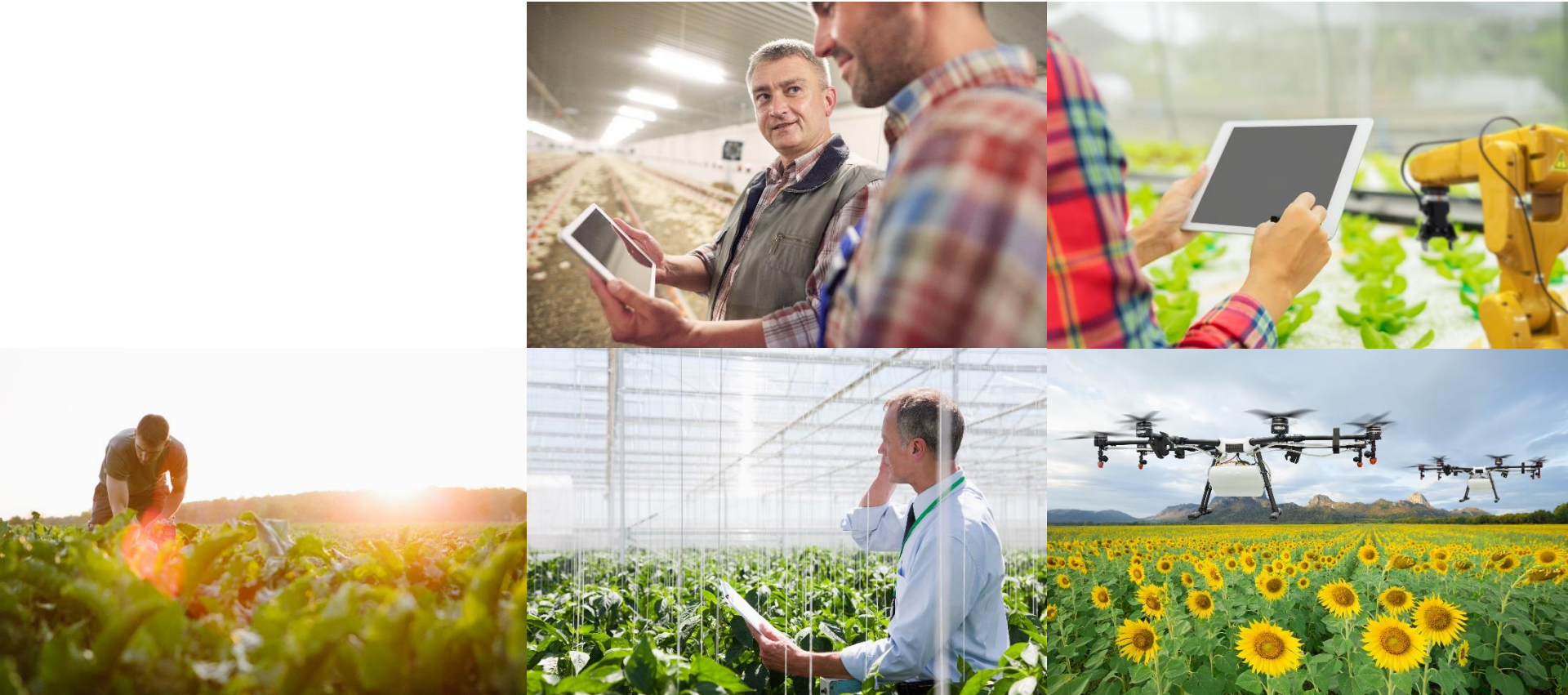


FlexiGroBots

Flexible robots for intelligent automation of
precision agriculture operations

18-02-2021

Digitalising agriculture



Motivation



Safety	Major risk in case of failure	Safe interaction with humans
Impact on the task	Stopped until repair	Re-planning of tasks
Impact on the field	Soil compaction	Less compaction and precise movements
Personnel	One operator per robot	One operator per robot team

Vision

- **Cost-effective multi-robot systems for heterogeneous, safe and complex agricultural missions**



Pilots

Grapevines – Terras Gauda (Spain)

Objectives

Early detection of pests - drones, robots & CV

- Identify black spots
- Anticipate appearance of symptoms

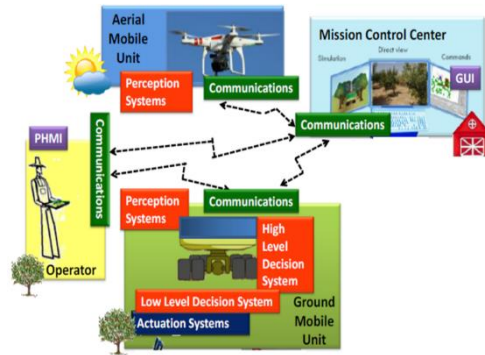
Phytosanitary treatments - drones, robots

- Accurate treatment to the affected grapes

Transport of the grapes - robots.

- Carried out autonomously

Crop health information maps - drones, IoT, satellite images.



Pilots

Rapeseeds (Finland)

Objectives

Recognition insects - drones & robots

Grass & rapeseed status mapping - drones, satellites images

Rumex plant weeding in grasslands - robots

Situation awareness of tractor fleets - drones

Pesticide spraying - drones, robots

Robotised tractor - robots

Silage operation planning - data & AI



Pilots

Blueberries (Lithuania & Serbia)

Objectives

Planning: yield prediction – sensors, drones, computer vision, artificial intelligence, satellite images.

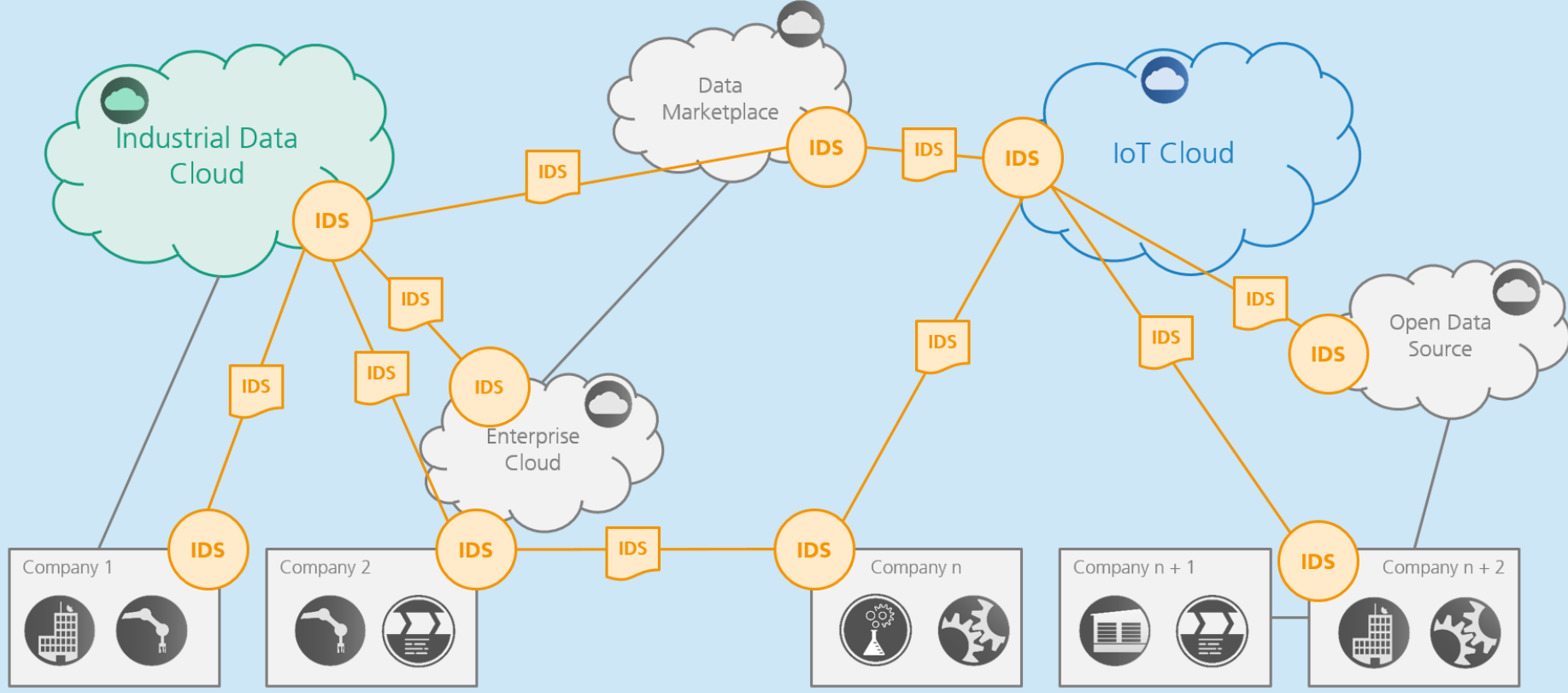
Sampling: automated field soil sampling and analysis – drones.

Diseases: early-stage blueberry disease detection – drones, robots, computer vision.

Spraying: targeted and autonomous agrichemical spraying – drones, robots

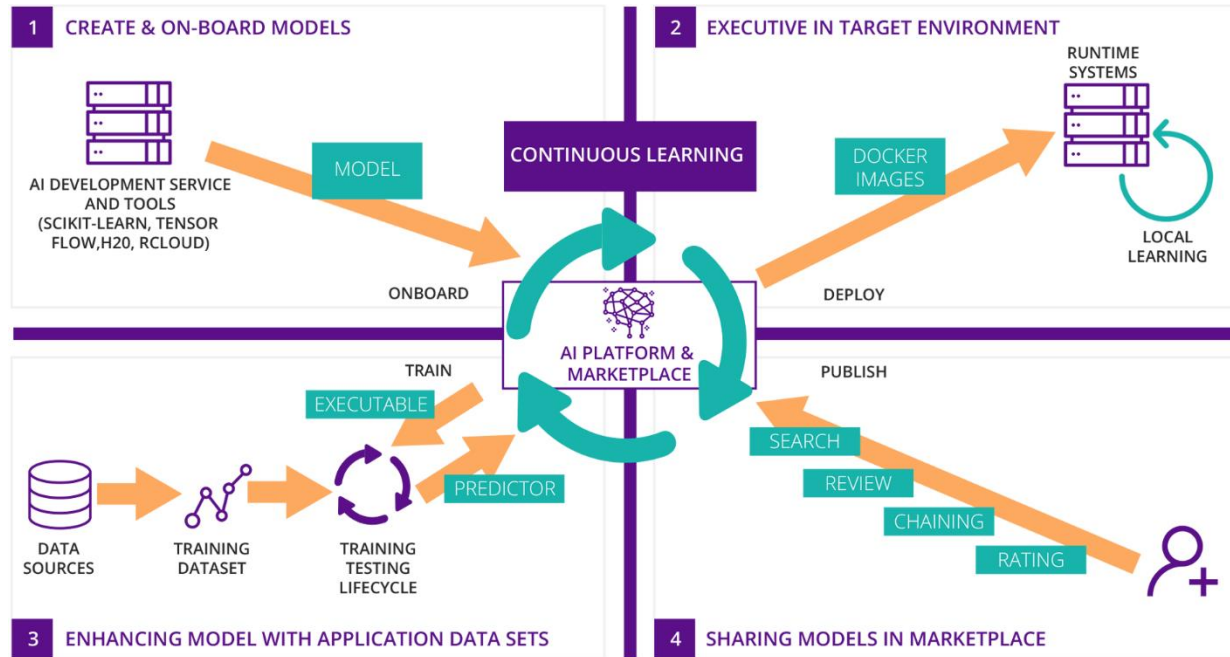


Data Sharing



Artificial Intelligence

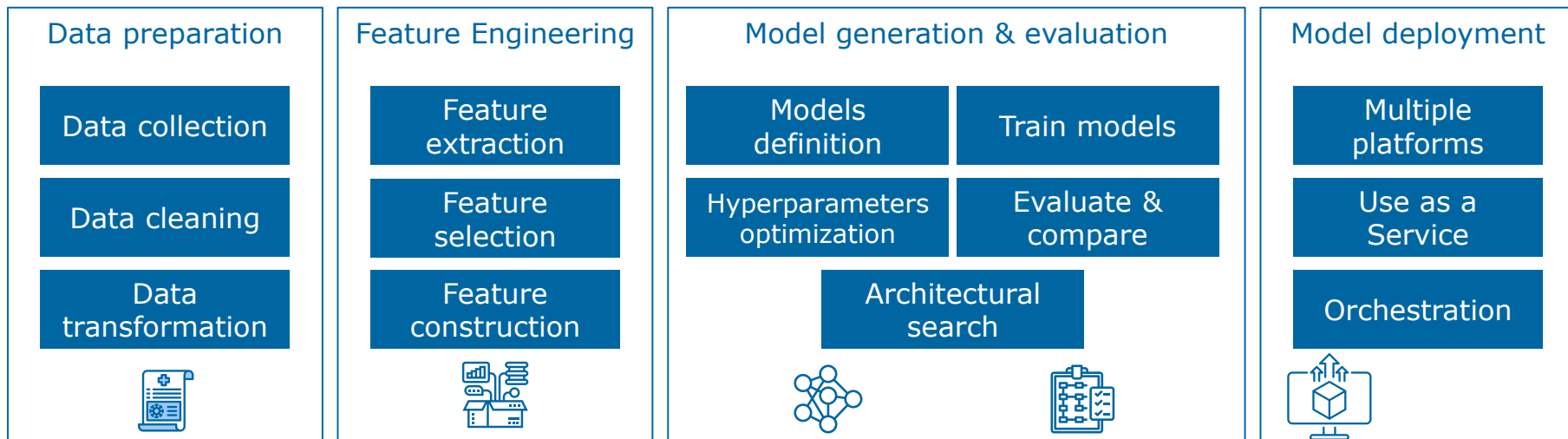
► Acumos AI platform (AI4EU) + AutoML



Artificial Intelligence

► Acumos AI platform (AI4EU) + AutoML

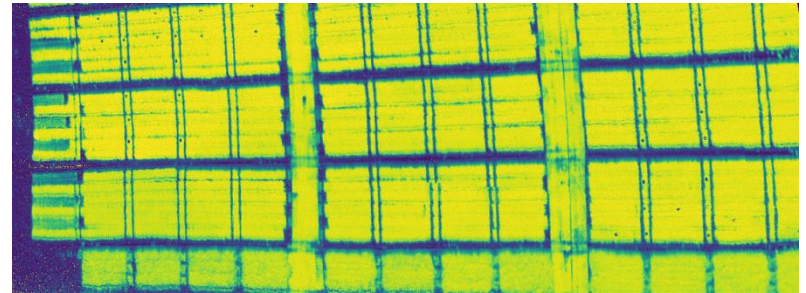
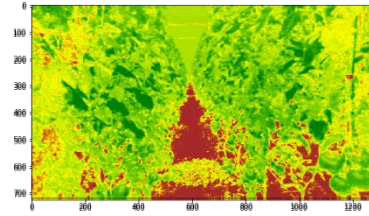
Classic workflow ~ several weeks



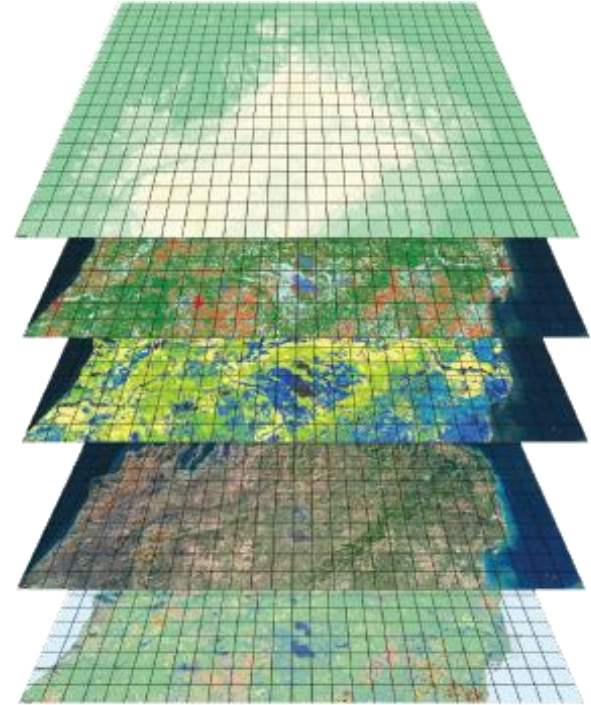
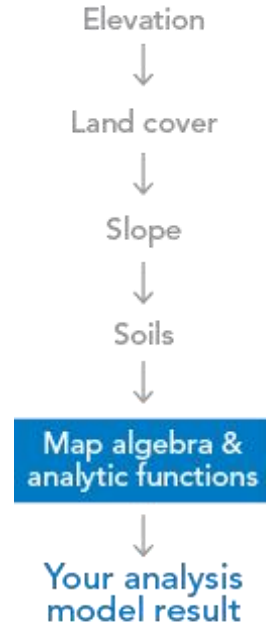
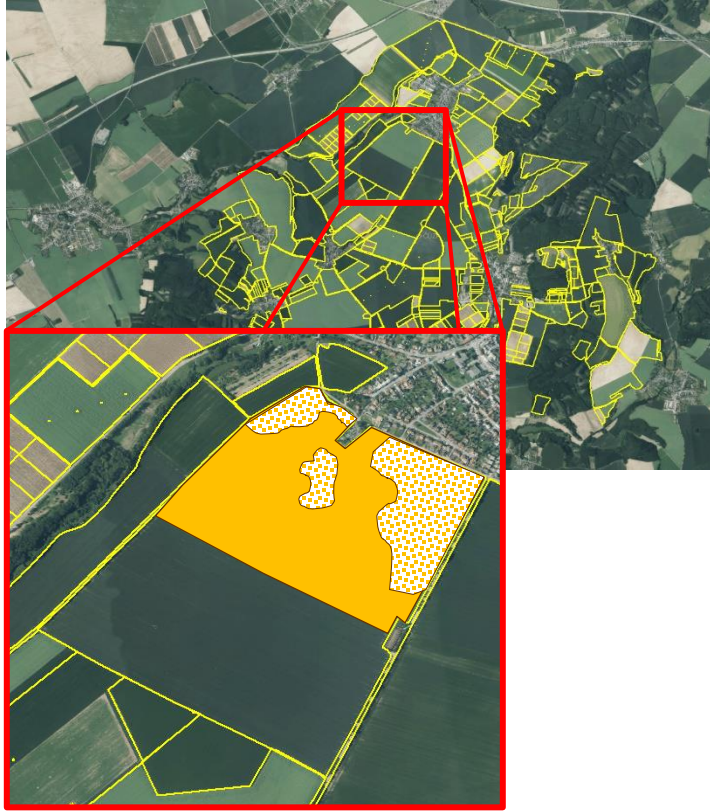
AI as a Service + AutoML ~ hours / days

Computer vision

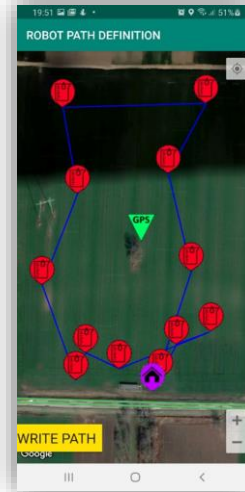
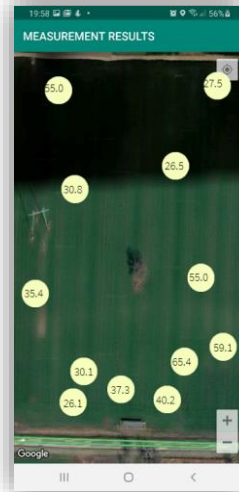
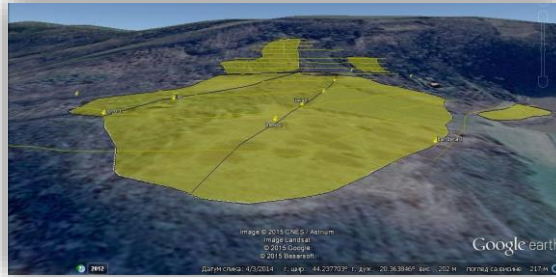
- ▶ Computer vision services for robotics and AI-powered applications
 - Image segmentation and pattern recognition.
 - Vegetation indices.
 - Hyperspectral image analysis.
 - Safe and autonomous navigation of drones and robots.
 - Automated detection of weeds.
 - Automated detection of crop diseases.
 - Detection of ground mobile vehicles from drones.
- ▶ Executed directly on robots and edge devices.



Geospatial services



Mission control centre



FlexiGroBots overview

- 1 **Mission control of heterogenous multi-robots** in agriculture
- 2 Secure and sovereign **data exchange**
- 3 AI-driven robotics methods and services for **analytics and automated decisions**
- 4 **Trustworthy AI**-driven heterogeneous multi-robot systems
- 5 Exploitation of information coming from **IoT sensors, satellite images**
- 6 **Large scale and industrial validation** in three European pilots





FLEXIGROBOTS

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This project has received funding from the European Union's H2020 research and innovation programme under the grant agreement No. 101017111

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Thank you

For more information please contact:
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The Atos logo, featuring the word "Atos" in a bold, blue, sans-serif font. The letter 'o' is stylized with a white dot in the center.