



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación

PORTFOLIO OF TECHNOLOGIES

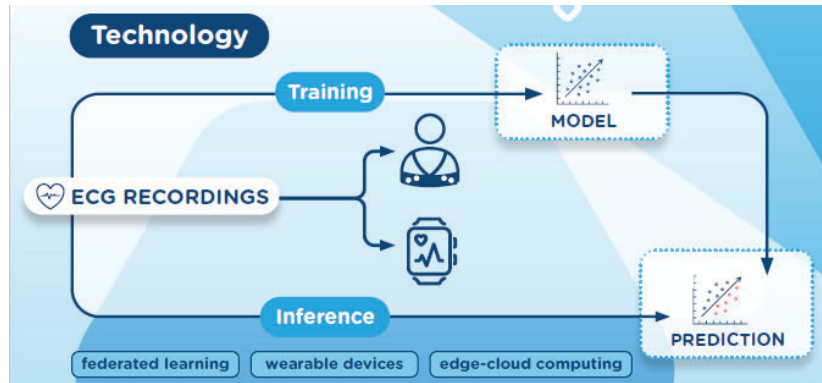
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AI - SPRINT

CHALLENGE AI for brain stroke detection.



DESCRIPTION Technological framework intended to support the implementation of software applications for stroke care based on edge-cloud computing and AI and wearable devices.

NOVELTY A solution groundbreaking customizable framework integrating AI, edge-cloud computing, and wearable devices to serve various stroke care scenarios. This innovative framework enables continuous monitoring of vital signs, detecting subtle changes and enabling early intervention, thus reducing the severity of strokes. Crucially, our solution promotes accessibility, making advanced stroke prevention technology available globally, including in remote areas, thereby democratizing quality healthcare. Beyond these immediate benefits, our approach aligns with the United Nations' Sustainable Development Goals (SDG), specifically SDG3 (Good health and well-being) by ensuring healthy lives and promoting well-being for all, SDG5 (Gender equality) and SDG9 (Reduced inequalities) by focusing on equitable healthcare solutions for men and women.

APPLICATIONS Powered by personalized AI models, our technology not only matches individual patient needs but also empowers stroke prevention efforts, serving as a valuable resource for medical professionals and caregivers to facilitate tailored treatment plans.

DESIRED PARTNERS Producers of smart devices (smart watches, smartphones, etc.), cardiologists, telemedicine operators.

KEYWORDS Stroke prevention, tailored treatment plans, edge-cloud computing, AI.

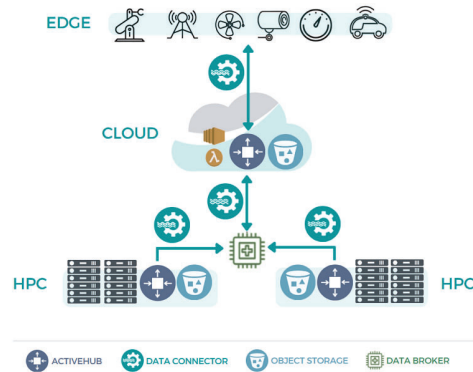
CURRENT TRL:
3

TIME TO MARKET:
1 year

IP PROTECTION:
In process

NearData: Extreme Near-Data Processing Platform

CHALLENGE To create and standarize secure methods to move and process exa-scale data from the edge to the cloud. This data is moreover highly confidential (helath data) thus the project must move this date in a secure way.



DESCRIPTION Thee main goal is to design an Extreme near-data platform to enable consumption, mining and processing of distributed and federated data without needing to master the logistics of data access across heterogeneous data locations and pools. We go beyond traditional passive or bulk data ingested from storage systems towards next generation near-data processing platforms both in the Cloud and in the Edge.

NOVELTY Create a novel intermediary data service (XtremeDataHub) providing serverless data connectors that optimize data management operations (partitioning, filtering, transformation, aggregation) and interactive queries (search, discovery, matching, multi-object queries) to efficiently present data to analytics platforms. As a second novelty mechanisms to enable real-time streaming and processing of health data will be provided. Finally a novel data broker service enabling trustworthy data sharing and confidential orchestration of data pipelines across the compute continuum will be created.

APPLICATIONS To allow efficient distribution of health data to sequence the genome and better understand human DNA. Create generalised machine-learning models that can aid surgeons during surgery and allow video data to be analysed in real-time and with low latency. Expand the analysis of metabolomics raw data and boost external access and efficient re-use of open data.

DESIRED PARTNERS Universities, hospitals, health institues, SME with expertise on security and confidentiality.

KEYWORDS Edge-cloud computing, data processing, health data.

CURRENT TRL:

3

TIME TO MARKET:

4 years

IP PROTECTION:

In process

VERGE

CHALLENGE AI-enabled edge computing architecture for 5G and beyond.

AI-powered eVolution towards opEn and secuRe edGe architEctures



DESCRIPTION VERGE is a research and innovation project under the European Smart Networks and Services Joint Undertaking (SNS JU), a Public-Private Partnership that aims to facilitate and develop industrial leadership in Europe in 5G and 6G networks and services. The main goal of VERGE is to provide an integrated approach on how to tackle the challenges of edge computing evolution, described around three main pillars:

1. "edge for AI", namely a flexible, modular and converged edge platform design, unifying the lifecycle management and closed-loop automation for cloud-native applications, Multi-access Edge Computing (MEC) and network services across the edge-cloud compute continuum for ultra-high computational performance.
2. "AI for edge", namely an AI-powered portfolio of solutions leveraging the multitude of collected metrics for intelligent management and orchestration.
3. "security, privacy and trustworthiness of AI-based models at the edge", providing a suite of methods to protect AI models against adversarial attacks, increase their explainability and reliability, and ensure data privacy.

NOVELTY Flexible, modular and converged edge platform design. AI portfolio for intelligent orchestration and management of computing and communication resources. Methods for secure, private, trustworthy and explainable AI.

APPLICATIONS IoT applications for smart cities (e.g., smart mobility), XR-enabled industrial applications.

**DESIRED
PARTNERS**

KEYWORDS Smart mobility, 5G, 6G, AI, smart cities.

CURRENT TRL:

3

TIME TO MARKET:

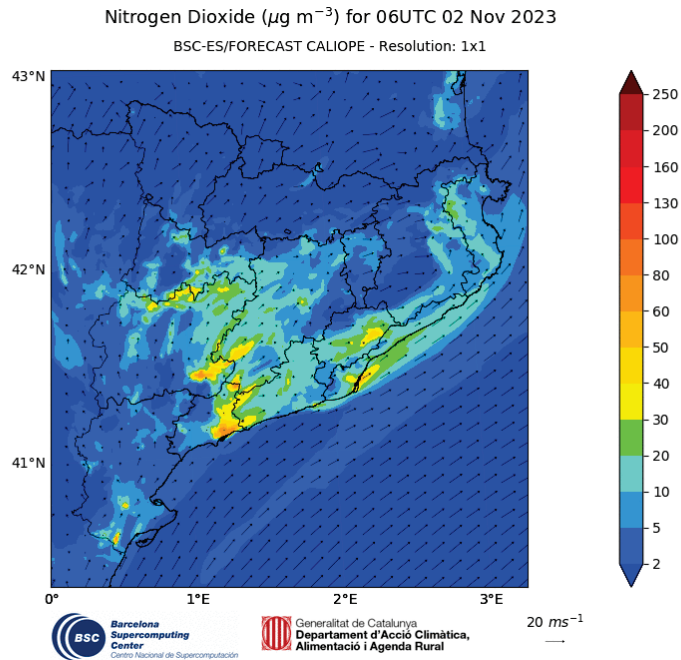
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IP PROTECTION:

In process

Air Quality Services

CHALLENGE This information is key for optimal decision-making and planning at urban and regional scales to tackle air pollution and improve citizens' health and wellbeing.



DESCRIPTION High-Performance Computing (HPC) to develop and improve air quality models, which are effective tools for obtaining forecasts and assessing the dynamics of regulated air pollutants. By applying a co-production approach that allows knowledge exchange between service providers and users, Tailored services through the exploration of new visualisation and communication techniques that improve the usability of air quality information.

NOVELTY Integrated approach at different spatial scales.

APPLICATIONS Urban planning, air quality management, health.

DESIRED PARTNERS Public administration, companies.

KEYWORDS Air quality, urban planning, health.

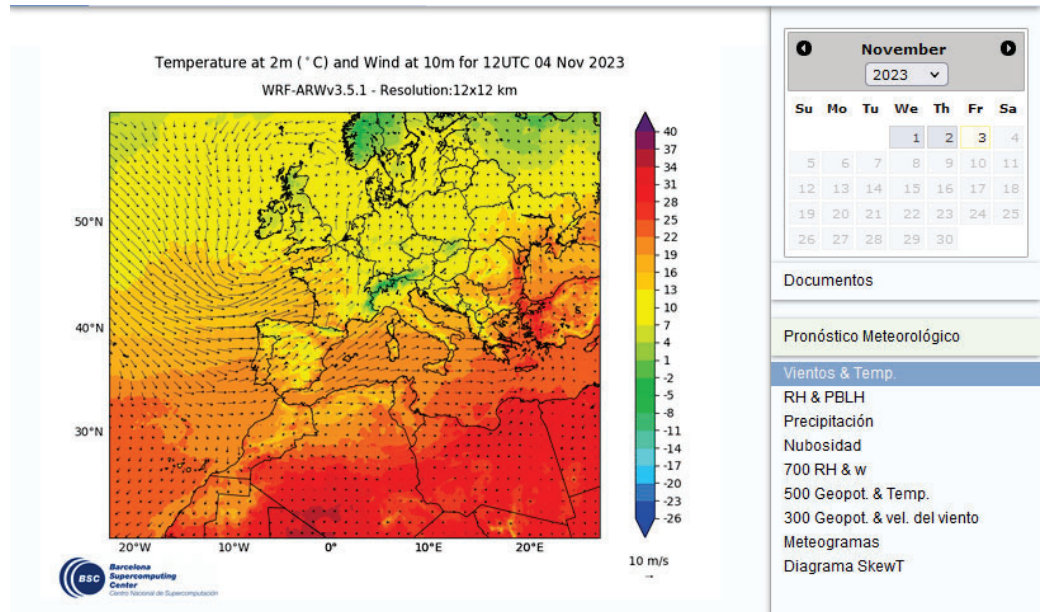
CURRENT TRL:
9

TIME TO MARKET:
Available

IP PROTECTION:
Know-how and IPR

Climate Services

CHALLENGE Produce information on future weather and climate conditions to support climate change adaptation in different socio-economic sectors, such as energy, agriculture, water management and health.



DESCRIPTION High-Performance Computing (HPC) to develop and improve air quality models, which are effective tools for obtaining forecasts and assessing the dynamics of regulated air pollutants. By applying a co-production approach that allows knowledge exchange between service providers and users, Tailored services through the exploration of new visualisation and communication techniques that improve the usability of air quality information.

NOVELTY Integrated approach at different temporal scales.

APPLICATIONS Energy, agriculture, urban planning.

DESIRED PARTNERS Energy companies, farmers, risk management services providers.

KEYWORDS Climate, agriculture, urban planning, energy.

CURRENT TRL:
9

TIME TO MARKET:
Available

IP PROTECTION:
Know-how and IPR

vCity

CHALLENGE Creating an urban digital twin.



DESCRIPTION Creating a platform of tools to create and design urban digital twins.

NOVELTY To combine high-performance computing, big data tools, and state-of-the-art research to create AI-enhanced urban digital twins centered on the impact on society.

APPLICATIONS Urban digital twins enable fast data-driven urban planning and decision making, and they empower citizens to explore and audit urban interventions.

DESIRED PARTNERS Administrations, urban data providers, public utilities, geographic data providers, cloud computing providers.

KEYWORDS Urban digital twins, data-driven urban planning, decision making.

CURRENT TRL:

8

TIME TO MARKET:

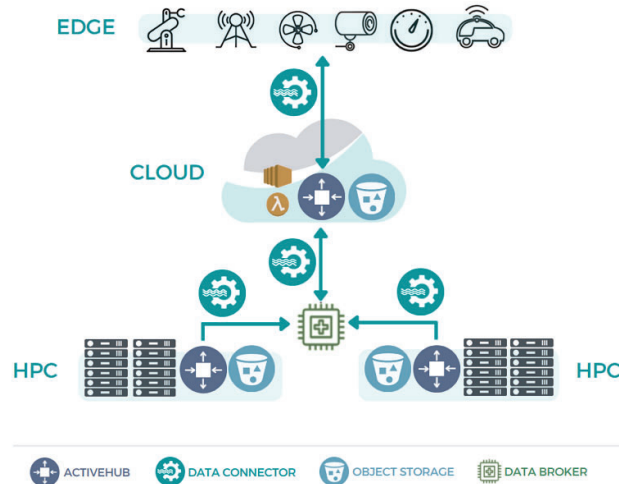
1 year

IP PROTECTION:

Open / different IPs

SAFEXPLAIN: Safe and Trustworthy AI in critical systems

CHALLENGE The safe use of AI in critical systems such as cars, trains and satellites.



DESCRIPTION

Deep Learning (DL) techniques are at the heart of most future advanced software functions in Critical Autonomous AI-based Systems (CAIS), where they also represent a major competitive factor. Hence, the economic success of CAIS industries (e.g., automotive, space, railway) depends on their ability to design, implement, qualify, and certify DL-based software products under bounded effort/cost. However, there is a fundamental gap between Functional Safety (FUSA) requirements on CAIS and the nature of DL solutions. This gap stems from the development process of DL libraries and affects high-level concepts such as (1) explainability and traceability, (2) suitability for varying safety requirements, (3) FUSA-compliant implementations, and (4) real-time constraints. As a matter of fact, the data-dependent and stochastic nature of DL algorithms clashes with current FUSA practice, which instead builds on deterministic, verifiable, and pass/fail test-based software.

NOVELTY

Unleash the potential of AI for autonomous operation (e.g., autonomous driving) while preserving safety.

APPLICATIONS

Any system with safety requirements (transportation, industrial, medical, etc.).

DESIRED

Automotive, space, railway, avionics.

PARTNERS

KEYWORDS

AI, safety requirements, transportation, industrial, medical.

CURRENT TRL:

4

TIME TO MARKET:

3 years

IP PROTECTION:

No explicit protection yet



Impetus4Change

CHALLENGE Collaborating with urban decision makers to co-produce near-term climate services.



DESCRIPTION Despite the increased awareness surrounding the climate crisis, there is still an information gap regarding the time scales at which action must be taken in order to avert the worst impacts of global warming. Cities across the globe are currently facing many negative impacts due to climate change, namely extreme weather events and their aftereffects. This poses many risks as the extreme weather events combined with as densely populated areas can result in catastrophic population loss. Urban decision-making requires tailored science-based climate information and services at the local scale to support adaptation and planning efforts to deal with climate change impacts. In line with the EU's Mission on Adaptation to Climate Change for a "climate prepared and resilient Europe" by 2030, I4C aims to improve the quality, accessibility and usability of near-term climate information and services at local to regional scales.

NOVELTY Seamless, high-resolution, co-produced urban climate services,

APPLICATIONS Supporting real-world climate urban adaptation decisions.

DESIRED PARTNERS Local authorities, private sector, NGOs.

KEYWORDS Climate, urban planning, adaptation.

CURRENT TRL:
7

TIME TO MARKET:
4 years

IP PROTECTION:
-

AINA

CHALLENGE Provide Catalan with the necessary infrastructure for the development of applications based on AI and language technologies.



DESCRIPTION The AINA project is an artificial intelligence project in Catalan that aims to generate corpora and computer models of the Catalan language so that companies that create applications based on artificial intelligence (AI), such as voice assistants, Internet search engines, automatic translators and correctors, conversational agents, etc., can easily do this in Catalan. The models and data corpora created within the framework of the AINA project are in available to all those companies or entities that want to use them, since they are published openly and with permissive licenses. New corpora are currently being created to incorporate the different dialectal variants of Catalan, different linguistic registers (colloquial, literary, administrative, etc.) and voice and image files, which make it possible to train models capable of solving new tasks in Catalan. To carry out this task, we count on the invaluable collaboration of multiple institutions and people who give their data repositories and their works to AINA.

NOVELTY With public leadership and funding, the idea of developing "digital commons" with a software mindset is followed free. This allows the promotion of an entire ecosystem of services and companies that are built around this "digital commons". The work on digital commons are an essential part of the policies of the European Commission in the framework of "The decade digital".

APPLICATIONS The field of AI and language technologies is very broad. To mention some of the applications: Speech recognition (what a person says when they speak), Artificial voice synthesis (with dialectal variants of Catalan), Summary of texts, Advanced search in databases, Automatic translation between several languages, Text sentiment analysis, Speaker Identification, etc.

DESIRED PARTNERS Consulting companies, integrators of AI systems.

KEYWORDS Catalan, AI, language technologies, speech recognition, voice synthesis.

CURRENT TRL:
8

TIME TO MARKET:
Available

IP PROTECTION:
Open-source



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