Innovations stemming from EVOLVE

evolve

Leading the Big Data
Revolution
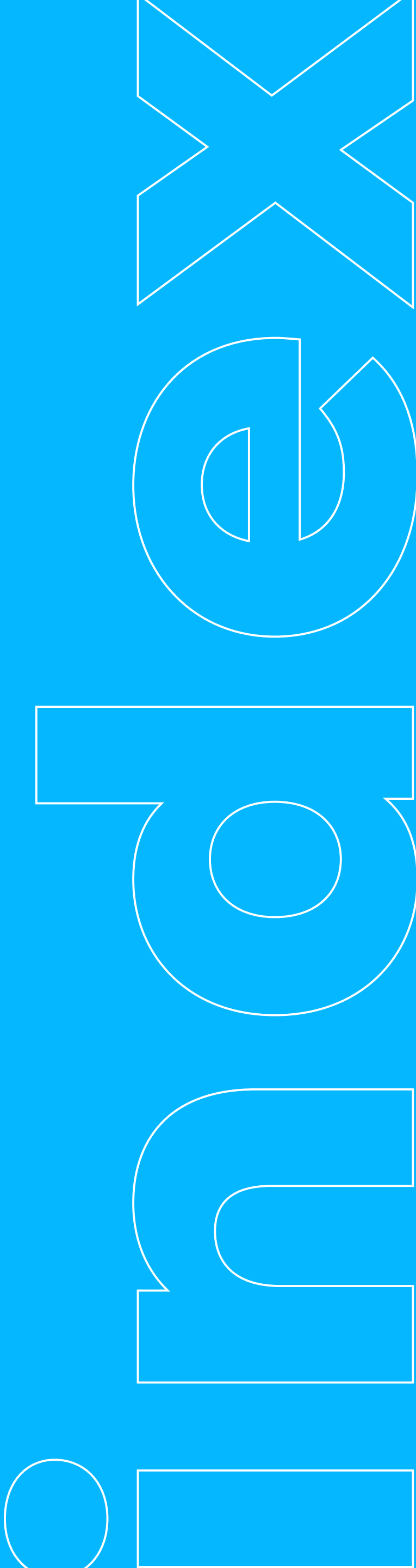
Introduction to EVOLVE

Bringing together the HPC, Big Data and Cloud worlds

The **High-Performance Computing** world brings high focus on hardware and software designed to drastically improve application performance: iops, code acceleration, highly parallelized algorithms, bare metal optimization are paramount to HPC applications. However, this highly specialized domain is not easily accessible to SMEs and require very specific skills not affordable to all application domains.

The **Big Data** world brings a versatile and heterogeneous treatment of zetabytes of data with streams, pictures, videos or audio files and huge databases. Big Data leader use processes integrated in automatized workflows designed to extract the most value out of large datasets. But, these still lack the specialization and optimizations that HPC can offer to applications.

The **Cloud** world provides virtualized environments taking advantage of a hidden infrastructure: experts can concentrate on their domain application problems while DevOps can optimize the running environment. The possibility to use multi-tier subscription to services running on very efficient infrastructure allow SMEs to benefit from high-end hardware and optimizations tailored to their needs. But application from the Cloud are not necessarily designed to scale well in Data and compute time and can benefit from the expertise of HPC and Big Data.

What if we could benefit from the best of these worlds?

The EVOLVE Platform combines the expertise of HPC, Big Data and Cloud users to bring an affordable and efficient platform for applications.

The advantages of EVOLVE

Reduce Time to Market for new products and services powered by HPC

Development and operational costs are reduced

Benefit from greater performances with Big Data Analytics

Easy to deploy, easy to maintain, easy to use

Completely secure and private

EVOLVE demonstrates its value proposition in the following domains:
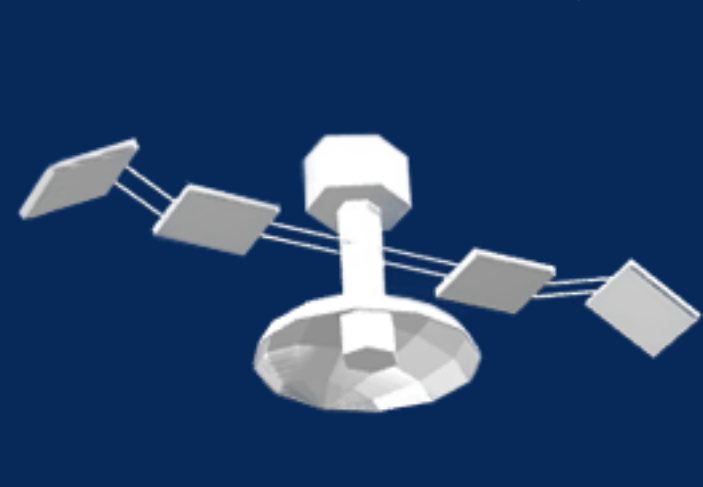
Radiometric correction and change detection on Sentinel-2 satellite images.

Optimizing **agricultural production** yield using numerical models and massive historic data (through CybeleTech's umerical simulation and machine learning technologies).
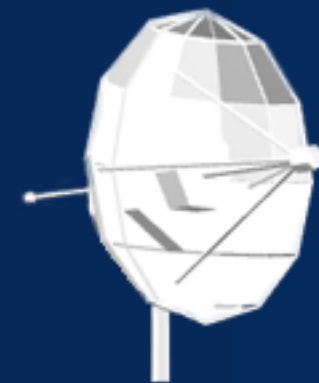
Data-assisted automotive service development.

Automotive data-driven services for vehicle predictive maintenance.

Maritime surveillance at scale and high accuracy, by using massive observation and domain-specific data (using Space Hellas' massive data from satellites and other sensors).

Improvement of public bus services that dominate transportation in Europe.

Advanced vehicle routing algorithms and mobility services optimization.

Our experts are there to understand your needs and improve the platform based on your use cases. You can gain a great competitive advantage by having a platform that scales seamlessly with your datasets. We provide you with performance analysis tools on your application during the project, see your performance grow with each improvement on the platform.

Be part of EVOLVE-Ecosystem
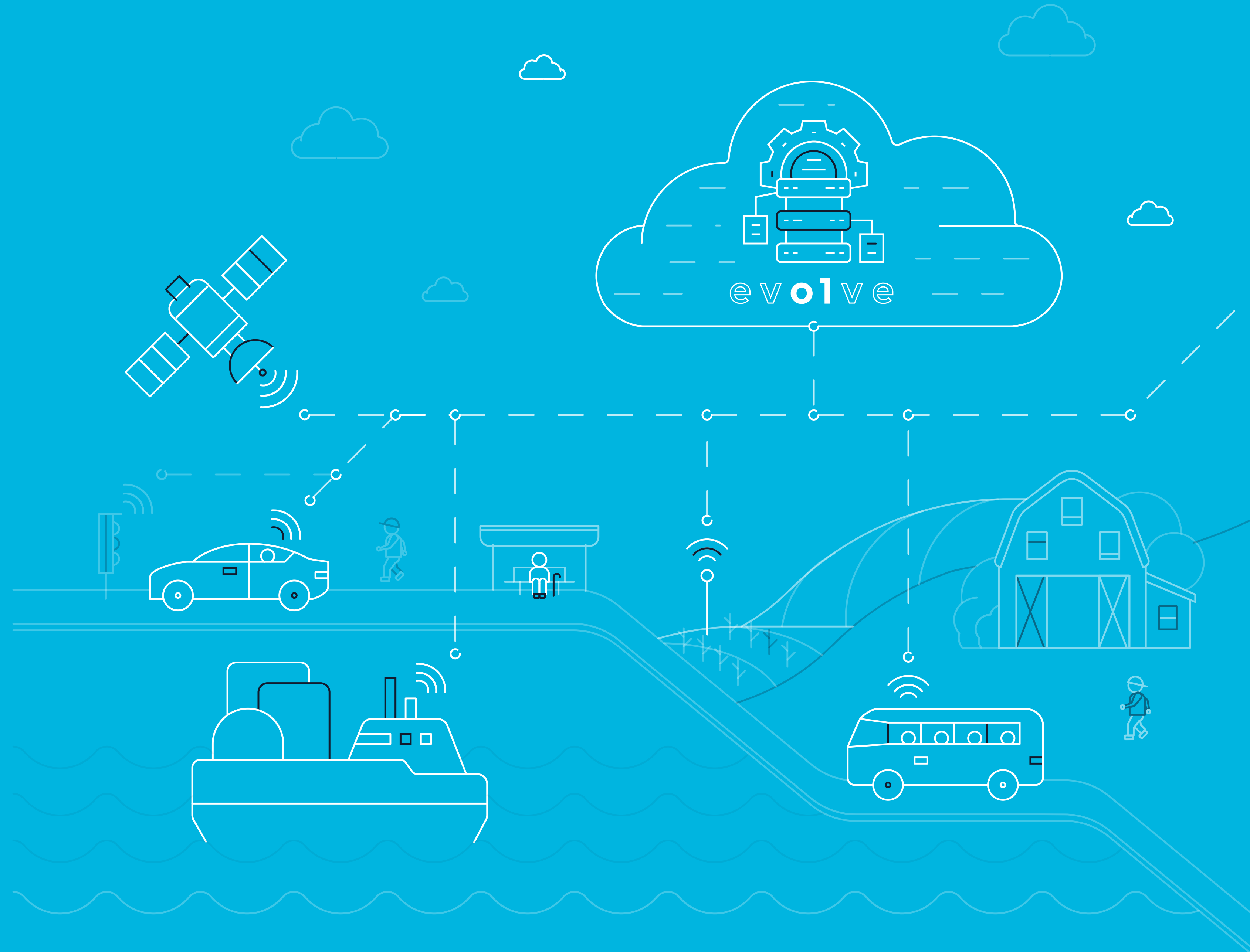
Main innovation for commercialisation

The platform built for the Evolve project represents a point of convergence of the HPC with Big Data and Artificial Intelligence as well as an opening to the cloud. The hardware and software technologies assembled on this platform according to a specific architecture will obviously be re-used for the design of future HPC systems by ATOS/Bull S.A.S who is a global leader in digital transformation and a European leader in HPC.

Figure 1: EVOLVE Platform at Atos/Bull Headquarters

Further innovations

As a whole, EVOLVE delivered a new testbed for data processing that can be deployed in public or private setups. In addition, certain components of the software have particular interest for certain sub-sectors of the industry or certain application domains.

In the next chapters we describe the list of the other commercialization opportunities stemming from the EVOLVE project and the related strategies for commercialization that are associated with each innovation. The project partner(s) best placed to take a particular innovation to the market is also identified.

AccelX: Hardware and software architectures to support a scalable and interoperable integration of computing acceleration technologies →

Karvdash: High-productivity and performance software stack for data science on Kubernetes →

Datashim: frictionless access to data for containerized applications →

Argus: Holistic performance monitoring system for heterogeneous platform →

Skynet: An Adaptive Resource Allocator for Datacentre workloads →

VizCon: Visualization and Contextualization Micro-Service →

Acritas: Maritime Surveillance Platform →

Celso Mobility Dashboard: Real-time Public Transportation Monitoring →

Cybel: Imagery for crop detection in agricultural environment →

accelx

Hardware and software architectures to support a scalable and interoperable integration of computing acceleration technologies

owner: Bull SAS

Optimal exploitation of Hardware accelerators implies a rethinking of hardware architecture, communication protocols (e.g. cache coherence, memory consistency) and integration within the software stack. Evolve contributes a small part to this big scheme:

- GPU/FPGA-based acceleration (hardware integration, communication interface, synthesis and programming models);

- Interaction and cooperation between acceleration technologies (GPU vs FPGA vs TPU);

- AI-oriented software stack (from the hardware abstraction layer up to AI frameworks).

Type of innovation:
Significantly improved product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
Current customers

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Established competition but none with a proposition like the one under investigation

Needs to fulfil market potential:
Expanding to more markets

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
SDG 9 - Industry, Innovation, and Infrastructure:

- 9.1 - Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

- 9.4 - By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

- 9.5 - Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

SDG 17 - Partnerships for the Goals:

- 17.8 - Technology - ully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

karvdash

High-productivity and performance software stack for data science on Kubernetes

owner: FORTH, Sunlight.io

Karvdash is a frontend for facilitating data science on Kubernetes. It provides a web-based graphical user interface to coordinate accesses to the platform, orchestrate service execution in containers from pre-defined templates (including Zeppelin and Jupyter notebooks), and interact with collections of data that are automatically attached to application containers when launched; all in a secure manner. Zeppelin notebooks embed a custom EVOLVE-specific interpreter, for simplifying the definition and deployment of workflows.

Karvdash exploits the available infrastructure and extends the software stack towards the user, imposing a specific usage methodology, which has been tailored to high-performance Big Data analytics applications.

Features of the Innovation:

Type of innovation:
New product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
New customers

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Established competition but none with a proposition like the one under investigation

Needs to fulfil market potential:
 Investor introductions (FORTH, Sunlight.io), expanding to more markets (Sunlight.io), partnership with other SME(s) (FORTH, Sunlight.io), partnership with large corporates (FORTH, Sunlight.io)

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
No. It is a technology innovation, with indirect social impacts that do not map to one of the predefined Societal Challenges.

datashim

frictionless access to data for containerized applications

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owner:
IBM Research Europe - Dublin

The Datashim adds the dataset abstraction in Kubernetes as a point of reference to an S3 or NFS data source. Containerized applications do not need to know any detail about the data source and just reference its mnemonic name.

Datashim takes care of all the details of making sure credentials are valid, mounting the data source and attaching to containers, decoupling users of data from the maintenance of the data lifecycle.

Features of the Innovation:

Type of innovation:
New product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
No exploitation planned. The exploitation is let to the open source community

Main users of the innovation:
New customers

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Patchy, no major players

Needs to fulfil market potential:
Expanding to more markets

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
Not relevant to any Societal Challenge. It is a technology innovation, with indirect social impacts that do not map to one of the predefined Societal Challenges.

More information available at:
https://lfaidata.foundation/projects/datashim/

Argus

Holistic performance monitoring system for heterogeneous platforms

owner: Bull SAS, DDN

Monitoring the performance of a heterogeneous system requires the ability to probe the usage of different resources from a variety of technologies and display meaningful metrics to assess performance of the whole solution. Leveraging an existing open-source project, Prometheus, the innovation proposes new connectors and exposes new API to existing products in order to build a comprehensive dashboard of the performance of the system.

Features of the Innovation:

Type of innovation:
Significantly improved product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Only deployed as new to the organisation/company (new internal processes implemented, etc.)

Main users of the innovation:
New and current customers

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Established competition but none with a proposition like the one under investigation

Needs to fulfil market potential:
Expanding to more markets (Bull and DDN); Partnership with large corporates (DDN)

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
Yes

Contribution to UN Sustainable Development Goals (SDG):
SDG 9 - Industry, Innovation, and Infrastructure:
- 9.5 - Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

Skynet

An Adaptive Resource Allocator for Datacentre Workloads

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owner: FORTH

Skynet is a Kubernetes scheduler, which given Performance Level Objectives (PLOs) for applications, dynamically monitors their performance and adjusts allocated resources at runtime.

Our experiments with popular industry services, both in local datacentres and in cloud deployments, show that Skynet allows Kubernetes to decrease the amount of unused resources by 200%, while it reduces PLO violations by 300%.

Features of the Innovation:

Type of innovation:
New product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
New customers

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Established competition but none with a proposition like the one under investigation

Needs to fulfil market potential:
Investor introductions, biz plan development, partnerships with other SME(s), partnerships with large corporates

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
Not relevant to any Societal Challenge. It is a technology innovation, with indirect social impacts that do not map to one of the predefined Societal Challenges.

vizcon

Visualization and Contextualization Micro-Service

owner: webLyzard technology

The EVOLVE Visualization and Contextualization Service and the corresponding visual analytics dashboard help analysts to explore big data repositories across multiple metadata dimensions. Special emphasis has been placed on the temporal and geographic dimensions, both in terms of rendering statistical data as well as the ability to put results in the context of the public debate (e.g., news outlets, social media, stakeholder Websites).

Features of the Innovation:

Type of innovation:
Significantly improved product

Level of innovation:
Highly innovative through automated contextualization and classification to integrate structured and unstructured big data

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
Corporate decision makers, federal agencies as well as application developers who want to integrate visualizations into their solutions

Market maturity:
Emerging. There's a growing demand and few offerings are available

Market competition:
Established competition but none with a proposition like the one under investigation

Needs to fulfil market potential:
Investor introductions, biz plan development, expanding to more markets, partnership with large corporates

Time for commercialisation after project ends:
Less than 1 year

Other markets for this innovation:
Yes

Contribution to UN Sustainable Development Goals (SDG):
Yes. Contribution to UN Sustainable Development Goals (SDG): Relevant across a wide range of SDGs (see www.weblyzard.com/unep-live), particularly #8, #9, #13 and #17.

vizcon

Visualization and Contextualization Micro-Service

owner: webLyzard technology

The EVOLVE Visualization and Contextualization Service and the corresponding visual analytics dashboard help analysts to explore big data repositories across multiple metadata dimensions. Special emphasis has been placed on the temporal and geographic dimensions, both in terms of rendering statistical data as well as the ability to put results in the context of the public debate (e.g., news outlets, social media, stakeholder Websites).
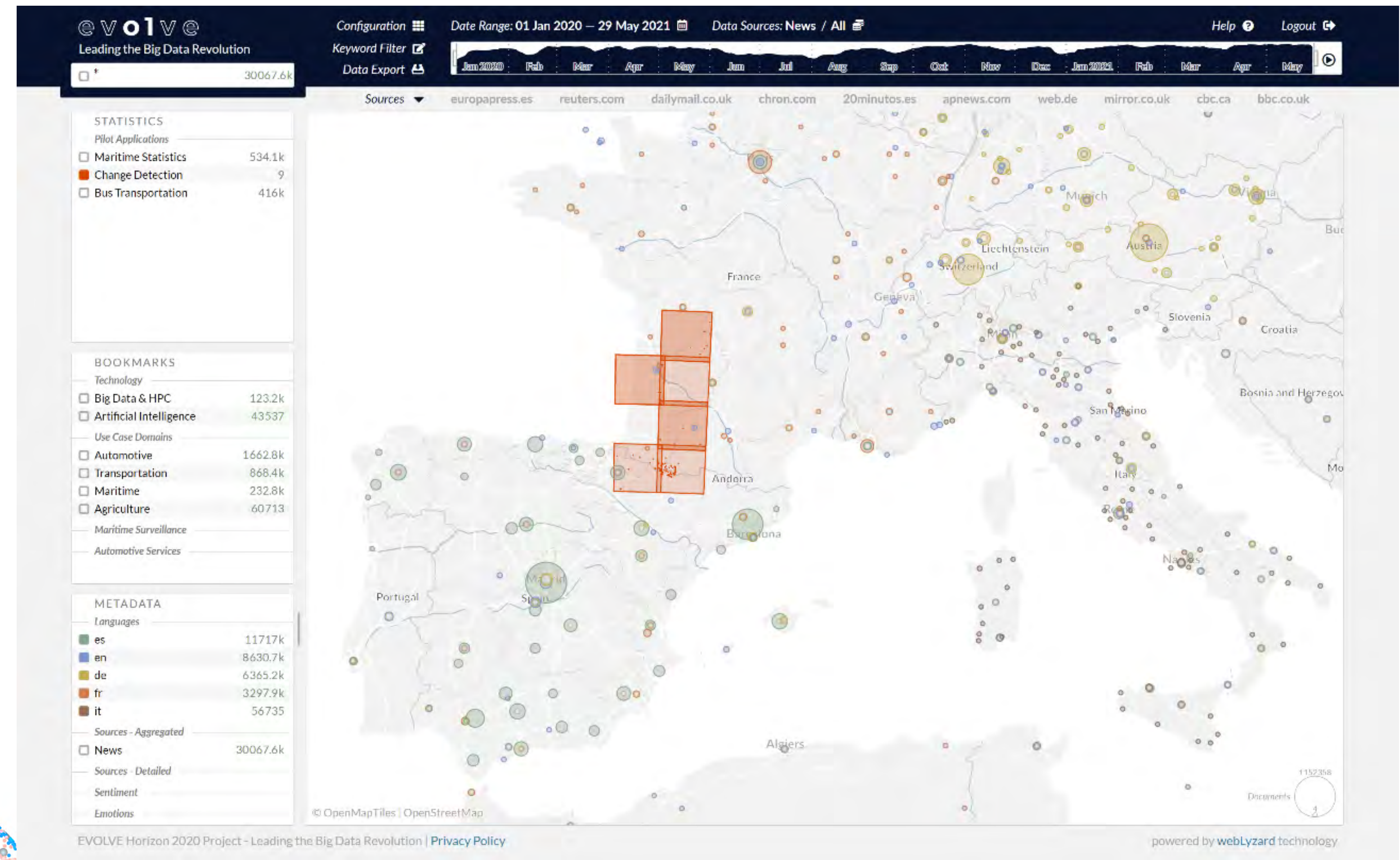

Figure 1. Screenshot of the EVOLVE Visual Analytics Dashboard

Maritime Surveillance Platform

owner: Space Hellas S.A.

The EVOLVE maritime surveillance platform is a composite software application which combines and analyses information from multiple sources, such as satellite images, AIS data and radar tracks, in order to augment the maritime situational picture.

Features of the Innovation:

Type of innovation:
Significantly improved product

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
Current customers

Market maturity:
Mature. The market is already supplied with many products of the type proposed

Market competition:
Several major players with strong competencies, infrastructure and offerings

Needs to fulfil market potential:
Biz plan development, expanding to more markets

Time for commercialisation after project ends:
Less than 1 year

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
SDG 16 - Peace, Justice and Strong Institutions:

- 16.1 - Significantly reduce all forms of violence and related death rates everywhere

- 16.4 - By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

Celso
Mobility Dashboard

Real-time Public Transportation Monitoring

owner: MemEx Srl

Through the technologies and the innovative solutions implemented in EVOLVE project, MemEx aims to obtain an innovative tool which allows to the Public Transport operators to have information concerning both the traffic congestion on PT network and the PT service. Thanks to the solutions and high computational resources of EVOLVE platform the travel time and related delays will be estimated in a real time way.

Features of the Innovation:

Type of innovation:
Significantly improved product

Level of innovation:
Very innovative

Commercial exploitation:
Only deployed as new to the organisation/company (new internal processes implemented, etc.)

Main users of the innovation:
New customers

Market maturity:
Emerging: There is a growing demand and few offerings are available

Market competition:
Patchy, no major players

Needs to fulfil market potential:
Investor introductions, partnerships with large corporates

Time for commercialisation after project ends:
1-3 years

Other markets for this innovation:
None

Contribution to UN Sustainable Development Goals (SDG):
SDG 9 - Industry, Innovation, and Infrastructure:

- 9.5 - Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending
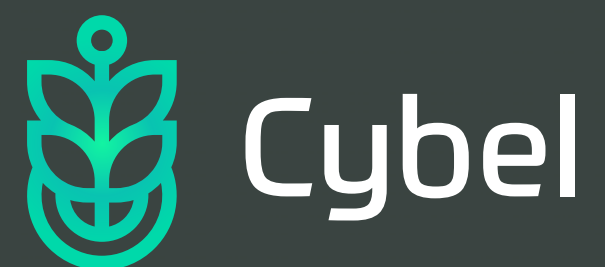
Cybel

Imagery for crop detection in agricultural environment

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owner: CybeleTech

The objective is to deploy deep learning algorithms to detect the agricultural crop in place at a given geographical point. This technology helps cooperatives to better organize and prepare harvests and stock management.

Features of the Innovation:

Type of innovation:
Significantly improved service (except consulting services)

Level of innovation:
Obviously innovative and easily appreciated advantages to customer

Commercial exploitation:
Introduced as new to the market

Main users of the innovation:
New customers

Market maturity:
Emerging: There is a growing demand and few offerings are available

Market competition:
Several major players with strong competencies, infrastructure and offerings

Needs to fulfil market potential:
Investor readiness training, investor introductions, expanding to more markets, partnerships with large corporates

Time for commercialisation after project ends:
Less than 1 year

Other markets for this innovation:
Edge, Fog, Cloud Computing

Contribution to UN Sustainable Development Goals (SDG):
SDG 2 – Zero Hunger

- 2.4 - By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality and public and private research and development spending

According to the European Commission's Innovation Radar[1], the EVOLVE project "shows a high potential for innovation, with concrete examples that are expected to make it to the market in 1-3 years".

[1] The Innovation Radar is a European Commission initiative to identify high potential innovations and innovators in EU-funded research and innovation projects. It's goal is to allow every citizen, public official, professional and business person to discover the outputs of EU innovation funding and give them a chance to seek out innovators who could follow in the footsteps of companies such as Skype, TomTom, ARM Holdings, all of whom received EU funding in their early days. This platform is a first step to achieving such ambitions by making information about EU-funded innovations from high-quality projects visible and accessible to the public via the Innovation Radar platform (https://www.innoradar.eu/) .

Be part of EVOLVE Ecosystem

The EVOLVE ecosystem aims to establish and nurture a network that will empower open innovation based on the platform that the evolve project is building. The EVOLVE ecosystem brings together all the policy makers, research organizations, engineers, developers and companies acting as end-users that are actively working on the fields of high-performance computing, big data and cloud.

The EVOLVE ecosystem will also facilitate innovative enterprises (large industries, SMEs, creative start-ups and university students – bachelor, master, PhD level) to develop and test their novel solutions.

Check the advantages of being part of the network and apply for membership

→

Consortium

DDN STORAGE
www.ddn.com

BULL
www.atos.net

IBM
www.ibm.com

FORTH
www.ics.forth.gr

Sunlight
www.sunlight.io

Institute of communications and computer systems
www.microlab.ntua.gr

MemoScale
www.memoscale.com

webLyzard technology
www.weblyzard.com

LOBA
www.loba.pt

Thales Alenia Space
www.thalesgroup.com

Space Hellas
www.space.gr

CybeleTech
www.cybeletech.com

Neurocom Luxembourg
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MemEX
www.memexitaly.it

Tiemme SPA
www.tiemmespa.it

Virtual Vehicle
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