



DA VINCI LABS

VISION

A deeptech accelerator inspired by Leonardo da Vinci, putting artificial intelligence, synthetic biology and quantum computing at the service of our planet...

BACKGROUND



Innovation at the service of the planet

- Xavier Aubry is the Founder of Da Vinci Labs, a deeptech incubator focusing on quantum technologies, artificial intelligence and synthetic biology.
- Da Vinci Labs aims to bring out the future deeptech champions able to tackle our era's most pressing challenges, such as biodiversity collapse and climate change.
- Da Vinci Labs participates in several European collaborative research projects and builds a technology infrastructure in France, which will be made available to researchers and entrepreneurs.
- Xavier Aubry has a background in life sciences and holds a MBA from Harvard Business School.
- For more information please visit: <https://www.davincilabs.eu/en/>



MISSION



Innovation at the service of the planet

Faced with the societal challenges of our era, our best researchers and entrepreneurs must come together!

Quantum

Artificial Intelligence

Synthetic Biology

- A multi-disciplinary deeptech research center
- Tackling our era's most pressing challenges using the power of these exponential technologies

10⁹+

How will you positively impact 1 billion people in the next decade?

Global Health, Water, Energy, Environment, Food, Education, Security, Poverty

7 ÉNERGIE PROPRE ET D'UN CÔTÉ ABORDABLE, 8 TRAVAIL DÉCENT ET CROISSANCE ÉCONOMIQUE, 9 INDUSTRIE, INNOVATION ET INFRASTRUCTURE, 10 INÉGALITÉS RÉDUITES, 11 VILLES ET COMMUNAUTÉS DURABLES, 12 CONSOMMATION ET PRODUCTION RESPONSABLES, 13 MESURES RELATIVES À LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES, 14 VIE AQUATIQUE, 15 VIE TERRESTRE, 16 PAIX, JUSTICE ET INSTITUTIONS EFFICACES, 17 PARTENARIATS POUR LA RÉALISATION DES OBJECTIFS

OBJECTIFS DE DÉVELOPPEMENT DURABLE

MISSION



What are the real challenges?

We need to avoid « tunnel vision » when it comes to societal challenges

From [Graeme MacKay](#) ©



MISSION



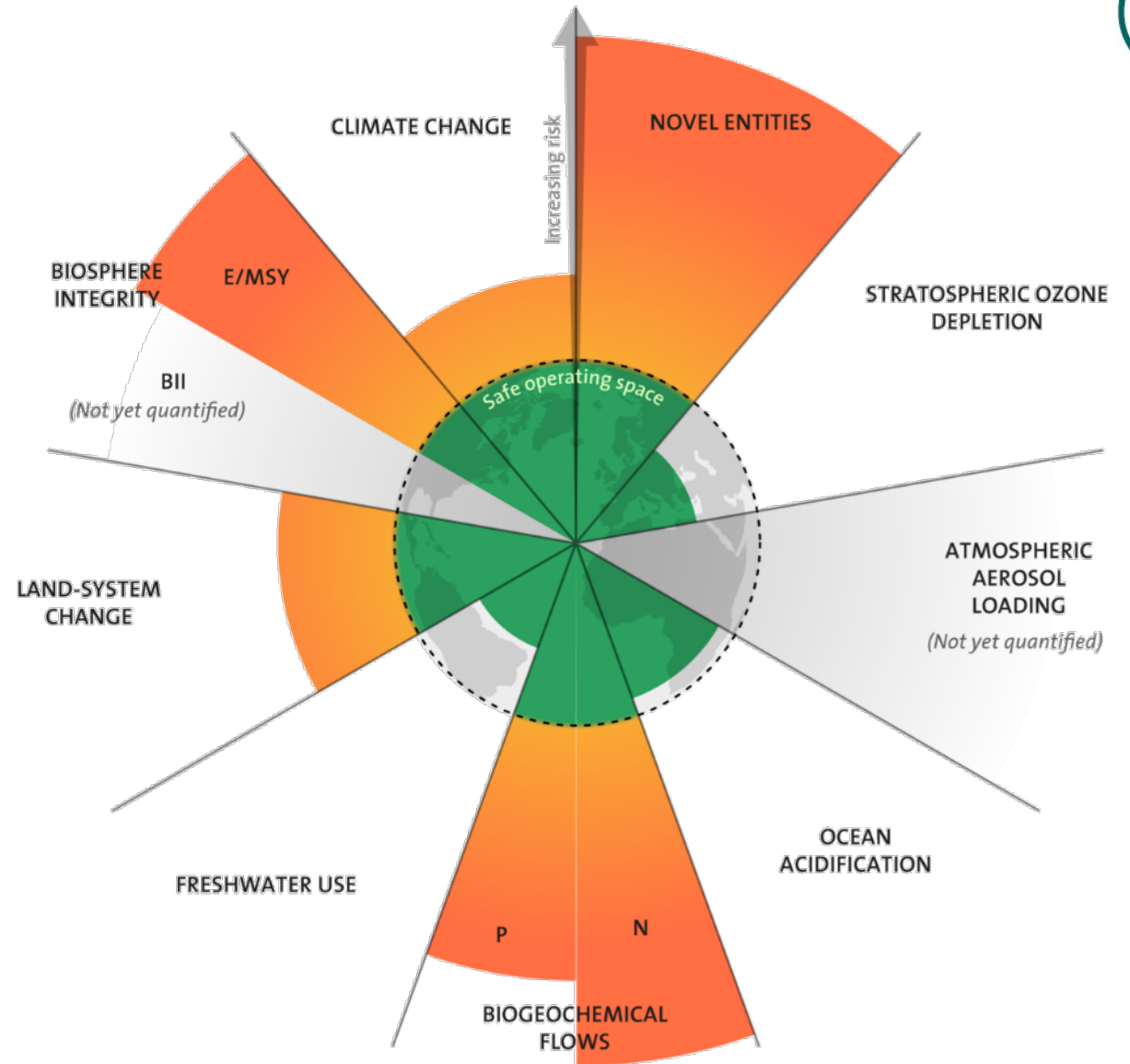
Planetary health

We have overshoot the planetary boundaries in many directions

- Biodiversity
- Pollution
- Eutrophication

But we have succeeded in the past to restore the environment...

- Ozone layer



"Azote for Stockholm Resilience Centre, based on analysis in Persson et al 2022 and Steffen et al 2015"

MISSION



Technology sovereignty

Europe missed the internet revolution, can it lead the deeptech renaissance? We believe Europe has the research excellence and the political will to do

- Defending Europe's technical sovereignty in strategic domains
- Leading Europe's deeptech renaissance and re-shoring of key industries

EU fears falling behind in race to control key technologies

30 Jun 2022 | News

Europe lags on quantum computing, artificial intelligence and biotechnology, the Commission warns. It also sees a role for small modular nuclear reactors in its power mix

By David Matthews



Scarlett Evans
August 10, 2022

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President Biden has signed the CHIPS act into law. Official White House Photo by Cameron Smith

President Joe Biden has signed the U.S. CHIPS and Science Act into law, including a significant investment intended to drive innovation in quantum computing.

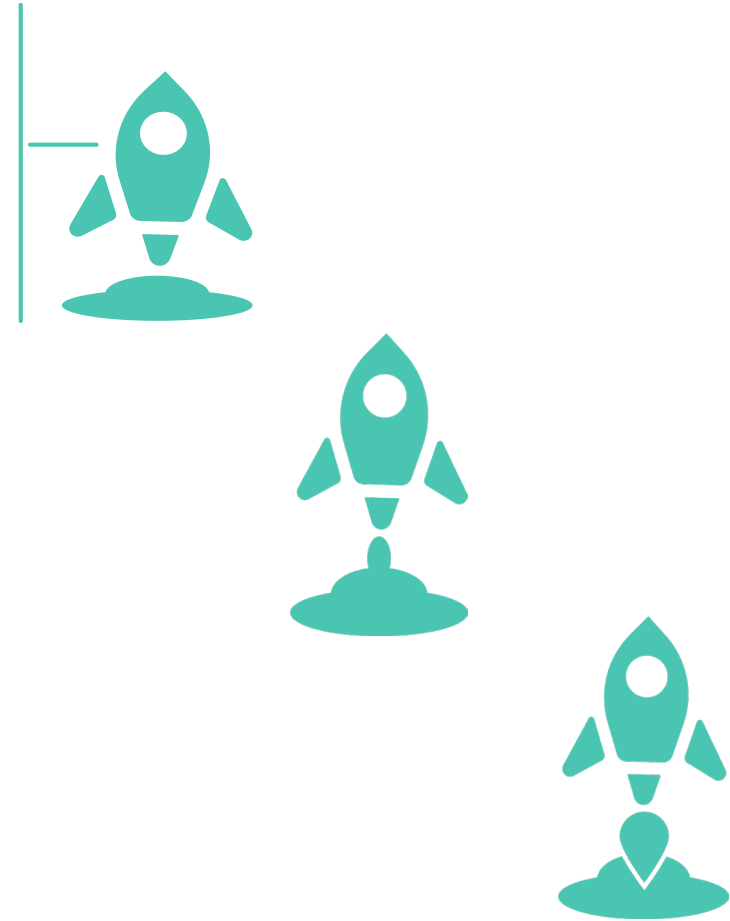
The legislation paves the way for more than \$200 billion to go towards science and technology over the next five years driven mainly by a drive to reduce dependency on imported semiconductor chips, most of which currently originate in Taiwan.

"The CHIPS and Science Act supercharges our efforts to make semiconductors here in America," said Biden. "[But] this bill is about more than chips. It's about science as well...this increased research and development funding is going to ensure the United States leads the world and the industries of the future, from quantum computing to artificial intelligence to advanced biotechnology."



Acceleration programme for deeptech start-ups

- In-depth Training & Mentoring: Our network of successful entrepreneurs, large industrial clients and policy-makers will allow you to hone your current skills, and learn important new ones such as developing an IP strategy, preparing their go-to-market, pitching investors, clients and partners
- Fundraising: We provide the best fundraising consultants in the business, currently responsible for 20% of the total deeptech funding raised from the European Commission in the EIC programme. We have access to a wide range of public and private instruments matching the level of maturity of each company.
- Technical Marketing & Communication: Communicating around deeptech is hard! We provide marcom specialists to develop key startup marketing collaterals (pitch deck, website, white papers, blogs & social media)



ECOSYSTEM SUPPORT

€20M to support UA deeptech startups

A strong signal for the UA deeptech ecosystem

European Innovation Council
€20 million to support Ukrainian tech start-ups

- Financing start-ups**
Financial support for over 200 tech start-ups, up to €60 000 each.
- Connecting start-ups**
 - business advisory services
 - matchmaking across Europe
 - information on EU funding schemes
- Budget**
€20 million action to support Ukrainian tech start-ups
- Call for proposals**
 - Pan-European network of start-up associations.
 - Collaborate with at least 1 Ukrainian innovation stakeholder.
 - Seek synergies with relevant EU initiatives.
- Call opening**
23 June - 7 September 2022 via [Funding and tender portal](#)

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UA SEEDS

Horizon Europe Project

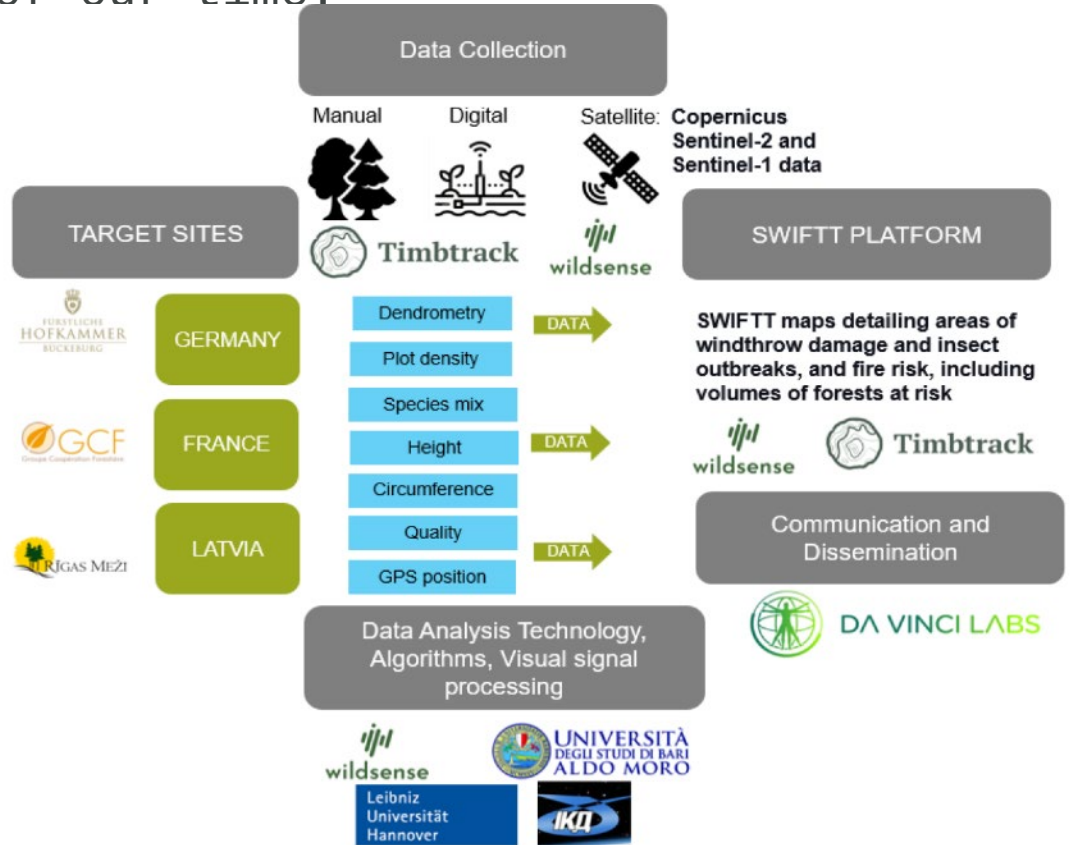
- Objective: support the deeptech ecosystem in Ukraine through pre-seed investments, coaching and acceleration services
- Coordinator: FundingBox (PL)
- Partners: 22 organizations including Ukrainian Start-up Fund (UA) and Da Vinci Labs (FR)
- Budget: €20M
- Duration: Sep 2023– Aug 2025

SEEDS
OF BRAVERY

RESEARCH

Data processing

The digitalization of our world offers a unique opportunity to apply machine intelligence to the societal problems of our time.



SWIFTT

Horizon Europe Project

- Objective: enable forest managers to adapt to climate change with affordable, simple and effective remote sensing tools backed up by powerful machine learning models.
- Coordinator: Wildsense (FR)
- Partners: Space Research Institute (UA), University of Bari (IT), University of Hannover (DE), Timbtrack (BE), Fürstliches Forstamt (DE), Groupe Coopération Forestière (FR), Rigas Mezi (LV), Da Vinci Labs (FR)
- Budget: €3M
- Duration: Nov 2022 – Oct 2025



RESEARCH

"Green" Computing Power

With Moore's law reaching a plateau, and the need for energy sobriety, quantum computing promises unparalleled computing power at minimal energy cost.

- Chemistry: simulation of complex molecules (fertilizers, catalysts, enzymes)
- Material science: new generation electric batteries, semiconductors, etc.
- Optimization: optimization of electrical networks, traffic flow management

EQUALITY

Horizon Europe Project

- Objective: to develop differential equation solvers, materials simulation algorithms, quantum optimizers for known industrial problems (airfoils, battery and fuel cell design, optimization of space missions) using existing quantum hardware
- Coordinator: Altran/Capgemini (DE)
- Partners: Pasqal Qu&Co (NL), Airbus (DE), DLR (DE), Fraunhofer, INRIA (FR), Université Leiden (NL), Da Vinci Labs (FR)
- Budget: €6M
- Duration: Nov 2022 – Oct 2025

⟨ EQUALITY ⟩

⟨EQUALITY⟩

Efficient QUantum
ALgorithms for IndusTrY

Funded by the European Union
under Grant Agreement 101080142



Funded by
the European Union

OBJECTIVES

EQUALITY aims to develop cutting-edge **quantum computer algorithms** to solve **strategic industrial problems.**

These are complex problems which have enormous computational requirements, forcing engineers either to use simplistic models or to rely on expensive build-and-test cycles.

Quantum computers provide an opportunity to tackle such questions, giving a competitive edge to the Europe and **billions of euros** for those industries over the coming decades.



**AERODYNAMICS
SIMULATION AND
OPTIMISATION**



**SPACE MISSION
OPTIMISATION
AND DATA
ANALYSIS**



**ENERGY STORAGE
MATERIALS AND
SYSTEMS**

EQUALITY brings together leading research groups, SMEs, and prominent industrial players to develop **quantum algorithms** for **real problems** running on **real quantum hardware**.

AIRBUS

Capgemini 



DA VINCI LABS

 **Fraunhofer**
ENAS



DLR

Deutsches Zentrum
für Luft- und Raumfahrt
German Aerospace Center

Inria



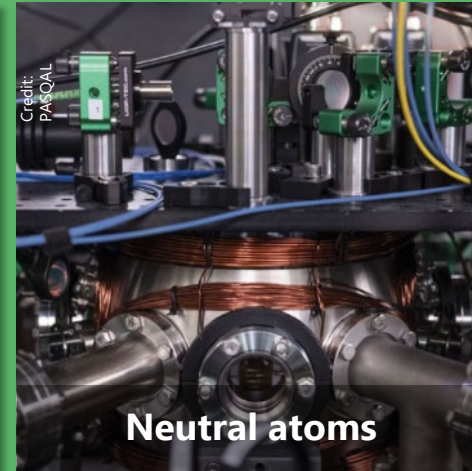
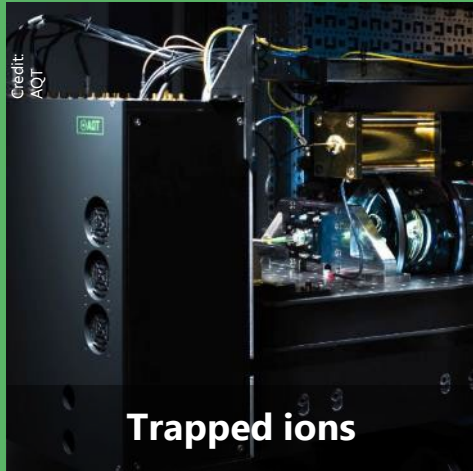
Universiteit
Leiden
The Netherlands

 **PASQAL**

The consortium has been awarded in the highly competitive Horizon Europe funding programme, and the partners will receive a cumulative €6M grant from the European Commission from 2022 to 2025.



QUANTUM COMPUTERS



HARDWARE EXPLOITATION

- Divide-and conquer strategies
- Optimal qubit routing algorithms
- Exploitation of analogue mode simulations
- Efficient trap-based noise characterisation
- Logic- and ML-based methods for circuit optimization

CORE ALGORITHMS

- Differential and Stochastic differential equation solvers
- Quantum generative models
- Quantum chemistry simulators
- Simulators for periodic materials
- Quantum evolution kernel methods
- Non-kernel quantum ML techniques
- Gibbs state-based optimization



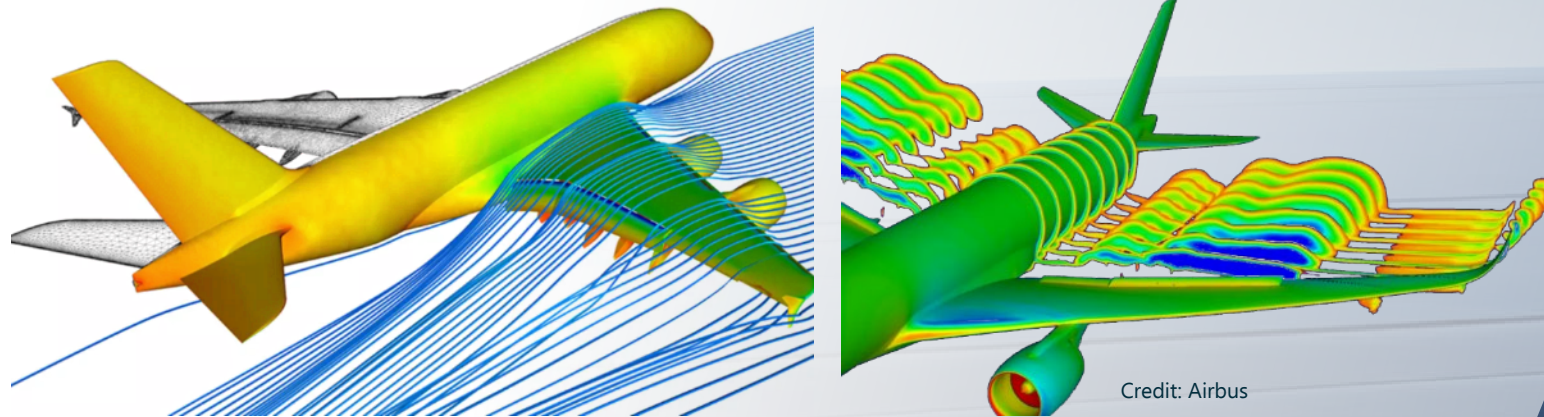
INDUSTRIAL PROBLEMS

AERODYNAMICS SIMULATION AND OPTIMISATION

One way of propelling the aviation industry **wards zero greenhouse gas emissions** is making more energy-efficient airplanes.

This involves **simulating in detail** the air flow around the aircraft and the aerodynamic forces acting on its surfaces, while optimising for frame weight, integrity, and performance, which **requires enormous computational resources.**

Visualization of aerodynamics simulation.



EQUALITY will investigate how **quantum computers could tackle such questions** computationally, potentially unlocking tens of billions of euros in value for the aerospace and automotive industries.

AIRBUS

Capgemini

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German Aerospace Center

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PASQAL

ENERGY STORAGE MATERIALS AND DESIGN

The development of new energy storage technologies, such as better batteries and fuel cells, is

crucial to the green transition.

Quantum computers offer a path forward for simulating these processes, to **overcome current trade-offs** between precision and scale.

EQUALITY will develop **quantum algorithms for modelling batteries and fuel cells**, potentially unlocking tens of billions of euros in value for the energy-storage industry.

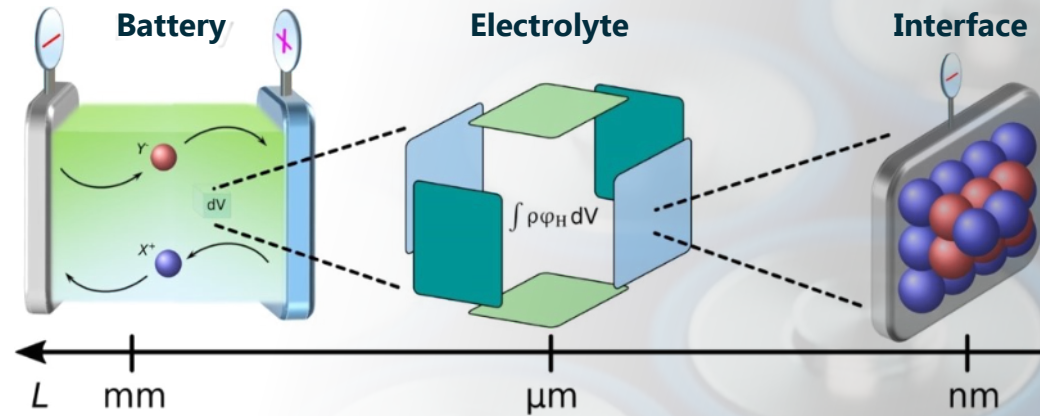
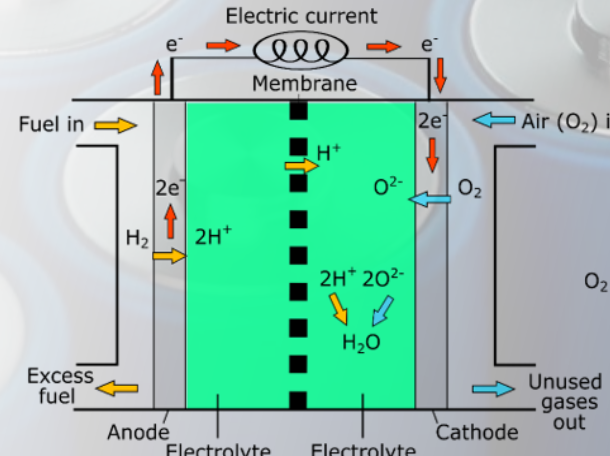


Illustration of the multi-scale approach for the example of a battery.



Left: state of the art planar solid-oxide fuel cell (SOFC) stack developed for stationary applications. Right: basic set-up of a FC via the example of a SOFC.

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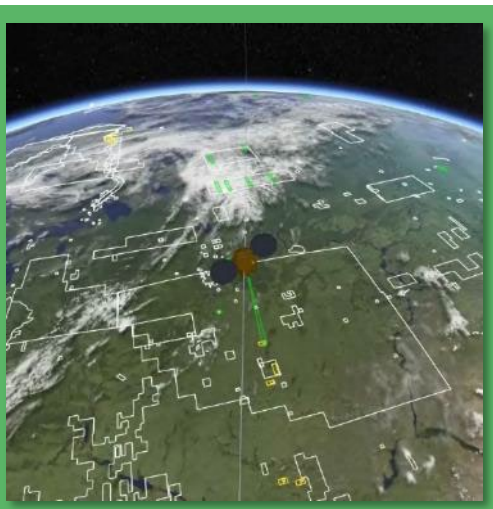
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PASQAL

SPACE MISSION OPTIMISATION

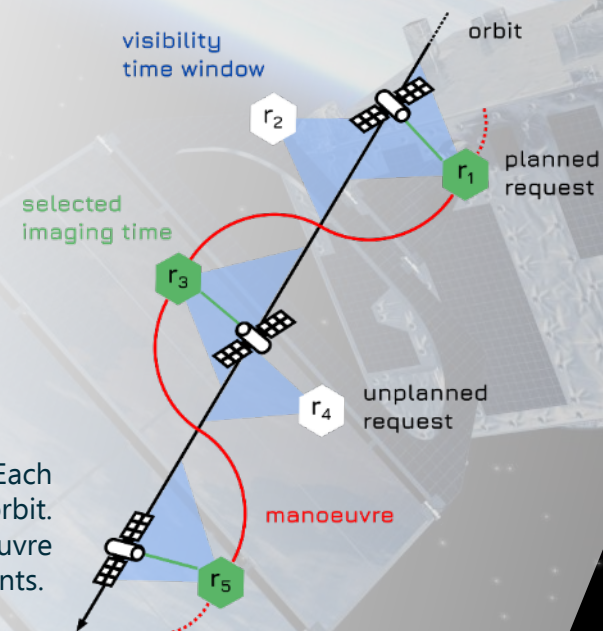
Space systems deliver **critical solutions for enterprises and governments**, such as telecommunication satellites, Earth observation instruments, deep space missions, etc.

However, **mission optimisation** involves solving enormously complex mathematical problems which are **hard to tackle using classical computing methods.**



Visualisation of mission plan depicting acquisition requests (white), planned acquisitions (yellow) and acquired observations (green).

Scheme of an Earth observation satellite mission. Each request is accessible during a limited portion of the orbit. Some requests cannot be fulfilled because of manoeuvre time constraints.



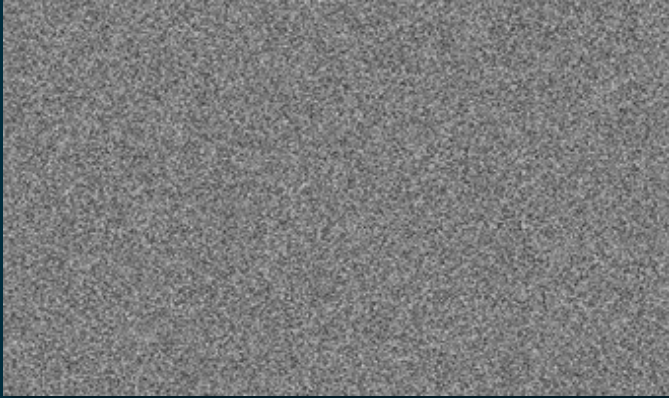
EQUALITY will develop **powerful optimisation methods for quantum computers**, potentially unlocking tens of billions of euros in value for the aerospace industries.

⟨EQUALITY⟩

SPACE DATA ANALYSIS

Earth-observation satellites provide essential information on agricultural lands, forest cover, and weather events, which are essential, for example, **to evaluate the present and future impact of climate change.**

SYNTHETIC-APERTURE
RADAR (SAR) RAW DATA



PROCESSED
DATA

Space data processing

Current trends, such as the use of satellite constellations and lower-cost (lower-resolution) imagery datasets **require more powerful post-processing techniques**, due to missing reference data, irregular sampling, and pseudo-periodic phenomena.

EQUALITY will investigate **quantum machine learning techniques for data analysis**, potentially unlocking tens of billions of euros in value for the aerospace industries.

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<EQUALITY>

Efficient QUantum
ALgorithms for IndusTrY

Join the
community!



equality-quantum.eu



[@equalityquantum](https://twitter.com/equalityquantum)



[company/equality-quantum](https://www.linkedin.com/company/equality-quantum)

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