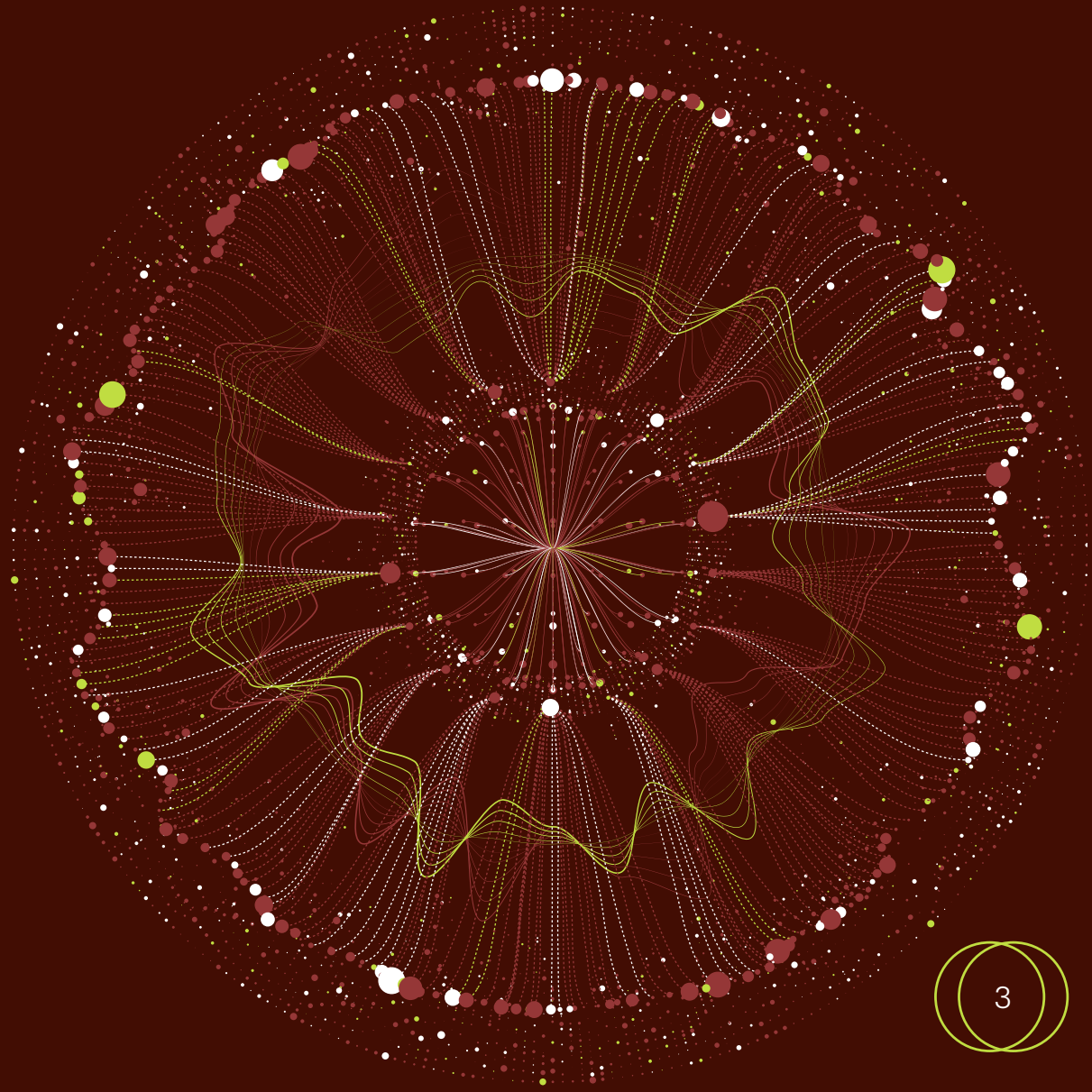
COMPANY PROFILE



CHI SIAMO

BI-REX is one of the **8 Italian Competence Centers** funded by the Ministry of Enterprises and Made in Italy (ex MISE) within the **Industry 4.0 National Plan**.

Our **public-private Consortium**, born in 2018, is located in Bologna and Palermo (Italy) and gathers in partnership **64 players** among Universities, Research Centers and Companies of excellence.

BI-REX is the only Italian Competence Center with an industrial guide

Metropolitan City of Bologna
BIS - CTE

European Digital Innovation Hubs & Competence Centers

THE ECOSYSTEM

bi-REX
Big Data Innovation & Research Excellence

Technopoles & ER High Technology Network

7 Italian Competence Centers

Sicily Innovation Hub

THE CONSORTIUM

64 PARTNERS

13 Institutions

24 End Users

27 Technology Service Providers

Outlook

- BI-REX, specialization area, funding managed
- Capability
- Service portfolio and results on state-aid transfers
- Serving to the AI Ecosystems: experience from the field

- Startup, HPC and AI applied to automation of litters in seas, river
- Micro Company, AI and Agentic AI applied to lighting in cities
- Medium size Company, Semantic twin and AI in quality prediction

- Cooperative of workers, GenAI for vehicles maintenance\repairers
- Midcaps, Integrationg AI and Mobile robots to coordinate BOM
- SMEs Network, Gen AI in Design for Additive Manufactoring
- TSP, Anomalous real-time detection of errors in Additive Manu
- SME, Extention of a dual use technology for Inclusion (LLM – LIS)

Finanziato dall'Unione europea
NextGenerationEU

An Ecosystems Integrator

bi-rex
Big Data Innovation & Research Excellence

BIG DATA RESEARCH AND INNOVATION EXCELLENCE

Finanziato dall'Unione europea
NextGenerationEU

- Italian Competence Center with focus on Data and Integration funded by Ministry of Enterprises and Made in Italy in Industry 5.0 (2018).

- Public-private Consortium, 63 Shareholders, +100 Service Providers, 10 accelerators-incubators, +200 startups (Ecosystem Integrators)

Distinctive features

- A node of the Italian Cybersecurity Agency
- UE Competence Center EuroCC – HPC (AI Factory)
- European Digital Innovation HUB (DEP) (BIREX++, UDD)
- The House of Emerging Technologies for Bologna City (52 Municipalities)

An Ecosystems Integrator

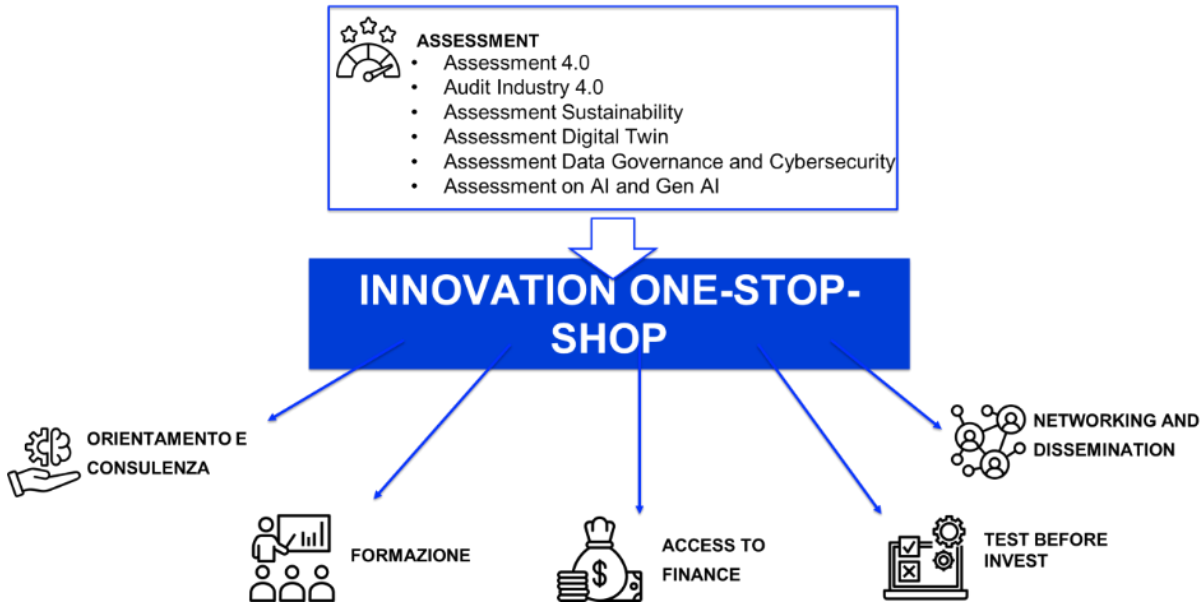
- Unique Capability
  - Smart Hyper-connected Cyber-physical Factory
  - INNOVATE HPC (the 5th in the world) (AI FACTORY
  - Hosting site for technologies, companies, and start-ups
  - Data Space Provider for Health & Manufacturing

OUR MISSION

Promote the processes of innovation, digitalization, and sustainability of companies, the implementation and development of emerging technologies, as well as Industry 4.0 and its evolutions.

Promote the sharing, transfer of knowledge, innovative technologies, and best practices in an Open Innovation context.

INTEGRATED SERVICES PORFOLIO



- + 180 training courses
- 2 e-learning Platform
- Advanced AVR Trainings
- 5 Accademy inside Industries
- 1 Master (800 hours)
- Custom jtraining journey

- Scouting opportunies
- Project preparation (UE to national grants)
- Open Innovation challenge
- Equity and debt tools

- Over 200 Demos
- Reconfigurable architecture

We Manage Grants for the Ecosystem (MIMIT + UE)

A – New Capability Expantion - 8.5M€ 2023-2026
On the top of 20M€ 2018-2023 Investments

B1 – Grants for Comapanies (midcaps+SMEs) – 10M€

Cascade grants, covering both internal and extenal costs up tp 400k€ with 50% max funding rate (art. 25 GBER) – TRL from 3 to 6/7 and Involvment of CC in the proposal

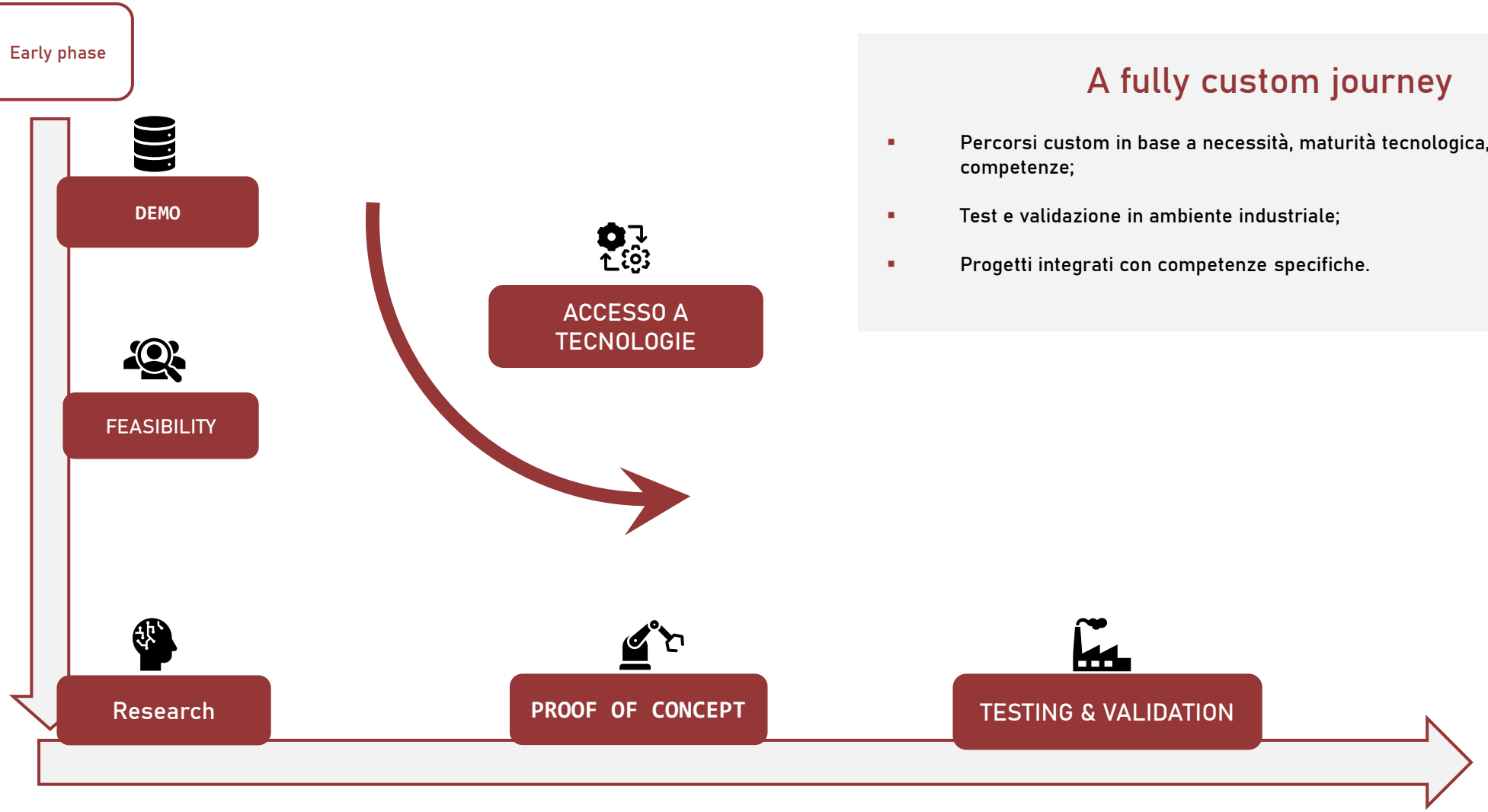
B2 –Services with state-Aid transfer 12.000.000€

- Provision of State Aid to companies, in the form of a "discount" on the price of services
- State aid intensity linked to the service and the company size;

EDIH BI-REX ++ 5.900.000€ entro il 30.06.2026
EUROCC-HPC 2.000.000€ free-of-charge service

Finanziato dall'Unione europea
NextGenerationEU

Assessment → A blended Mix of Service leading to TBI



A fully custom journey

- Percorsi custom in base a necessità, maturità tecnologica, dimensione, competenze;
- Test e validazione in ambiente industriale;
- Progetti integrati con competenze specifiche.

EDIH - SMEs

SERVIZIO EROGATO	Dimensione di Impresa			Daily Rate del Servizio	
	Micro & Piccole	Medie	Grandi		
Audit Tecnico, Valutazione Maturità Tecnologica					
Assessment	80%	75%	40%	200 €	1.500 €
Prova prima dell'investimento					
Accesso e utilizzo delle tecnologie (linee demo, etc)	80%	65%	30%	250 €	5.000 €
Demo & Test				800 €	1.650 €
POC, Prototipi, Progetti di innovazione; Integrated project etc.				1.200 €	1.500 €
Formazione					
Formazione a catalogo (mono o multi azienda) | Tailormade (< 24 ore)	80%	65%	50%	300 €	1.500 €
Formazione a catalogo (mono o multi azienda) | Tailormade (> 24 ore)	60%	50%	40%	1.200 €	5.000 €
Consulenza su accesso ai finanziamenti					
Accesso ai meccanismi di finanziamento bancario/equity/ debito etc.	70%	55%	50%	1.500 €	2.800 €
Accesso a bandi pubblici Regionali, MIMIT, UE e Crediti di imposta (mappatura, inserimento in partenariati, proposal drafting e project management)				800 €	2.700 €
Consulenza su innovazione tecnologica di processo e di prodotto, networking e sensibilizzazione					
Consulenza su innovazione di processo, di prodotto, di modelli organizzativi e attività di scouting tecnologico	65%	60%	50%	200 €	3.500 €
Networking e sviluppo di programmi di awareness				500 €	1.200 €
Sensibilizzazione - pricing ad evento				800 €	10.000 €
Consulenza su protezione proprietà intellettuale					
IPR Managment & Analisi Strategica	60%	55%	50%	800 €	1.250 €

- Staid-aid transfer as direct discount in a «commercial» offer, with no burocracy in reporting (no timesheet, no invoice.. No nothing!)

Funded by the European Union
NextGenerationEU

KPI

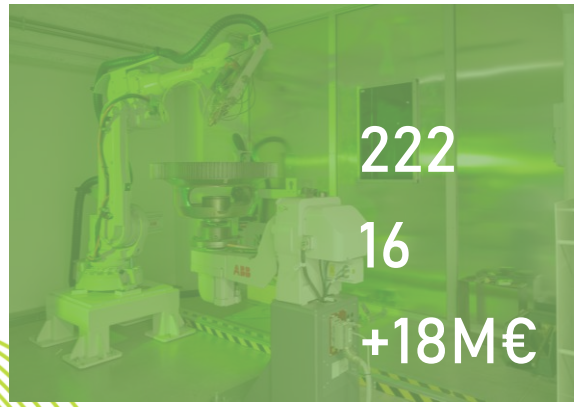
B1 R&I CASCADE GRANTS

Funded proposals

Use cases

Universities, RTO + 55 TSP

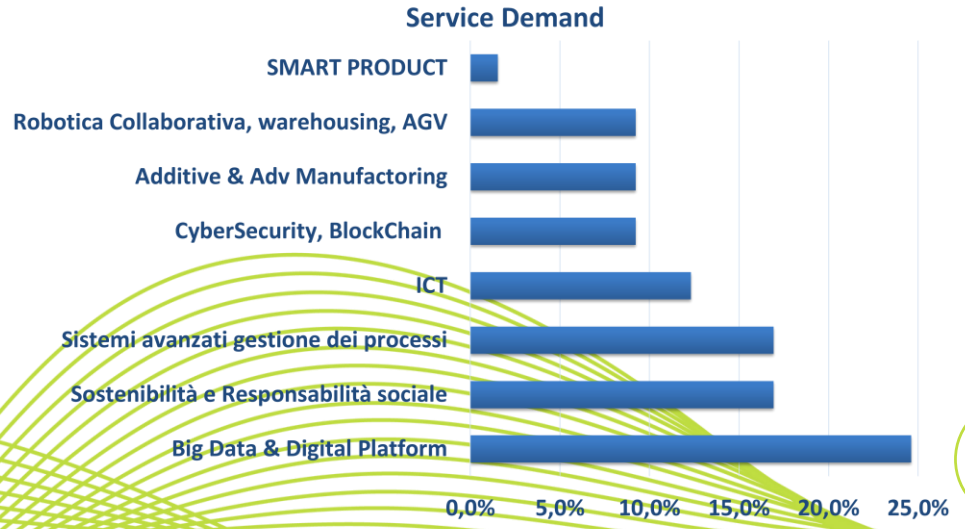
New Employees in SMEs



Companies

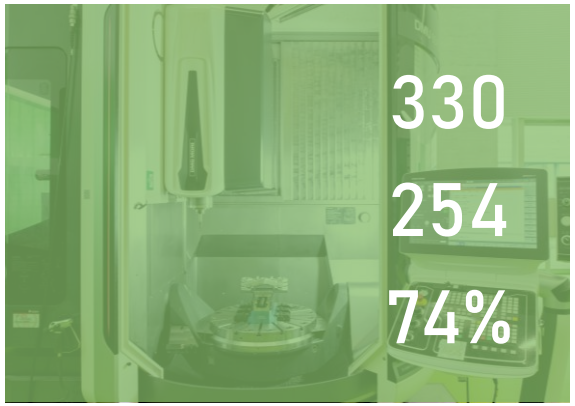
Ind Domains

Private Investments



KPI

B2 SERVICE WITH STATE AID TRANSFER



Delivered Services

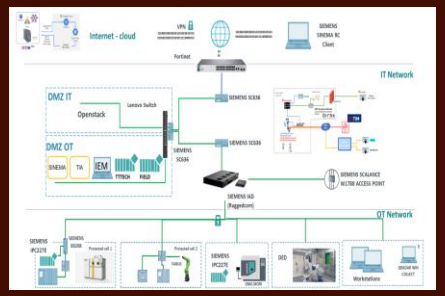
SMEs

To SMEs (State Aid)

In turnover (10M€ Staid id)

- 480 individual training courses (1.800 attender)
- 450 Assessment
- 180 TBI & 160
- 50 Access 2 finance
- 280 raising awareness events with 10.000 attendee

A 20M€ INVESTMENT - CYBER-PHISICAL & DIGITAL CAPABILITY



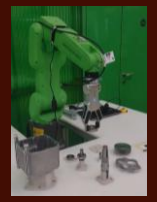
Pick & place

Quality Managment

Datawarehouse

Gen AI Robotics

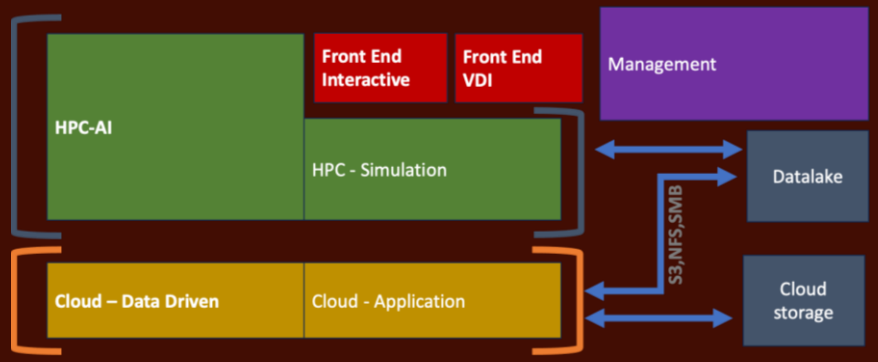
Assemblaggio



Adv Manufactoring

- A Smart Hyper-Connected, Cyber-physical Factory
- A private 5G NSA infrastrutture (3,7 Ghz, 27 Ghz);
- Continuum multi-edge-edge-cloud computing for AI;
- Data Federation
- HPC 4 Simulation, AI Training, Synthetic Data;
- A wide SW Porfoglio for I 4.0 & data life cylce managment;
- No & low-code cloud platform for AI ;
- Generative AI (Open AI, WatsonX, Cloudera, Hugging Face…)
- Infrastructure Design & Procurement
- Quantum Learning Machine & Comunications (Bob & Alice);
- Digital Twin & RPA (IT +OT);
- A Fleet of Mobile Collaborative Co-Bots, Dog-bots,;
- 3DP 4 Metal, Polimer, Ceramic, Electronics
- A Robotic Cell with DED, WAMM, PLASMA
- Cyber-Physical Systems
- Hosting service for partners (eg. Start-ups) at different TRL

INDUSTRY GRADE HPC



- Objective: Provide a flexible, modular, and cutting-edge industrial supercomputing system with Petascale capabilities and cloud-based services.
- Support a wide range of industrial applications, including simulations, data analysis, AI (e.g., ML, GenAI, LLM), and process digitalization.
- The HPC system: Separate partitions for HPC and cloud, designed for batch and real-time applications. A high-performance storage system with multiple protocols for data access. Interconnection through a high-performance data network based on 800 GbE Ethernet technology.
- The system hosted at the Tecnopolo di Bologna (DAMA) (LEONARDO) is designed to be energy-efficient and sustainable (LEED Gold).
- New investment with TIM: interconnect INNOVATE to a real time data streaming via 5G with national Edge-Teclo network

EUROHPC CALL EUROHPC-2024-CEI-IND-01

Co-Ownership: Autostrade per l'Italia, UnipolSai, SNAM, Almawave, CINECA, Fondazione ICSC, BI-REX…

DATA CENTER & CLUSTER HPC (Pilot Plant BI-REX)

DATACENTER SCALABILE, FLESSIBILE, CLOUD-READY
8 computing nodes
18 L40, 8 H100, 8 H200

RETE CONFORME A STANDARD DI PRODUZIONE SICURA (**IEC 62443**)

5G PUBBLICO e PRIVATO

INDUSTRIAL EDGE MANAGEMENT
Raccolta dati da tutte le machine.

HPC privato
Per calcolo ad alte prestazioni

MONITORAGGIO REMOTO

RIDUZIONE TEMPI DI FERMO

ABILITAZIONE ELABORAZIONE DATI

PROCESSO DECISIONALE INFORMATO

EFFICIENTAMENTO PROCESSI

A FULLY INTEGRATED 5.0 SW ENVIROMENT

SOFTWARE CAD-CAM	SOFTWARE MOM E PLM	SOFTWARE IIOT	SOFTWARE PROCESS & PLANT SIMULATION	SOFTWARE AR/VR
CREO Design Premium Piu	**Windchill**	**Thingworx**	**Altair HyperWorks suite**	**AR Vuforia**
Standard CAD features, surface design	Product Life Managmenent (PLM)	IT & OT Data Acquisition	Access to every software in Altair portfolio	Object Recognition & Tracking
Topology optimization	Requirements and contents Management	Data Analytics & Visualization	Physics Simulation	Experience Authoring
Design for Additive Manufacturing	Project Collaboration, Governance & Workflow	Business Process Flow	Simulation-driven Design	Expertise Capture
Augmented Reality (AR) visualization	BOM, Product Variability Management	Domain-specific Logic and Data Model Composition	Data Analytics	Logical Procedure Guidance
	Manufacturing, Service, Quality Process Management	Industrial Protocol Translation	Smart Products Enablement	Ad Hoc Collaborative Experiences
		Digital Content Management & Remote Access	Cloud & High-Performance	HMI/Experience of Things
			Computing Tailored Solutions	Multi-Platform Device Support
				Content Management
NX-Mach 3 Additive Design	**Teamcenter**	**Mindsphere**	**Digital Twin e simulation software**	**FrameS**
Standard CAD features, surface design	Product Life Managmenent (PLM)	Analyze & Predict	Siemens Plant simulation	Software for Virtual Reality (VR)
Design for additive features and data exchange	BOM, Workflow, Documents Management	Closed-loop Simulation	Siemens Process simulation	Interaction amd Design Dynamic view
CAM 5 Axis Machining	Electrical & Mechanical Design Management	Data Exploration	Siemens Process simulate human and motion capture	Real-time Communication
Convergent Design	Manufacturing Data & Process Management	Machine Monitor and remote managmenet		Animation Customization & setting
	Product Cost, Simulation Management	Predictive Learning		Multimedia Integration
	Quality & Compliance Management	Visual Flow creator		

SOFTWARE CAD-CAM	SOFTWARE MOM E PLM	SOFTWARE IIOT	SOFTWARE PROCESS & PLANT SIMULATION	SOFTWARE AR/VR
Materialize Magics	**CPP 4.0**	**MOMIS**	**Mechatronics Concept Designer**	
Software for 3D printing, for all Additive Manufacturing technologies	Manufacturing Execution System (MES)	Data input	Digital Twin development of automatic machines and machining tools	
Data editing and enhancement tools	Plant supervision	Data gathering, monitoring and data export	Time to market reduction	
Automated build platform preparation	Equipment monitoring and maintenance	Data aggregation from multiple sources		
Measurements and reporting for quality control	Expert system of operator guide			
Integrated simulation capability				
Materialize Mini Magics	**Opcenter Execution Discrete**	**Space Bunny**	**TIA Portal**	
Viewer 3D Models	Manufacturing Operations Managment (MOM)	http and API data history	Totally Integrated Automation Portal	
Measurements	Work instructions module for additive manufacturing	Protocol bridging	Digital Twin of a PLC system, integrated with physical machine model	
Easy Communication and compression		M2M		
Optimized for Arburg Freeformer		Software AR/VR		
		Live stream		
		Queue cache		
		Data monitoring		
Geomagic Control X e Design X			**Add-on di software CAD**	
Dimensional inspection for 3d scan			Creo Real Time simulation, fluid dynamics computation and fatigue advisor.	
Reverse engineering, features recognition			NX Integrated simulation and validation	
Point cloud: processing and refining				
Automatic, feature-based solid and surface extraction from scans				

Oltre 2 Mln € di Software

Competenze tecniche specifiche per:

- Formazione;
- Implementazione;
- Customizzazione.

GEN AI FOR SUSTAINABILITY (PEOPLE PLANET PROFIT)

Enhance Customer Experience

Chatbots and Virtual Assistants: Sumplify customer self-service processes and reduct cost operations with generative AI. using chatbots, voice bots, and assistant assistants to automate responses to us.

Agent Assistance and Conversational Anly-tics: Improve personalized experiences and increase customer engagement with targete effers and providing.

Personalization: Deliver mre personalized experiences and increase customer elgird personalized experiences.

Empower Employee Productiivity

Conversational Search: Boost ernployee productivity through fast, easy access to ar-curate information and content summaries via conversational interfaces.

Code Generation: Accelerate application development with code suggestions bas - based on comments or developer-written co:

Improve Community Engagement

Expand Accessibility: Connecs effectively with all community members using ouals such sach as language translation and interactive chatbots.

Improve Infermation Accuracy: Minimize human error in inaccurate information anreduce using generative Al to support and enable hur-man reviewers in decision-making processes.

Enhance Creativity in Problem Solving: Using generative.Al to produce a wide range of solutions to complex social Issues and provide different perspectives to public officials.

Accelerate Process Optimization

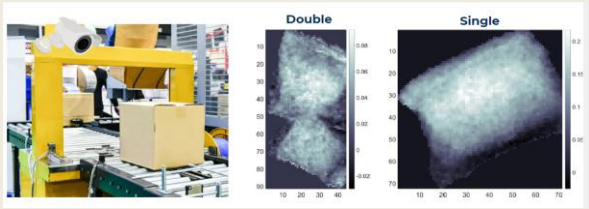
Document Processing: Improve bus.iness operations by automatically extracting am and summarizing data from documents and memos through Al-driven questions and answers.

Supply Chain Oprimization; improve logistics and reduce costs by evaluating and optimizing various scenarios within the supply cr

AI Demo in Computer vision (use cases manufacturing)

DATA in COMPUTER VISION

Image classification



assegnare etichette a immagini o video in base al loro contenuto

Semantic segmentation

classificare ogni pixel in base alla sua appartenenza a una specifica categoria

Object Detection

identificare e classificare oggetti all'interno di immagini o video.

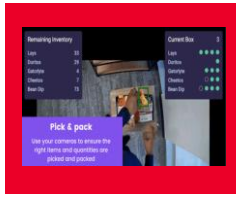
Image generation

creare nuove immagini realistiche o artificiali.

USE CASES

Quality Inspection and Defect Detection
Computer vision systems analyze visual data from cameras to inspect products and detect defects. This helps maintain high quality standards and reduces human errors. Algorithms can identify issues such as surface flaws, color deviations, or dimensional inaccuracies.

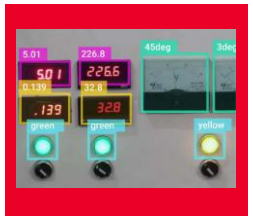
Object Recognition and Sorting
Computer vision can recognize and classify items on the production line, enabling automated sorting. It can identify components or products by shape, color, or markings and direct them to the correct assembly or packaging area.



Process Monitoring and Optimization
These systems monitor production to detect inefficiencies or deviations from optimal conditions. By analyzing visual data, they can identify events or people, detect bottlenecks, optimize workflows, and suggest improvements to boost productivity and reduce waste.

Robot Guidance
Computer vision enables robots to navigate and interact with their environment during production. Vision systems help robots locate objects, grasp them accurately, and perform visually guided tasks such as assembly, packaging, or material handling.

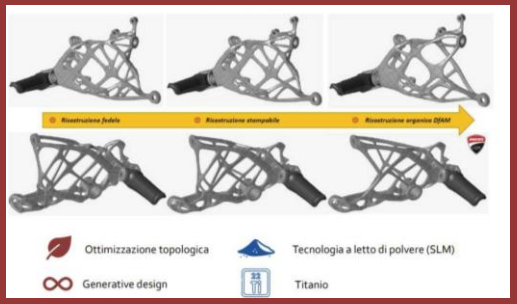
Safety and Hazard Detection
Computer vision improves safety in industrial environments by detecting hazards or risky conditions. It can identify workers in restricted areas, monitor the use of PPE, and detect anomalies that could lead to accidents or equipment failure.



Predictive Maintenance
By analyzing visual data, computer vision can detect signs of wear, degradation, or anomalies in machines and equipment. This enables predictive maintenance, reducing costly downtime and optimizing maintenance schedules.

GENERATIVE AI IN DESIGN OF AM

A network of SMEs TSPs (designer) is willing to accellerate the design of complex mechanical parts or cyber-phisical systems (clients: Ducati, Ferrari, Leonardo, SACMI,…)



The need: a cliear need in including Gen AI and HPC inside their design cycle Seamlessly into digital engineering workflows; investment over 1M€; missing HPC competences and poor AI knowled

A blended services approach: training in HPC and AI, Feasibility study, test-before-invest;

A generative AI methodology was developed for all

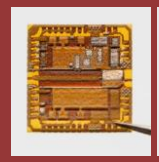
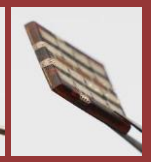
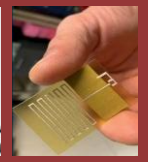
Integration of Open Software running in HPC with commercial SW environments

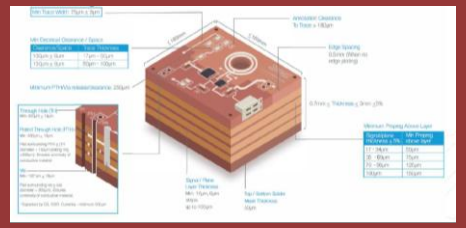
Integration of CAD – CAE – CAM (for manufacturing)

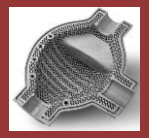
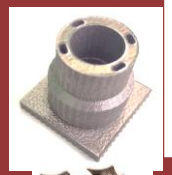
Production of prototypal design and AM components and systems

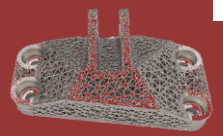
Reduced 30% time from initial design to optimal design

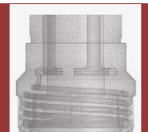
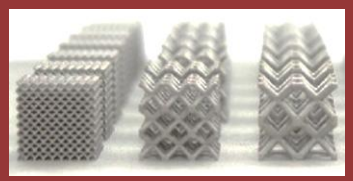
Overall from 15% to 60% improved in KPI under

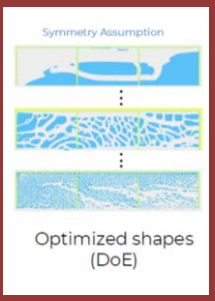








APPLICAZIONI AI IN BI-REX

Analisi dei difetti

Anomaly detection (energia)

Computer vision

Quality prediction

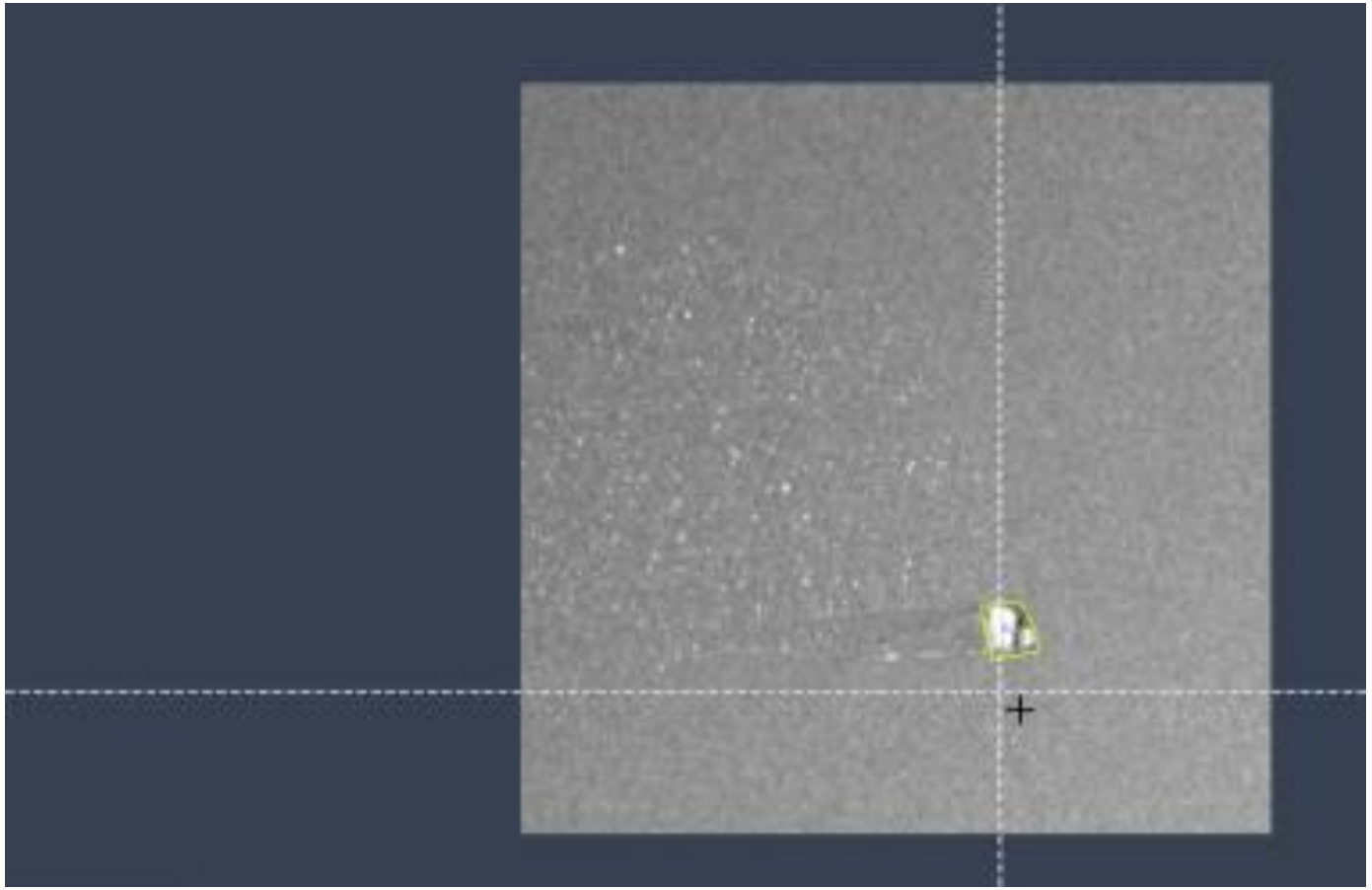
Manutenzione predittiva

Chatbot con LLM

Linguaggio naturale

Visual recognition

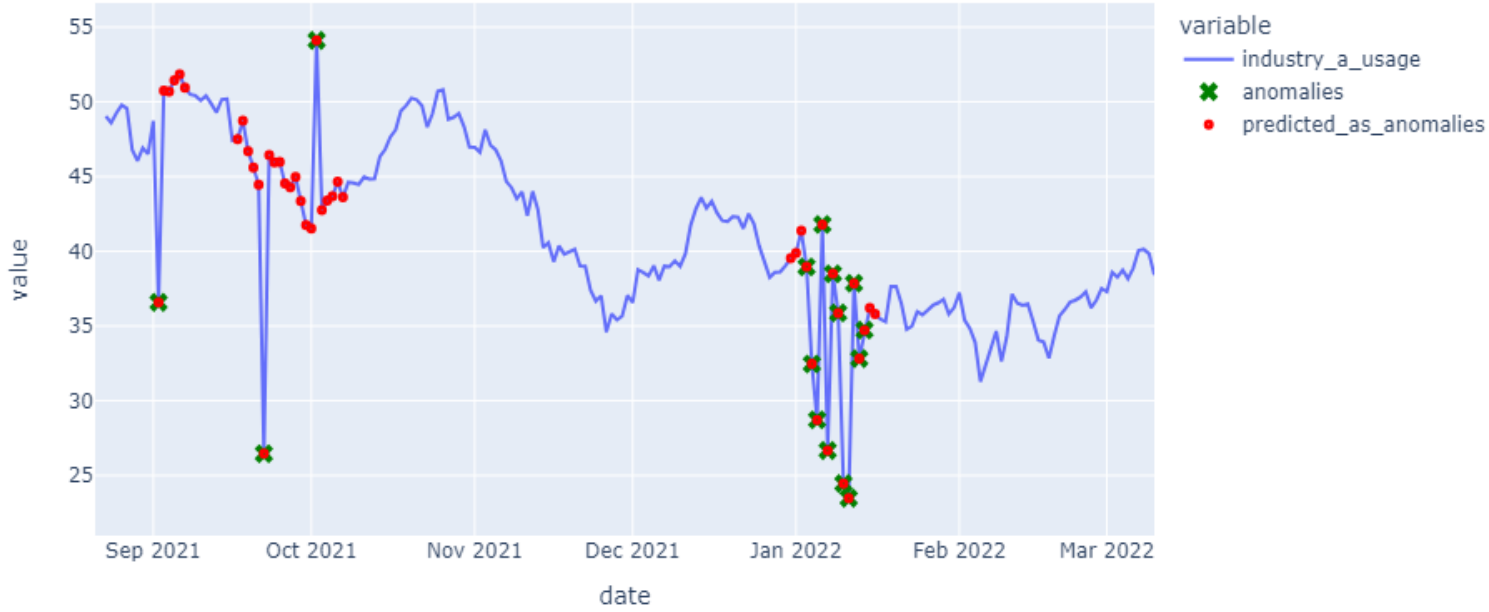
Defect analysis



- Convolutional Neural Network trained with images of powder layers labeled for layer defects
- Processing stops as soon as a defect is detected
- Defect identification by layer
- 3D defect map construction for post-process corrective actions

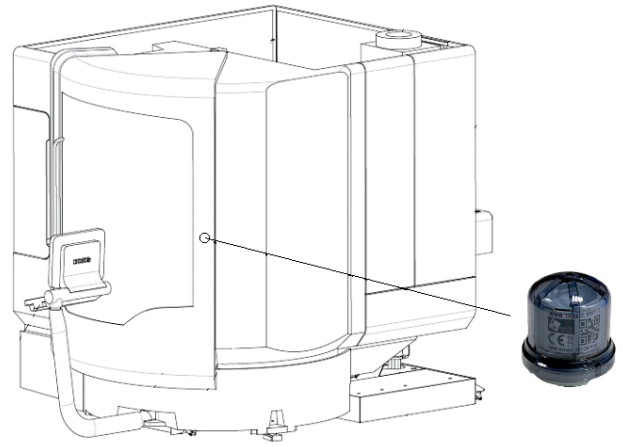
AutoAI FOR ANOMALY DETECTION

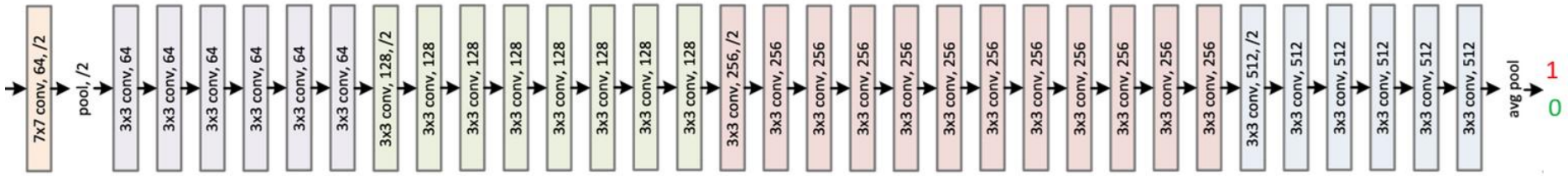
AutoAI è un serivizio che automatizza l'intero ciclo di vita della creazione di modelli di intelligenza artificiale, dalla preparazione dei dati alla selezione dei modelli e alla loro ottimizzazione, fino alla produzione di previsioni accurate.



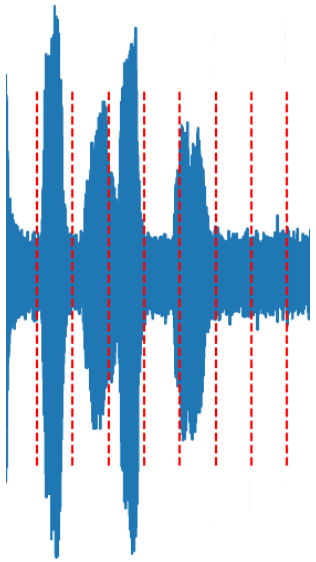
AUDIO ANOMALY DETECTION

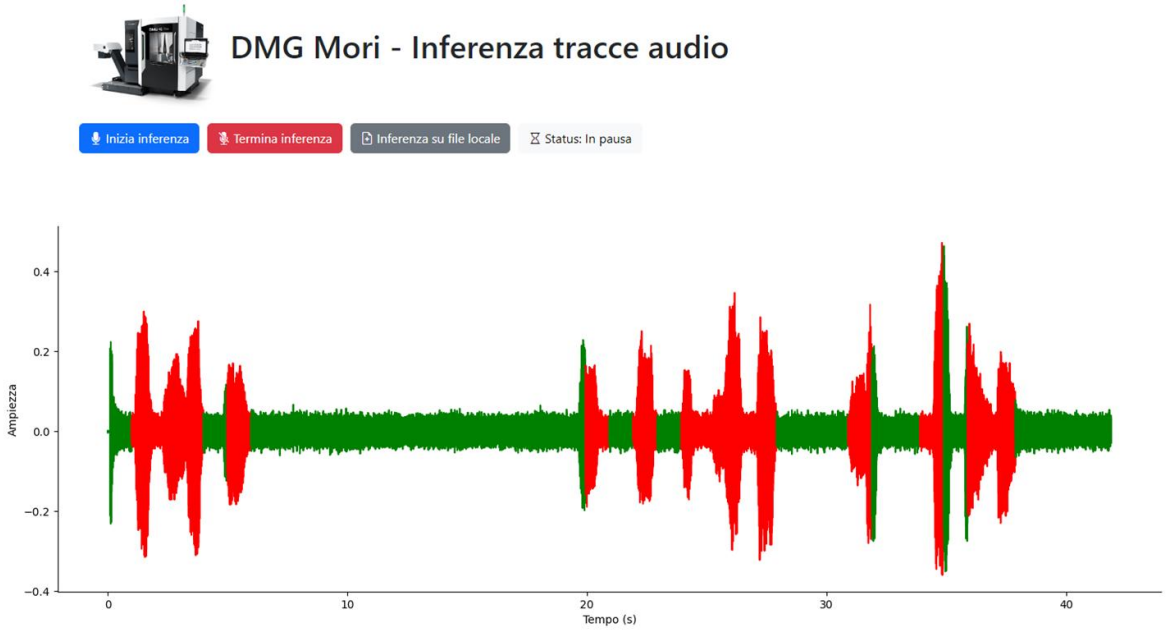
- Neural Network addestrata con spettrogrammi generati dal suono di lavorazione etichettate tramite know-how di tecnici esperti
- Possibilità di analizzare lavorazioni real-time o a posteriori
- Interruzione della lavorazione non appena viene rilevato un difetto evitando danni all'utensile

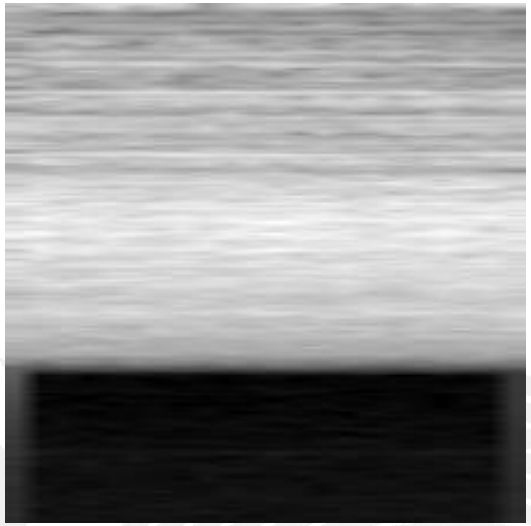




AUDIO ANOMALY DETECTION



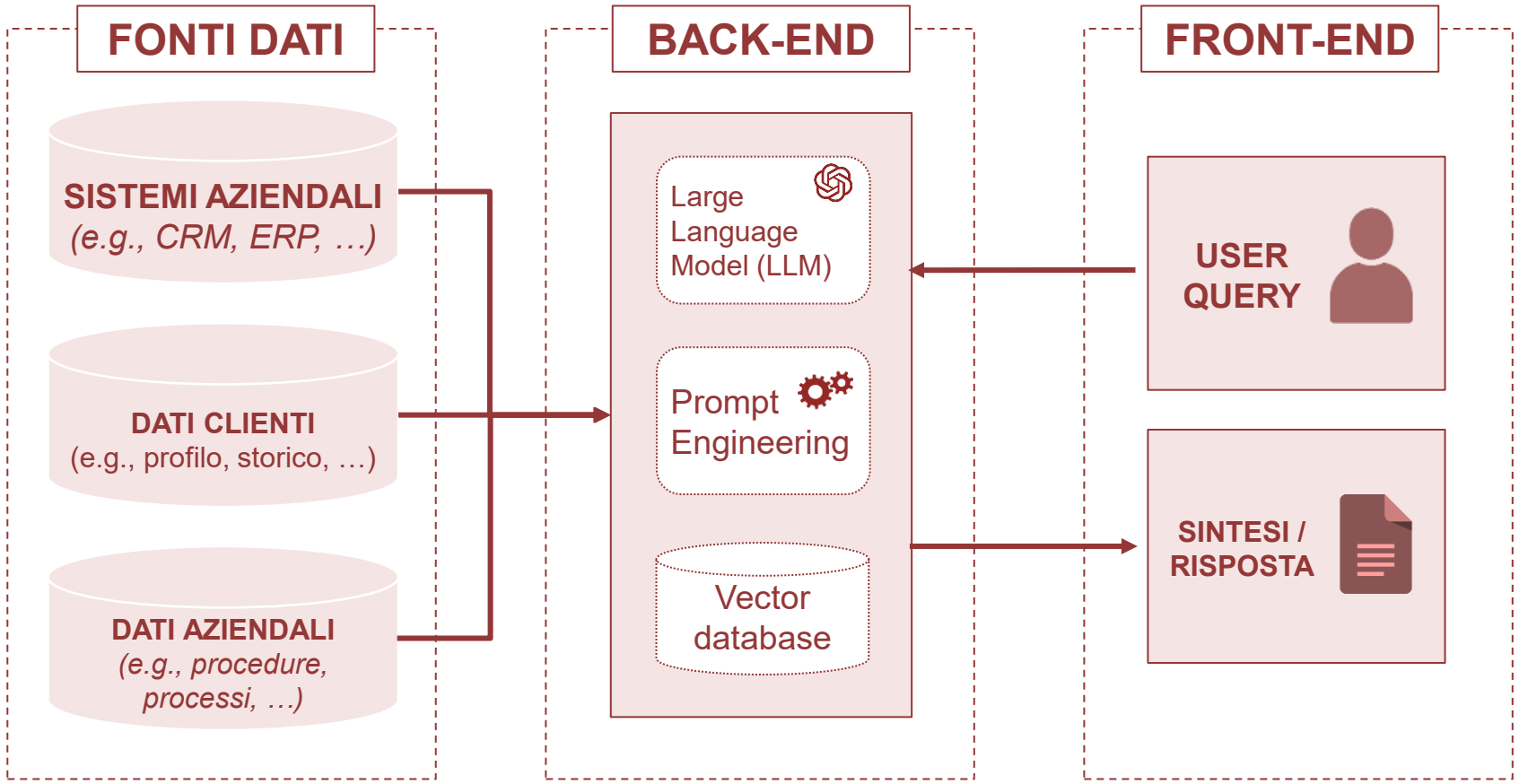




- Raccolta audio tramite microfono interno
- Suddivisione audio in chunk da 1 secondo
- Trasformazioni delle tracce audio in spettrogrammi

ANALISI DOCUMENTALE E GENERAZIONE DI REPORTISTICA

- RAG



Natural Language Processing

Large Language Models and Retrieval Augmented Generation can leverage various enterprise data sources to:

- Generate technical reports;
- Create a virtual assistant in an industrial setting.

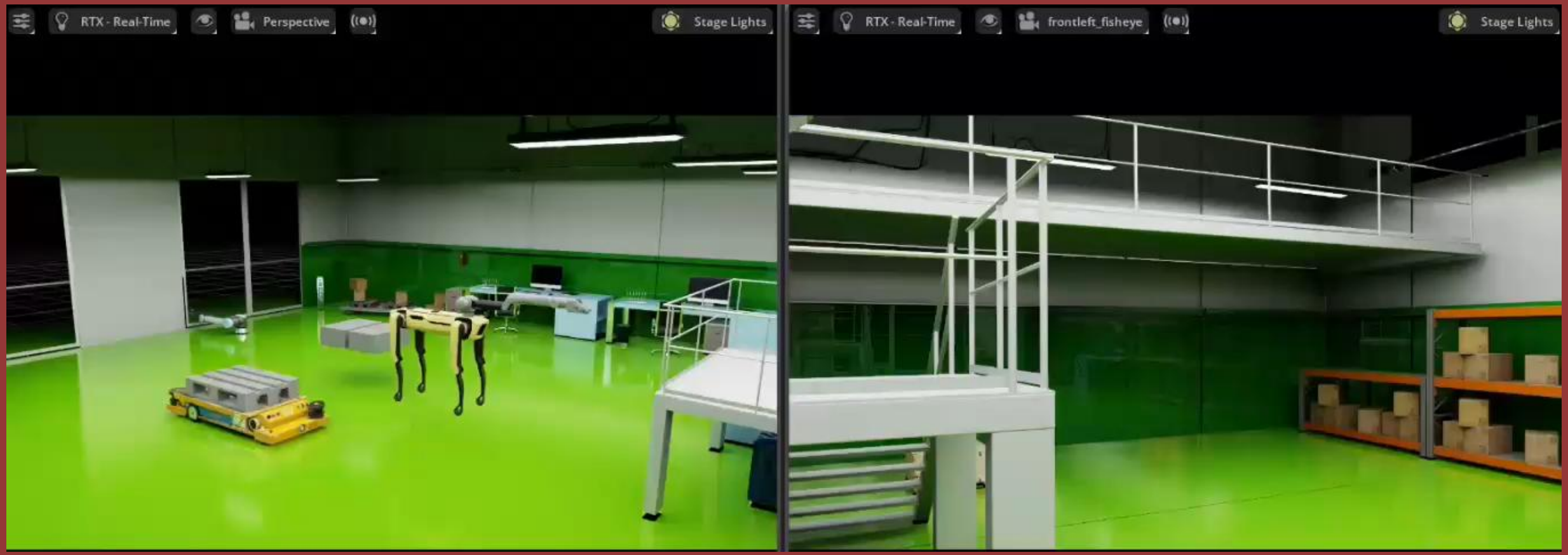
Natural Language Process techniques can be exploited to **interact with mobile robots** intuitively, moving beyond the concept of "mission" by instantly defining the set of actions to be performed.

DATASET E ACCESSO AI DATI

- Necessaria predisposizione alla raccolta dei dati e connessione IoT
- Utilizzo di Digital Twin per la generazione di dati sintetici

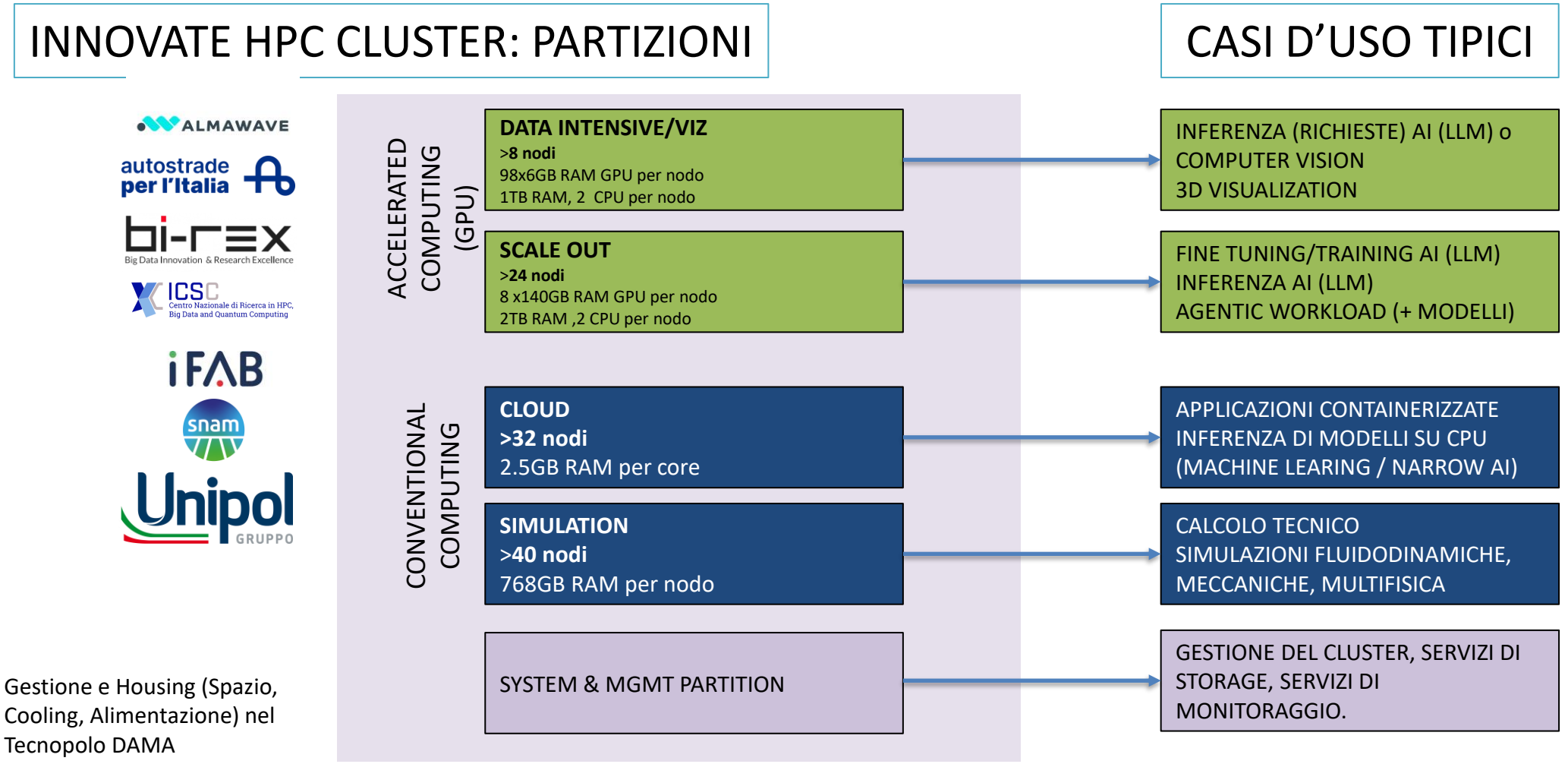
RILEVAMENTO AMBIENTI e SERVIZI 5G

OMNIVERSE DIGITAL TWIN

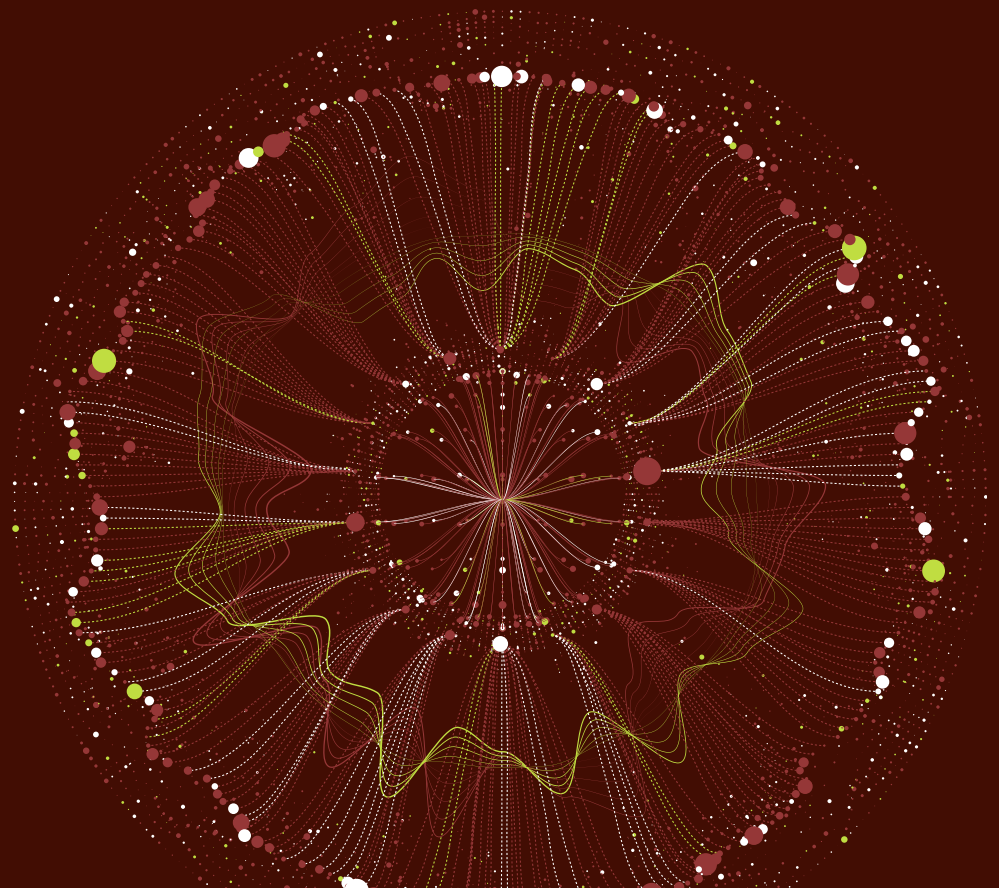


Proposte di investimento

Industry Grade HPC Innovate (hosted CINECA Tecnopolo DAMA)



Gestione e Housing (Spazio, Cooling, Alimentazione) nel Tecnopolo DAMA



CONTATTI

PER INFORMAZIONI:

info@bi-rex.it

Via Paolo Nanni Costa 20, 40133
Bologna (Italy)

Viale delle Scienze, Edificio 16, 90128
Palermo (Italy)

www.bi-rex.it