Beyond Innovation:
BSC IoT Technologies

Internet of Things

The connection between Internet of Things (IoT) and High Performance Computing (HPC) represents a dynamic fusion of technologies that will revolutionize numerous industrial sectors.

On the one hand, IoT encompasses the interconnectedness of devices and systems enabling data collection and communication. On the other hand, HPC leverages advanced computing techniques to process large amounts of data with speed, accuracy and efficiency. Together IoT and HPC create synergies that unlocks a new era of innovation, efficiency, and connectivity across various industrial domains.

TECHNOLOGIES

Real-time critical situation management platform

CREXDATA
Critical Action Planning over Extreme-Scale Data

Crexdata is a generic platform for real-time critical situation management, flexible action planning and agile decision using extreme scale and complex data.
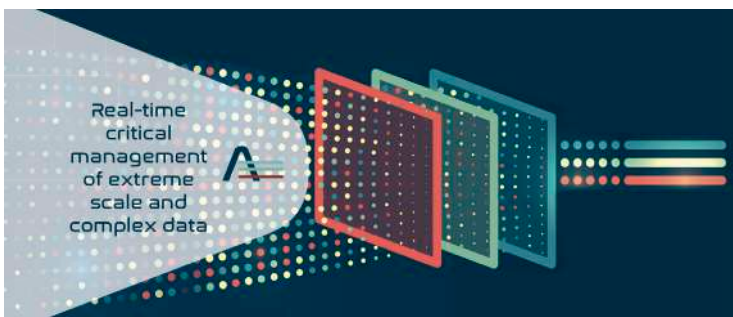
A comprehensive suite of tools designed to enhance crisis management through the use of big data and artificial intelligence. It focuses on the real-time analysis of large-scale data sets to predict crisis scenarios and support decision-making processes.

TARGET INDUSTRIES

Sector   **Key stakeholders in emergency and crisis management, including governmental agencies, public safety organizations, NGOs involved in emergency response, and technology companies specializing in analytics and AI-driven solutions.**

Why   To enhance the efficiency and effectiveness of responses in emergency situations by leveraging advanced computational tools, which set new standards in predictive accuracy and speed, significantly improving decision-making processes during crises.

Uses   Critical and high-impact areas such as emergency response systems, disaster management, public health surveillance, environmental monitoring and other domains where rapid and accurate data processing is crucial.

TECHNOLOGY

Crisis management

Artificial Intelligence

Machine Learning

Public security

Real-time critical management of extreme scale and complex data

Weather emergencies use case

Ingest and fuse extreme data to improve situation awareness that informs decisions in weather emergency scenarios

Health crisis use case

Integration of epidemiological and multi-scale simulation models with machine learning to support decision-making in health crises

Maritime use case

Real-time route forecasting to ensure safer navigational routes

Assisted living solution for elderly people living alone

DOMOBOI provides an assisted living solution for seniors living independently. Through a single measurement point, it observes electrical appliance usage, learns daily routines, and identifies real-time anomalies without active intervention. This advanced technology offers non-intrusive, low-cost monitoring for accident prevention and early detection of chronic diseases, ensuring the well-being of elderly individuals at home.

TARGET INDUSTRIES

Sector   **Home assistance.**

Why   Non-intrusive, low cost, low maintenance solution for home monitoring.
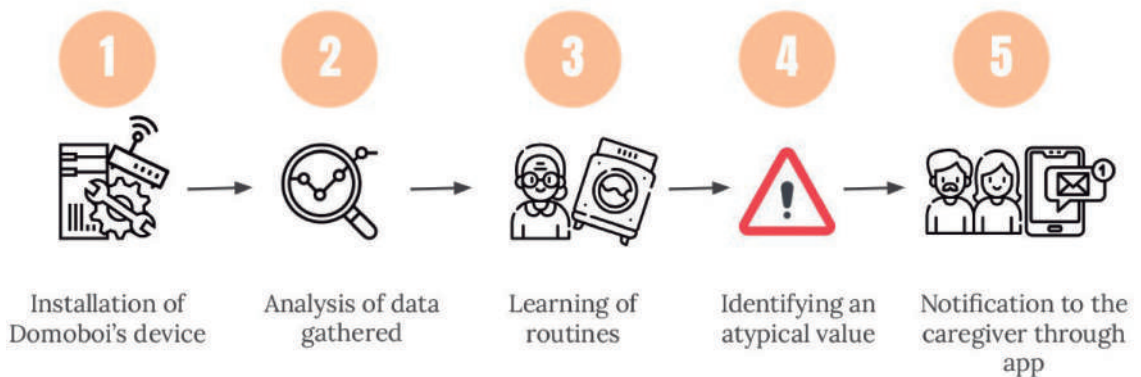
TECHNOLOGY

Artificial Intelligence

Medical Assistance

Eldery people

1	2	3	4	5
Installation of Domoboi's device	Analysis of data gathered	Learning of routines	Identifying an atypical value	Notification to the caregiver through app

Enhancing Workflow Lifecycle in Distributed Computing Infrastructures

PyCOMPSs and the eFlows4HPC software stack provide tools for developing and managing complex parallel workflows in distributed computing infrastructures. PyCOMPSs simplifies parallel workflow development by annotating Python scripts, auto-converting them into parallel workflows. eFlows4HPC automates deployment on distributed platforms, reducing time-to-market for computing solutions with HPC-ready container images.

TARGET INDUSTRIES

Sector **Engineering, bioinformatics, climate forecast, machine learning and software companies.**

Why Reduce the development and management time of complex workflows in distributed computing platforms.

Uses Programming parallel complex workflows for distributed computing platforms. Facilitate the development of complex workflows through HPC ready container images.

TECHNOLOGY

Software Stack Provider

Industries Target
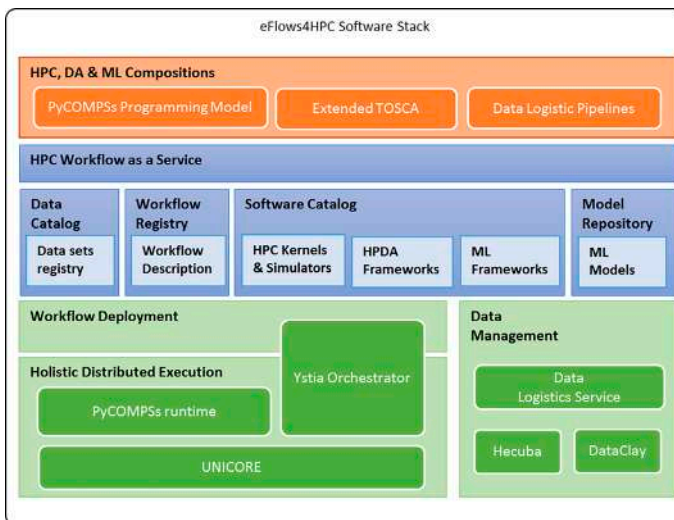
Machine Learning

Bioinformatics

Programming

AI Platform

Empowering data-driven decision-making with extreme data mining

EXTRACT
A distributed data-mining software platform for extreme data across the compute continuum

The EXTRACT platform delivers seamless data mining workflows across edge, cloud, and high performance computing technologies. It streamlines complex processes, ensuring efficient and secure data processing. Designed for sectors reliant on AI-driven decision-making, such as Industry 4.0 and smart cities, EXTRACT empowers data-driven choices. Real-life testing in Venice will validate its capabilities by providing personalized emergency escape routes, showcasing its practical applications in critical scenarios.

TARGET INDUSTRIES

Sector **Industry 4.0, Smart City, Crisis management, Research, Automotive, Healthcare- bioinformatics.**

Why The EXTRACT platform offers a scalable, fast, and distributed processing mechanisms capable of efficiently handling massive datasets to accelerate acquisition of actionable knowledge. It reduces costs for developing data mining workflows for extreme data, allows for a 50% faster implementation of data mining workflows, 60% less data transfers, 30% increase in security ML model attack detections and reduces energy use by leveraging edge computing with minimum performance impact.

Uses AI-big data analytics, data mining, Digital twin modelling, Smart mobility, Emergency response - real-time personalized instructions in a crisis, Cybersecurity, Astronomy, High-energy physics, AI-driven decision-making, e.g., bioinformatics.

TECHNOLOGY

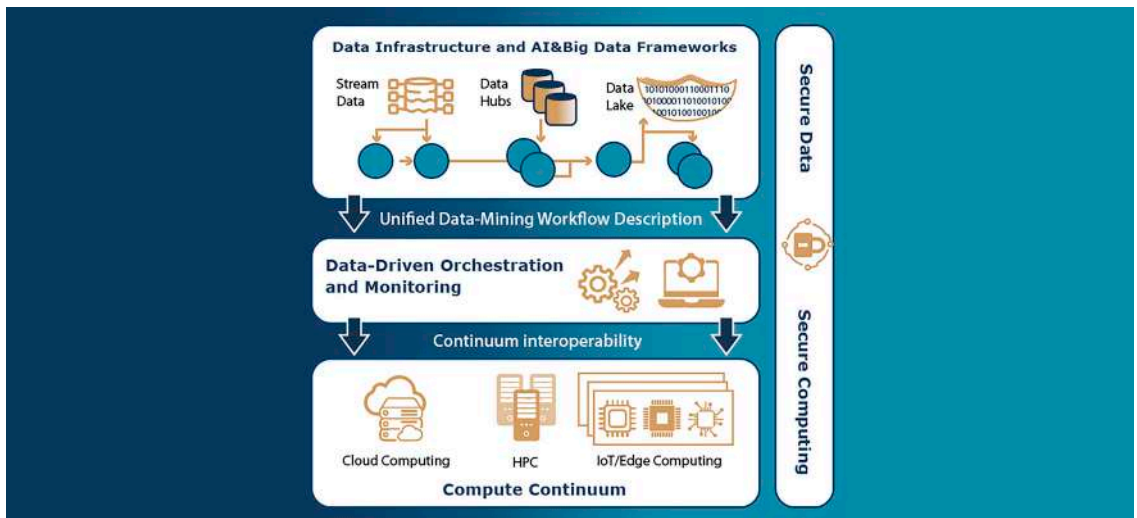Data-mining Software Platform

Digital Twins

Workflows across edge, cloud and HPC tech

AI Platform

5G

Designing large simulation workflows with integrated analysis and visualization

Horus, an innovative multi-platform GUI, empowers scientists in molecular modeling. With cutting-edge technology, it serves as a local app or centralized server, enhancing collaborative teamwork. Featuring an integrated 2D infinite canvas, Horus excels as a modular workflow designer across environments. Autonomous blocks allow seamless linking, enabling customizable workflows via an accessible API. As a desktop app, it facilitates workflow design, result visualization, and offers an extensive API for custom flows, blocks, and visualizations. Targeting pharmaceutical, biotechnology, and AI industries, Horus heralds a new era of efficiency and adaptability in scientific pursuits.

TARGET INDUSTRIES

Sector   **Pharmaceutical and Biotechnology Research.**

Why   Horus disrupts by revolutionizing drug discovery and biomolecular design processes. It streamlines and enhances collaboration among scientists, expediting research and development.

Uses   Hit identification, High throughput virtual screening, Molecular Visualization, Hit to lead optimization, Structure prediction.

Sector   **Artificial Intelligence Development.**

Why   Horus disrupts AI development by providing a user-friendly GUI and modular workflow design, boosting efficiency in algorithm creation and testing.

Uses   Algorithm Prototyping, Model Training, Collaborative AI Development.

Sector   **Scientific Research and Collaboration.**

Why   Horus disrupts traditional research methods, offering a centralized platform for scientists to collaborate, design workflows, and share insights seamlessly.

Uses   Centralized Collaboration, Workflow Customization, Data Integration.
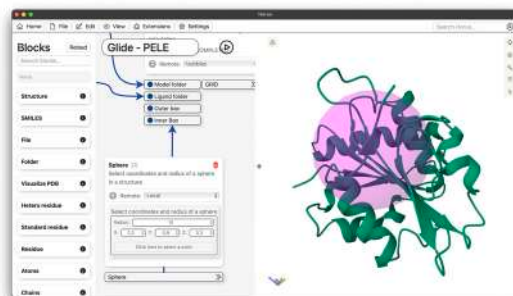
TECHNOLOGY

Large Simulation Workflows

Pharmaceutical and biotechnology research

Scientific Research

Artificial Intelligence Development

Personalized stroke risk assessment using AI and wearables for a healthier society

ONECAREAI
AI POWERED HEALTH MONITORING

Stroke, the 2nd leading global cause of death, is often underdiagnosed in women. OneCareAI addresses this by leveraging wearables and AI models developed in HPC environments. Pilot studies with hospitals reveal enhanced predictive accuracy and the discovery of non-trivial data patterns. This breakthrough technology, part of the AI-SPRINT project, utilizes wearables for data collection, making disease prevention accessible to the general population. OneCareAI strives to revolutionize stroke risk prediction, bridging the gap between advanced AI, HPC techniques, and wearable technology for the greater good of public health.

TARGET INDUSTRIES

Sector   **Digital healthcare.**

Why   The application of state-of-the-art AI and distributed computing techniques to a widespread technology as wearables devices, thus engaging general population in health monitoring and reducing healthcare system burden.

Uses   Telecardiology operators could benefit from an advanced analysis of patient's data to early detect stroke risks.

Hospitals that could integrate it among their portfolio of patients monitoring services.

Wearables manufacturers for the proposition of an added value service on top of the basic fitness functionalities.

Insurance companies that offer the service to the customers and monitor their health to reduce costs.

TECHNOLOGY

Medical Assistance

Stroke Risk Assessment

Citizens Healthcare

Wearable Devices

Enabling the safe use of AI in automotive, space and railway

SAFEXPLAIN
Safe and Explainable
Critical Embedded Systems based on AI

Safexplain ensures safe AI integration in automotive, space, and railway systems. It uniquely certifies solutions, addressing explainability, supervision, traceability, and real-time compliance. Following industrial best practices, it facilitates building safety-critical AI systems for autonomous navigation of cars, space shuttles and trains.

TARGET INDUSTRIES

Sector **Applications with safety requirements (Automotive, Railway, Space, avionics, Robotics, Industry, health, etc.).**

Why So far AI-based solutions have only focused on increased quality without ensuring compliance with domain-specific safety standards. SAFEXPLAIN solutions reconcile AI-based solutions with safety-relevant development processes to enable the use of AI in safety-critical applications.

Uses • Autonomous navigation.
• Safe object detection.
• Safe classification.

TECHNOLOGY

Artificial inteligence

AI integration in automotive

AI integration in space

AI integration in railway systems
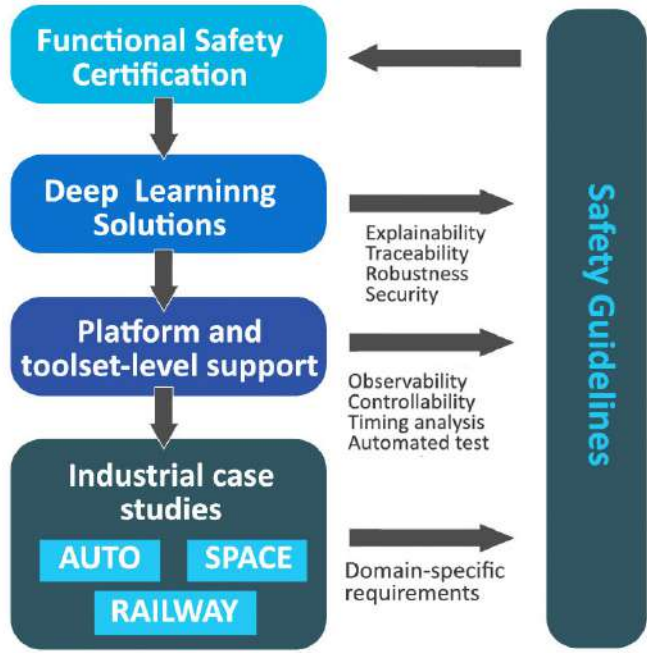
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RISC-V hardware-software stack for cloud services

Vitamin-V will deploy a complete RISC-V hardware-software stack for cloud services based on cutting-edge cloud open-source technologies for RISC-V cores.

Vitamin-V incorporates an innovative RISC-V virtual execution environment providing hardware emulation, simulation, and FPGA prototyping to enable software development, verification, and validation before actual hardware is released. It also supports porting the complete cross-compiling toolchain, software stack, and essential application libraries for the forthcoming release of the RISC-V processors.

TARGET INDUSTRIES

Sector   **SME based on hardware and cloud environments, universities, cloud providers, Big Data and AI users.**

Why   Vitamin-V will deploy a complete RISC-V hardware-software stack for cloud services based on cutting-edge cloud open-source technologies for RISC-V cores with a special focus on EPI cores. Vitamin-V incorporates an innovative RISC-V virtual execution environment providing hardware emulation, simulation, and FPGA prototyping to enable software development, verification, and validation before actual hardware is released. Vitamin-V also contributes to the porting of the complete cross-compiling toolchain, software stack, and essential application libraries for the forthcoming release of the RISC-V EPI processors.

Uses   AI and Big Data applications running on RISC-V cloud infrastructure, from traditional cloud to serverless environments. It will as well reinforce European industry leadership across the digital supply chain.

TECHNOLOGY

- Hardware
- Cloud environment
- Big data users
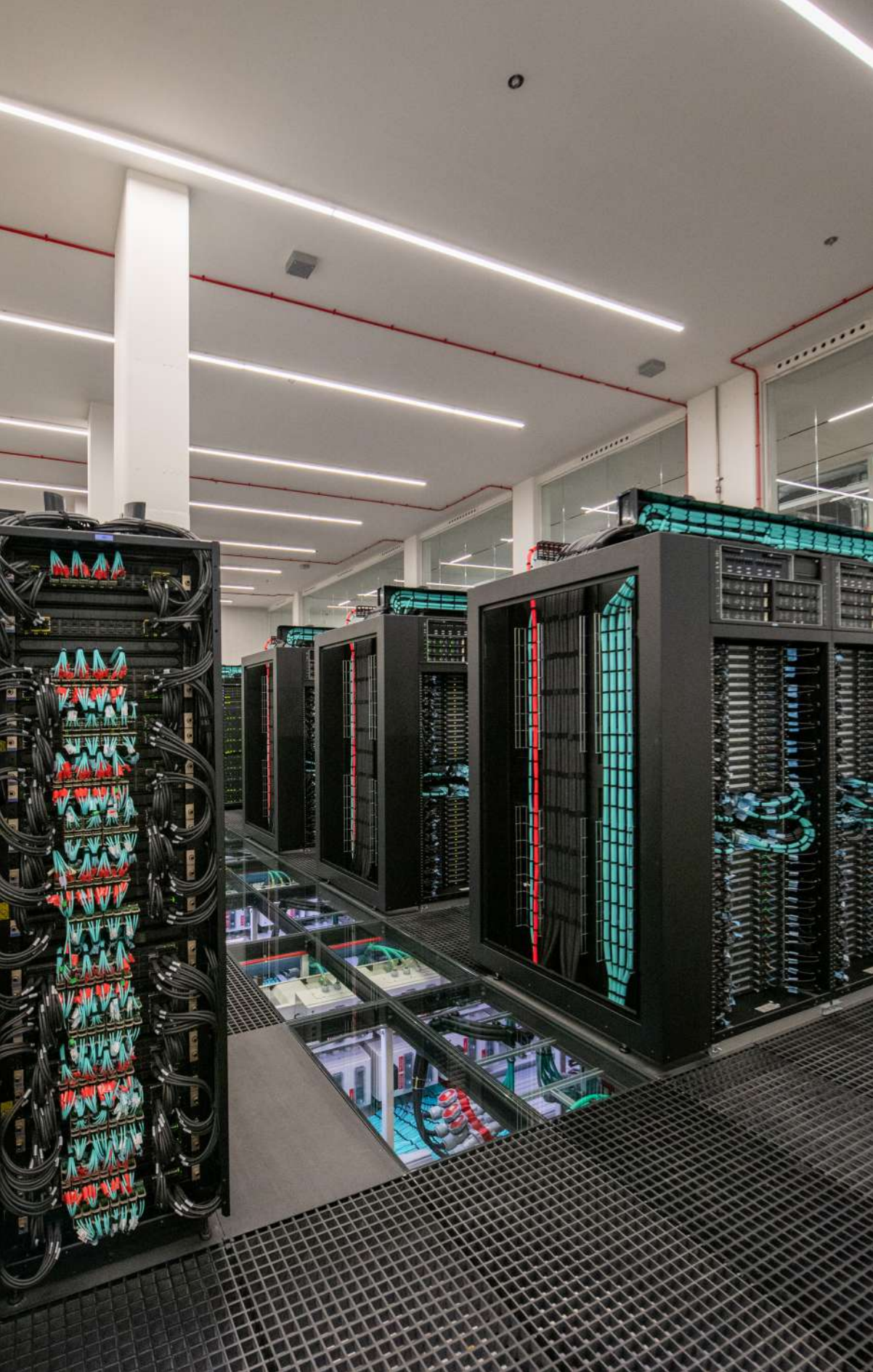- AI users
- Supply chain management

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