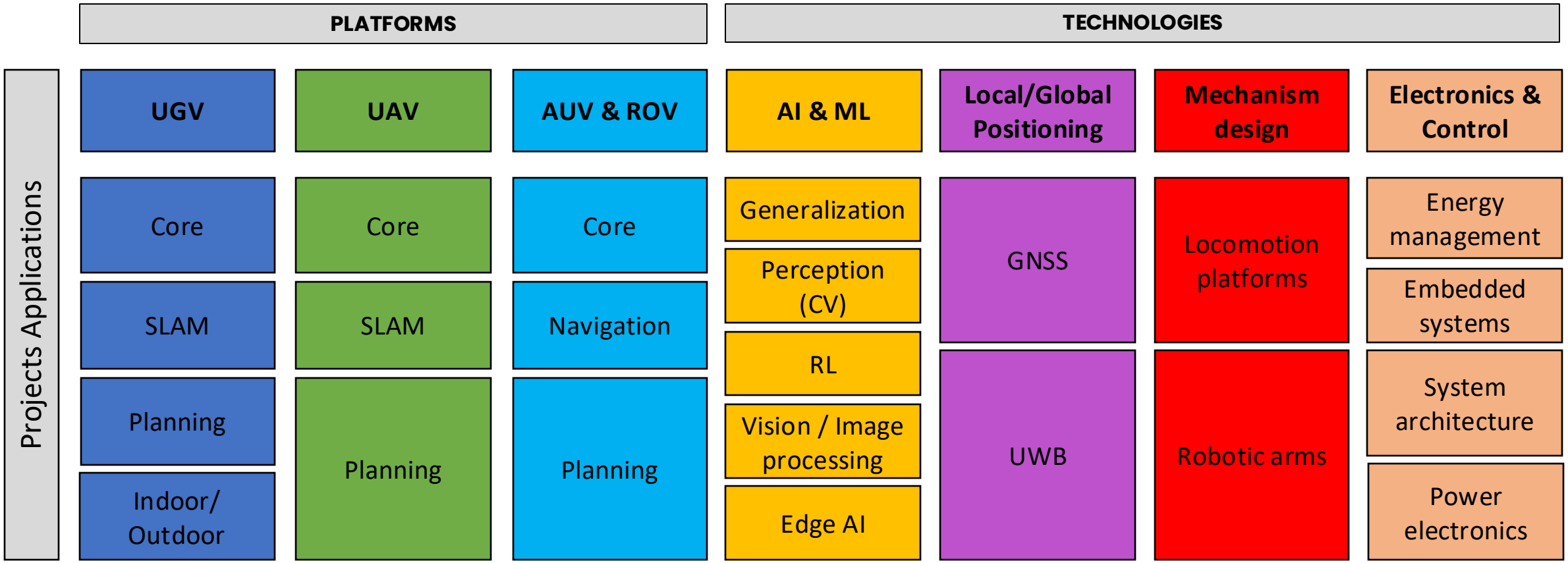
UNDERWATER



SPACE



# PIC4SeR – Internal organization



# Companies & Research partners

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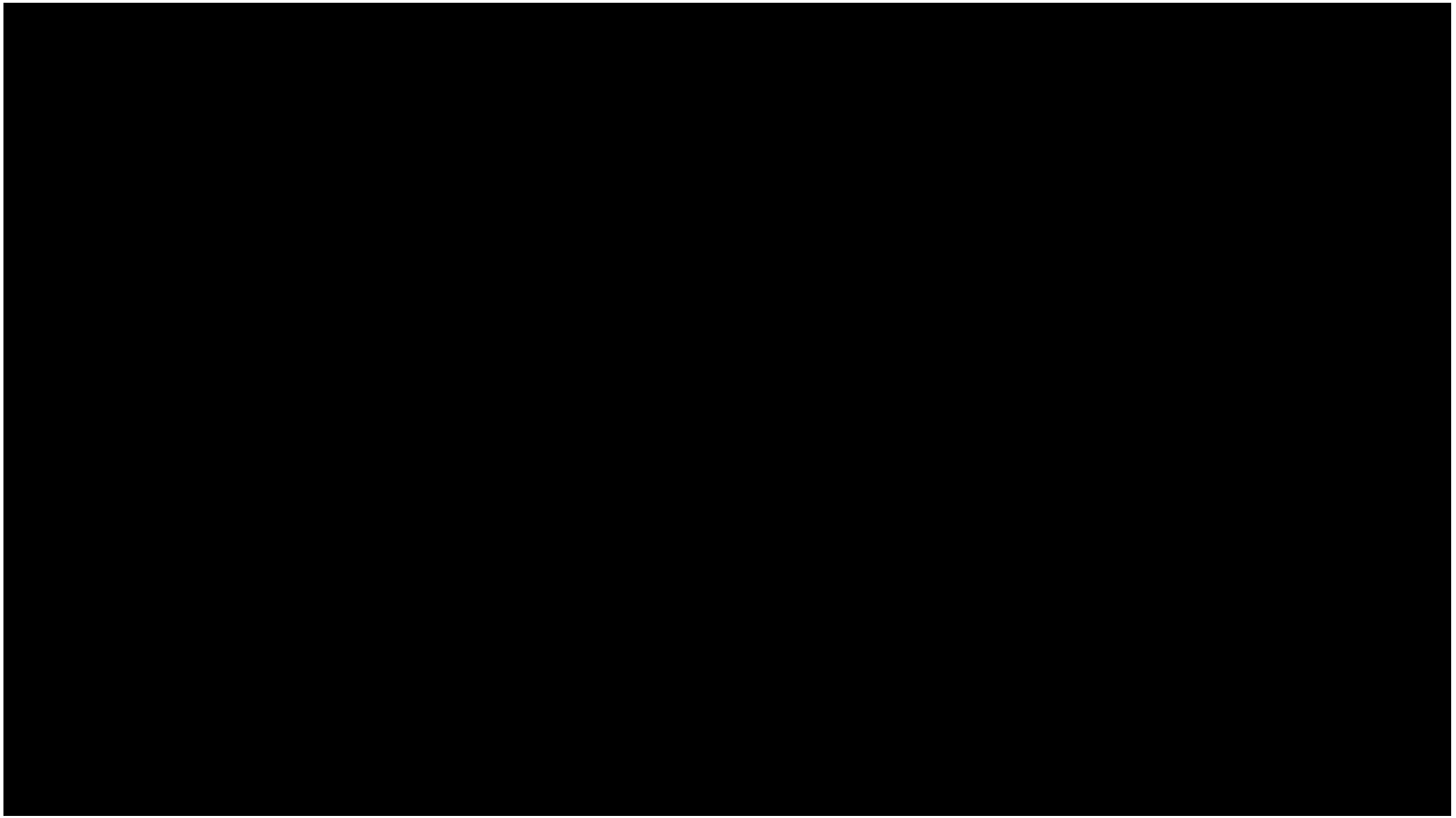
PIC4SeR
TIM
STELLANTIS
INTESA SANPAOLO INNOVATION CENTER
EDISON EDF GROUP
EPF
ALBA
CENTRO RICERCHE FIAT
FONDAZIONE D.O.T. DONAZIONE ORGANI E TRAPIANTI
ThalesAlenia Space
agenzia spaziale italiana
esa European Space Agency
JPL Jet Propulsion Laboratory California Institute of Technology
argotec
POLO AGRIFOOD REGIONE PIEMONTE
AMET Applied Mechatronics
InnoTech BRING FUTURE TO LIFE
REPLY
accenture
CNH INDUSTRIAL
GOMA ELETTRONICA SpA
iit ISTITUTO ITALIANO DI TECNOLOGIA
COMAU
TORINO CITYLAB
DORALAB Drones Testing Area
Incubatore Imprese Innovative Politecnico Torino
CLEARPATH ROBOTICS™
Sant'Anna Scuola Universitaria Superiore Pisa
DRONEUNIT NETWORKING, INNOVATION, AND EXCELLENCE FOR LAW ENFORCEMENT DRONE UNITS
MESAP Meccatronica e Sistemi Avanzati di Produzione
DISAFA Università degli studi di Torino
Universität Zürich UZH
UNIVERSITÀ DI TRENTO
EPFL
IUSTO Rebaudengo Aggregato alla Facoltà di Scienze dell'Educazione - Università Pontificia Salesiana
ETH zürich
TU/e Technische Universiteit Eindhoven University of Technology



# Thank you!

www.pic4ser.polito.it