



AWS RESEARCH ROADSHOW – 4 APRIL 2023

Accelerate Research Impact & Outcomes with AWS

AWS Education & Research Team

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What do research organizations ask for?



Research leadership

- Be top in their field
- Accelerate research
- Agility
- Collaboration
- Assurance: Security, compliance, governance, budgets

Researchers

- Flexibility
- Compatibility
- All levels of expertise
Simple to use and easy to learn
- Focus on science



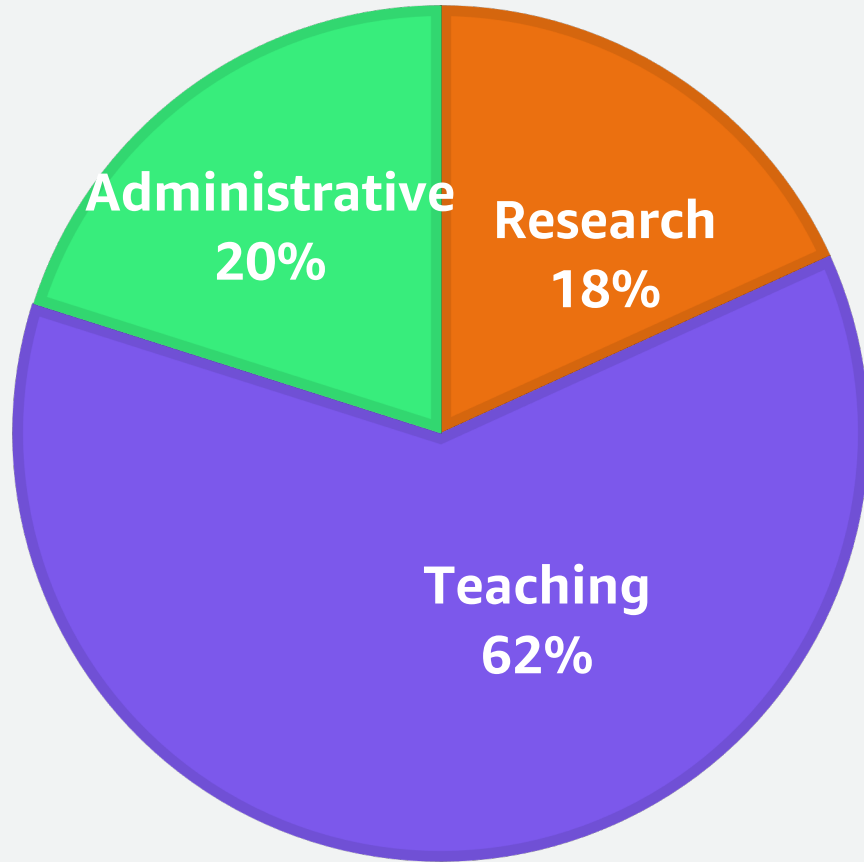
Research IT

- Simple and rapid deployments
- Reduce technical debt
- Monitoring and security
- Open source and open standards

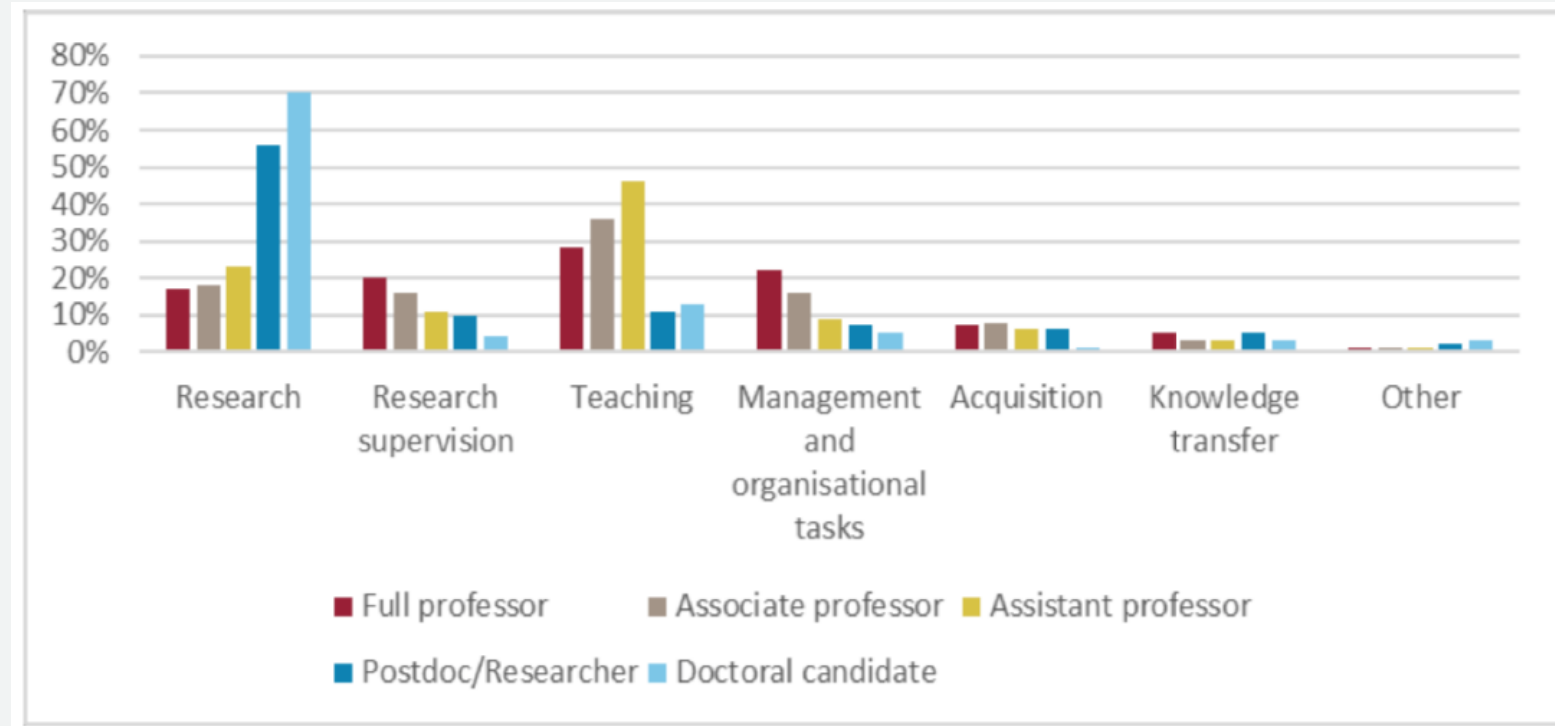


Time is a limiting factor for research

2004



2018

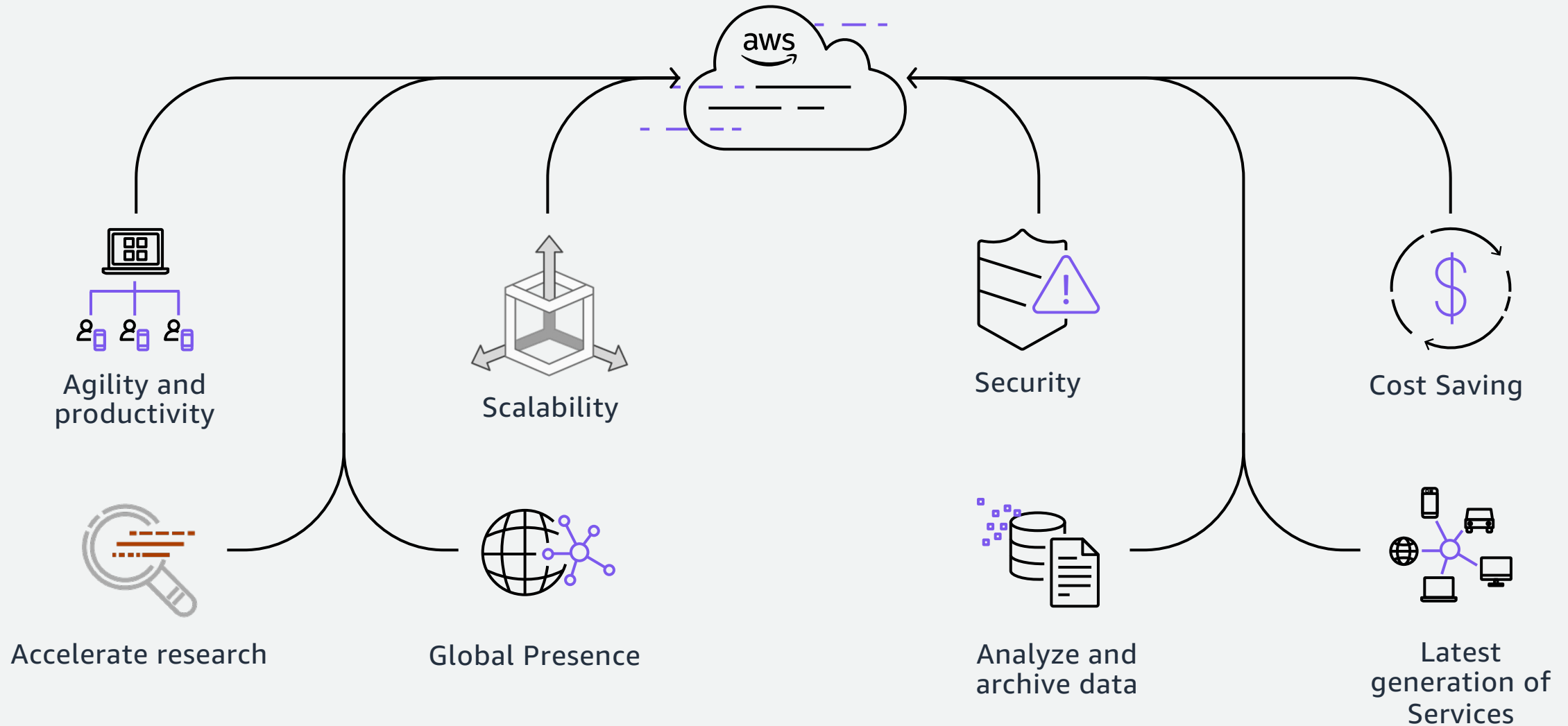


Source: 2004 National Study of Postsecondary Faculty

Koens, L., R. Hofman & J. de Jonge (2018). *What motivates researchers? Research excellence is still a priority*. The Hague: Rathenau Instituut



Why using AWS Cloud for Research and Education



It's about **science**, not
servers

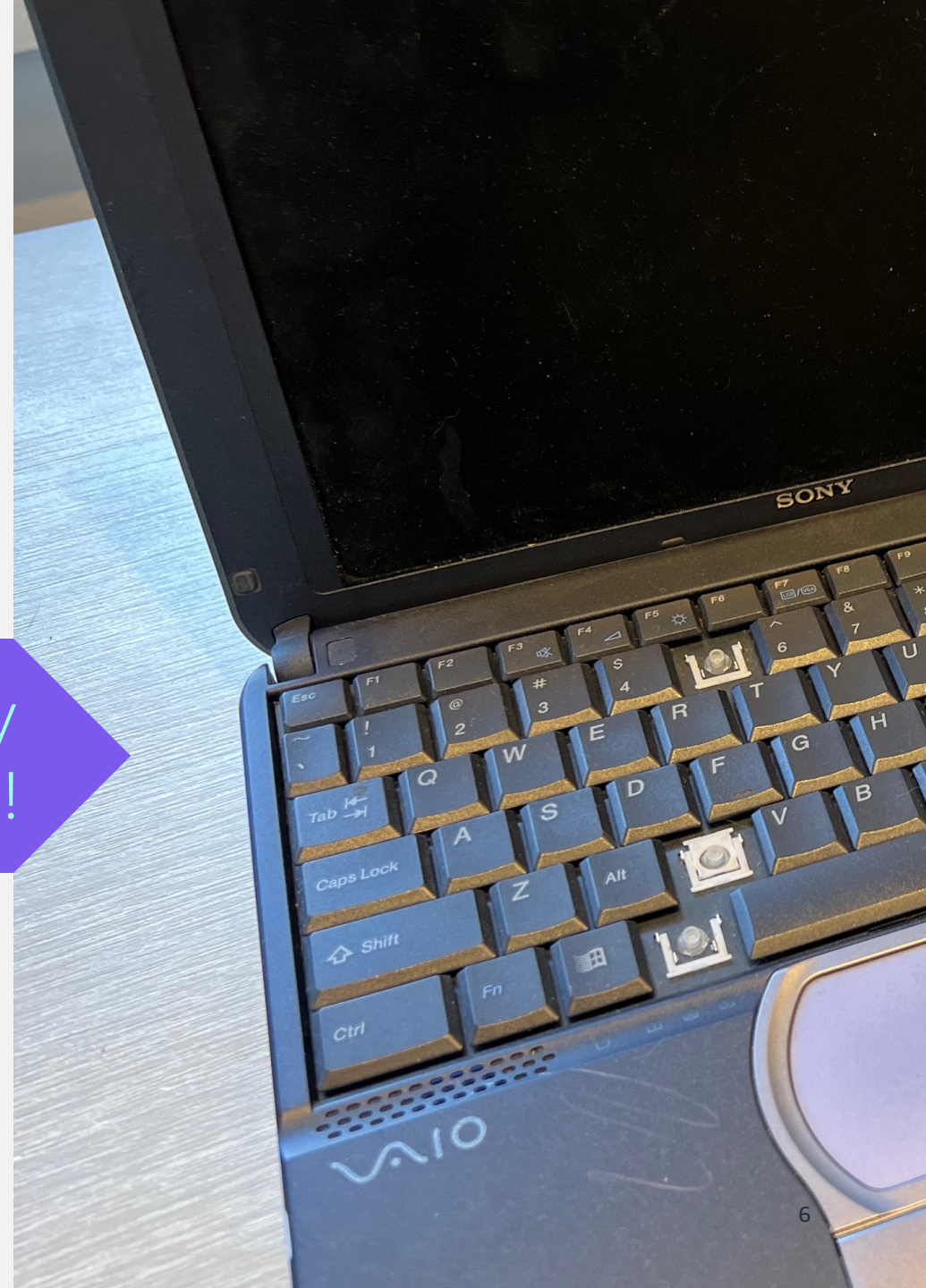


Research

Research lives on laptops...

- Papers & proposals written
- Data stored & visualized
- Analyses performed
- Collaboration platform

Increasingly
demanding!



Modern Research

Modern research needs...

- Compute: speed/cores/GPU
- Memory: limited problem size
- Time: long running/multiple analyses



More resources, when needed

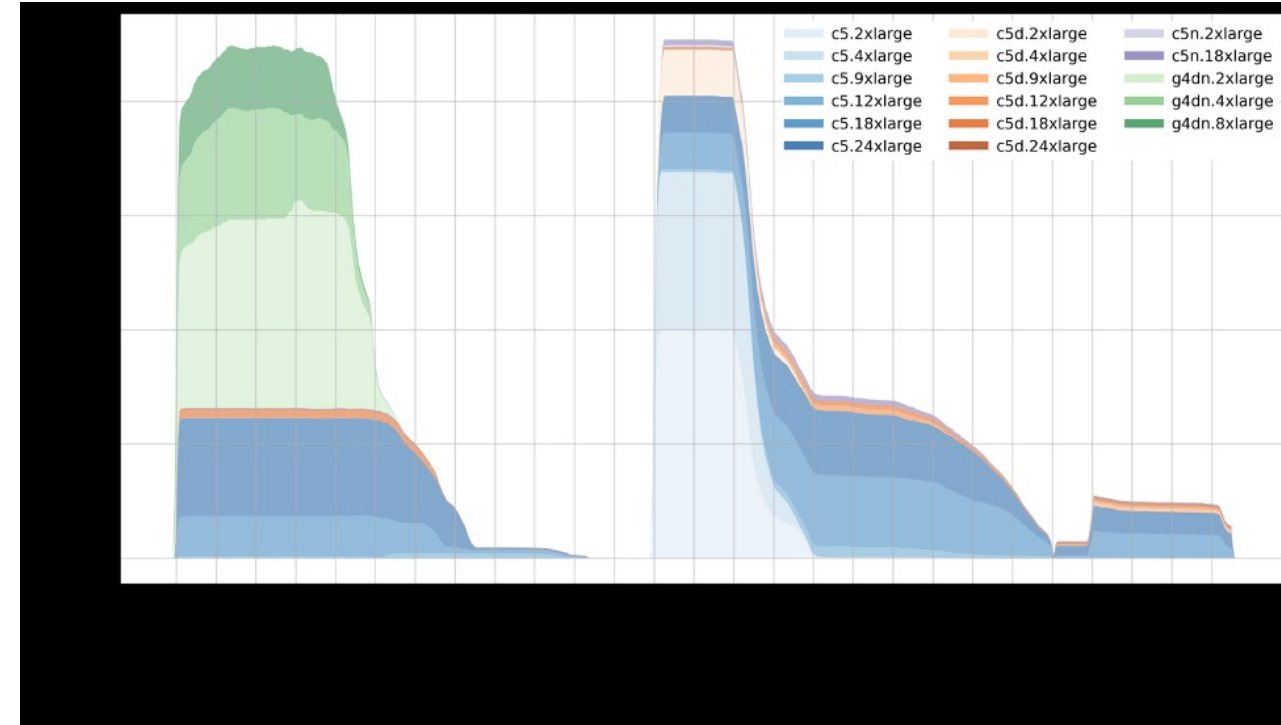


GROMACS: Max Planck Institute



MAX-PLANCK-INSTITUT
FÜR KOHLENFORSCHUNG

- **Challenge:** Computer aided drug design
- Molecular dynamics simulation, on both GPU and CPU instances
- Used compute across 6 AWS regions
- Optimising for time-to-result, but also studied optimising for price-performance
- **Almost instant access to necessary compute**, results ready the next morning



<https://aws.amazon.com/blogs/hpc/running-20k-simulations-in-3-days-with-aws-batch/>
<https://pubs.acs.org/doi/10.1021/acs.jcim.2c00044#>



Rapid access to new technologies



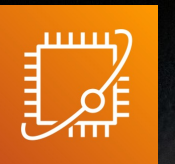
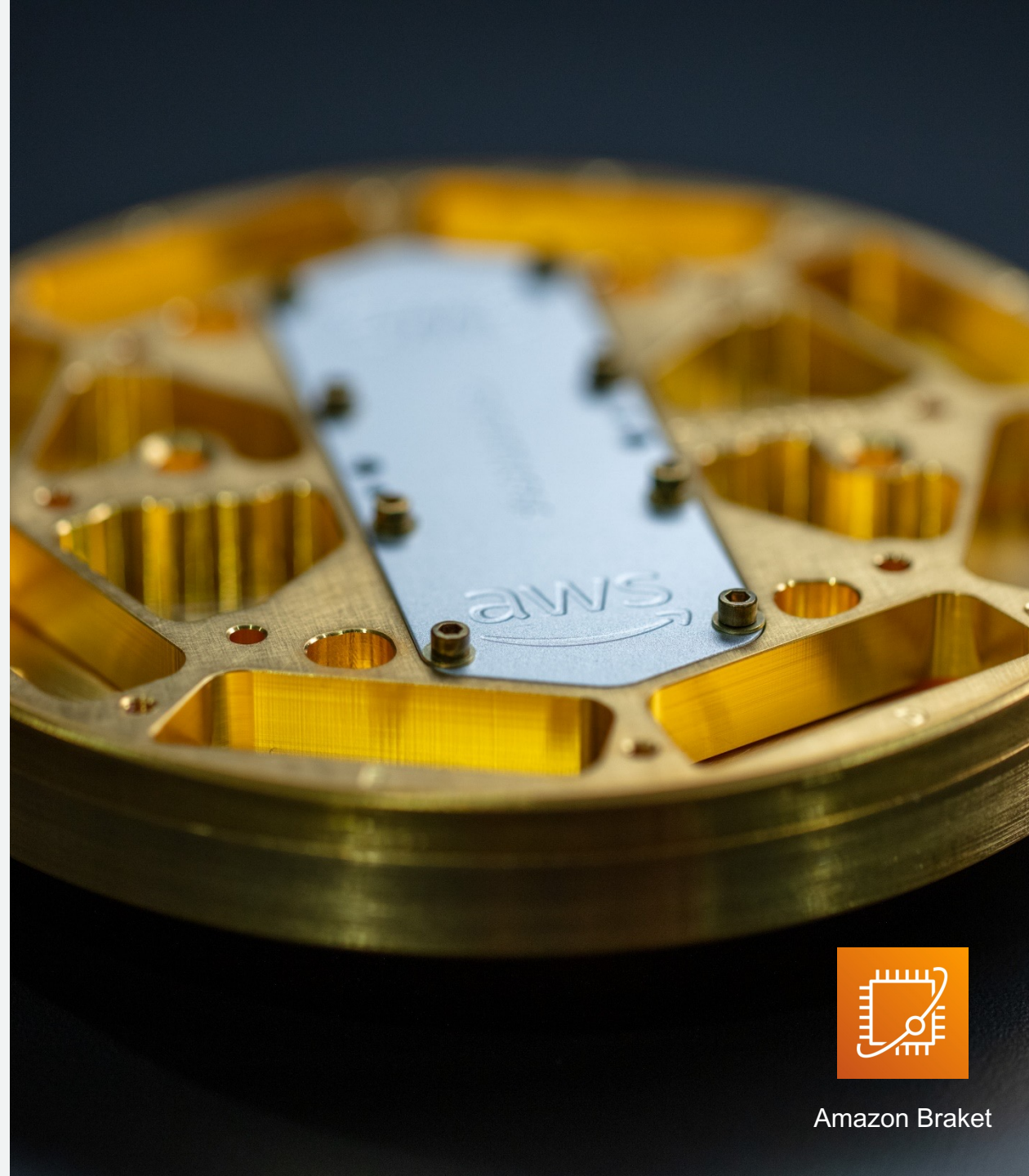
NATIONAL INSTITUTE OF NUCLEAR PHYSICS AND AWS WORK TOGETHER TO ACCELERATE QUANTUM COMPUTING RESEARCH

“We are pleased to partner with AWS in what is an important element of our global strategy in quantum computing research.”

Marco Pallavicini, executive board member of INFN.



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Amazon Braket



Agility and scalability



Stability



Reliability

University of Nicosia in Cyprus turns to the cloud to better serve its students



UNIVERSITY *of* NICOSIA

“ We initially migrated our web infrastructure. Then, when our university got very deep into distance learning, we set up our Learning Management System (LMS) on AWS.

Now, we can scale up and scale down depending on our needs. We don't need to replace the server, and we don't need additional staff for maintenance. Even with the cost of AWS, we are still saving

”

-Dmitry Apraksin, Chief Information Officer (CIO) of UNIC

<https://aws.amazon.com/blogs/publicsector/university-of-nicosia-in-cyprus-turns-to-the-cloud-to-better-serve-its-students/>

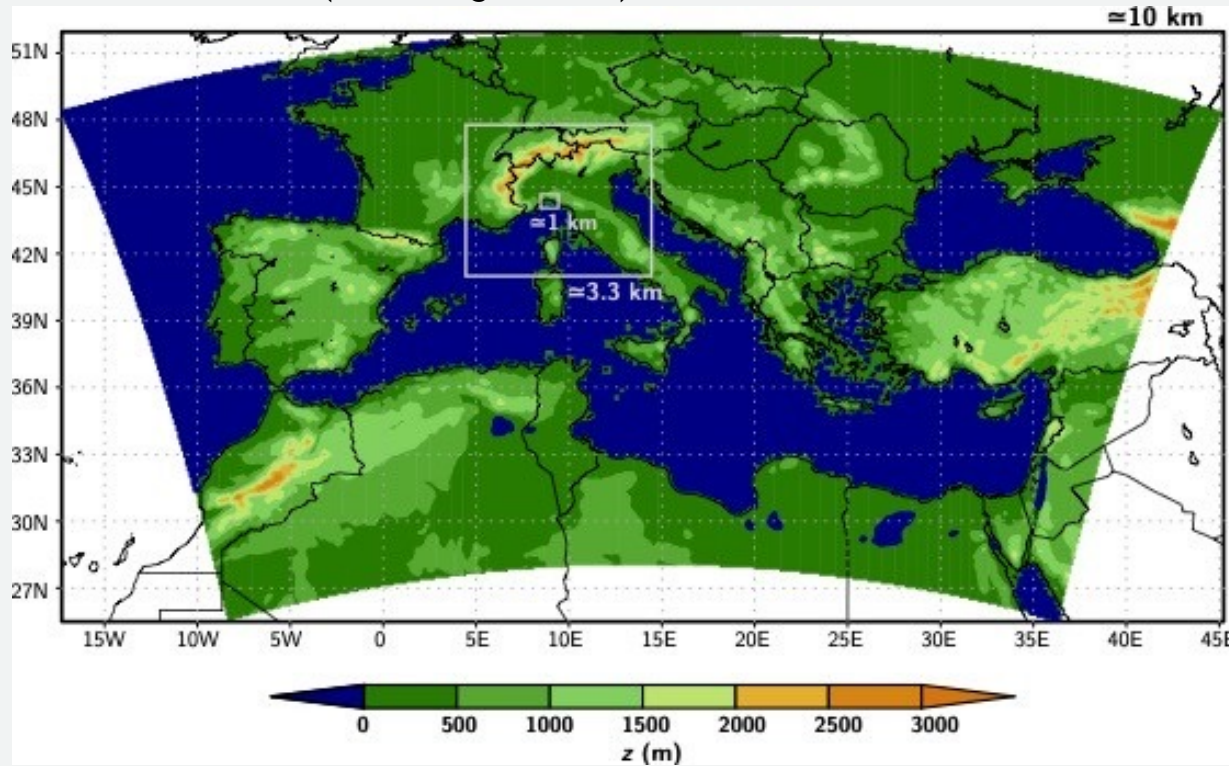


MeteOcean: Operational forecast

Daily 5-day hourly forecast running on C5.24XLarge machines

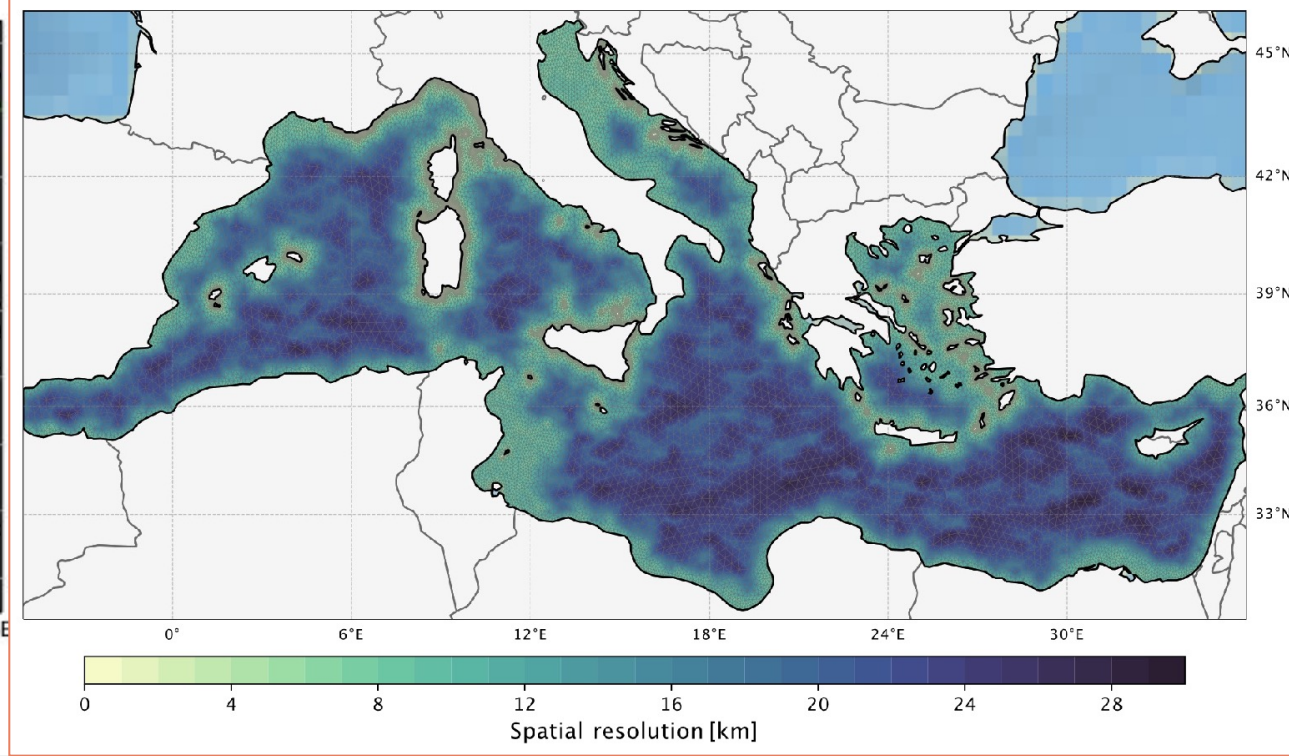
Atmosphere

35 vertical levels
3 nested domains with increasing resolution
→ 10 - 3.3 - 1.1 km (6.381.865 grid nodes)



Waves

Initialized from 10-m wind field Unstructured grid with increasing resolution
→ 20 km - 10 km - 500 m - 300 m (50960 grid nodes)



Sharing and collaborating



Data silos



Open Data, the FAIR data principles

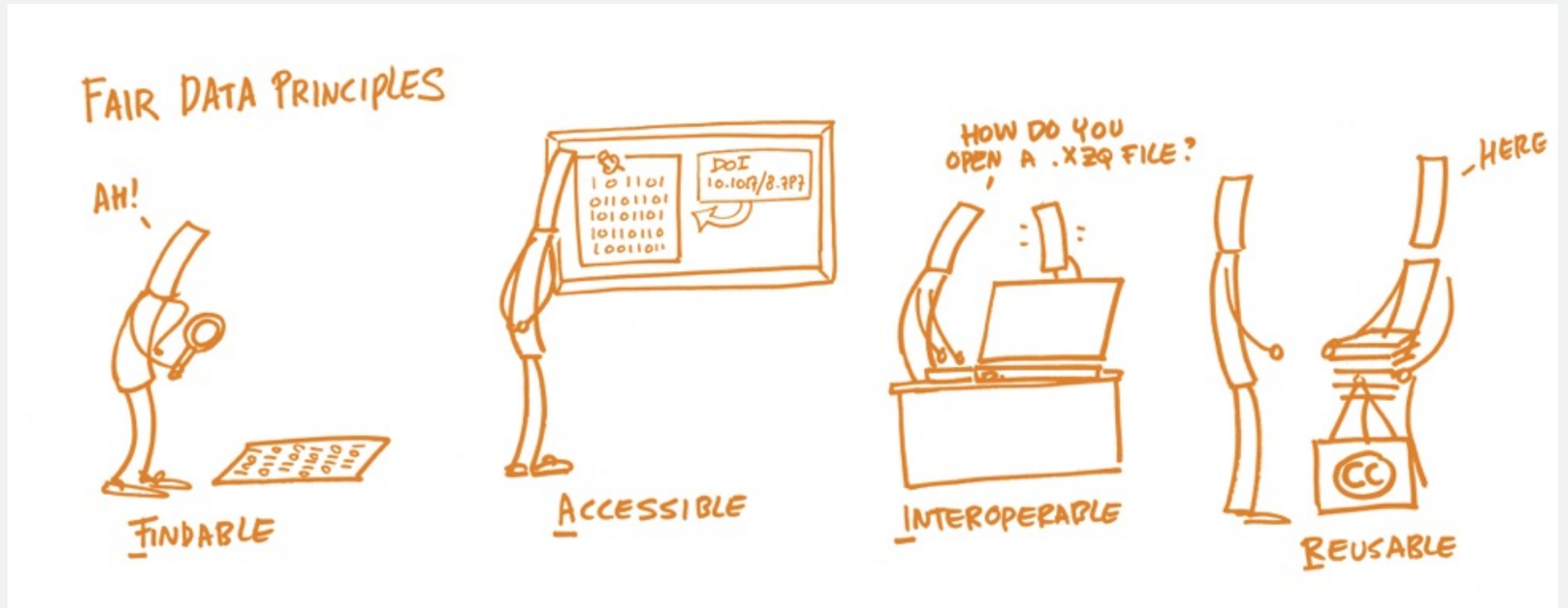
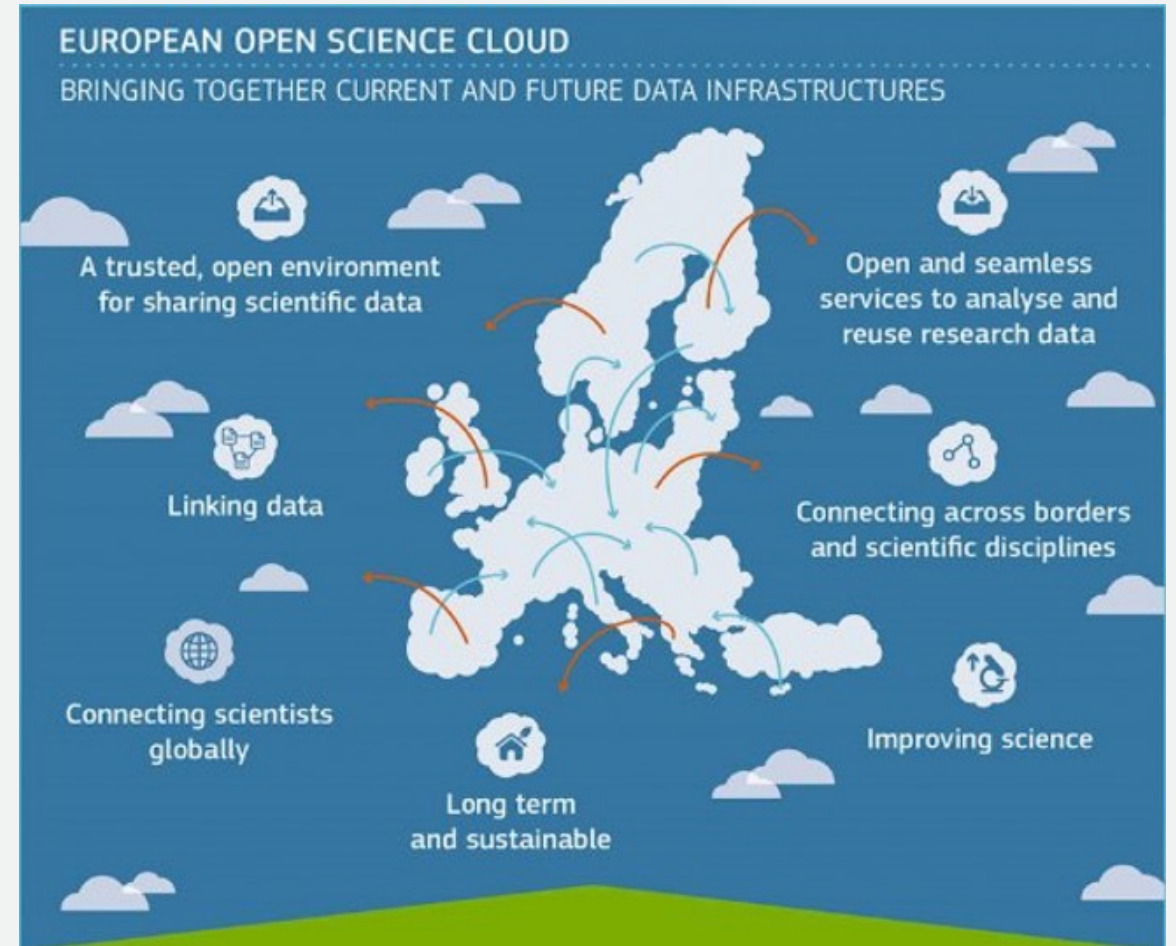
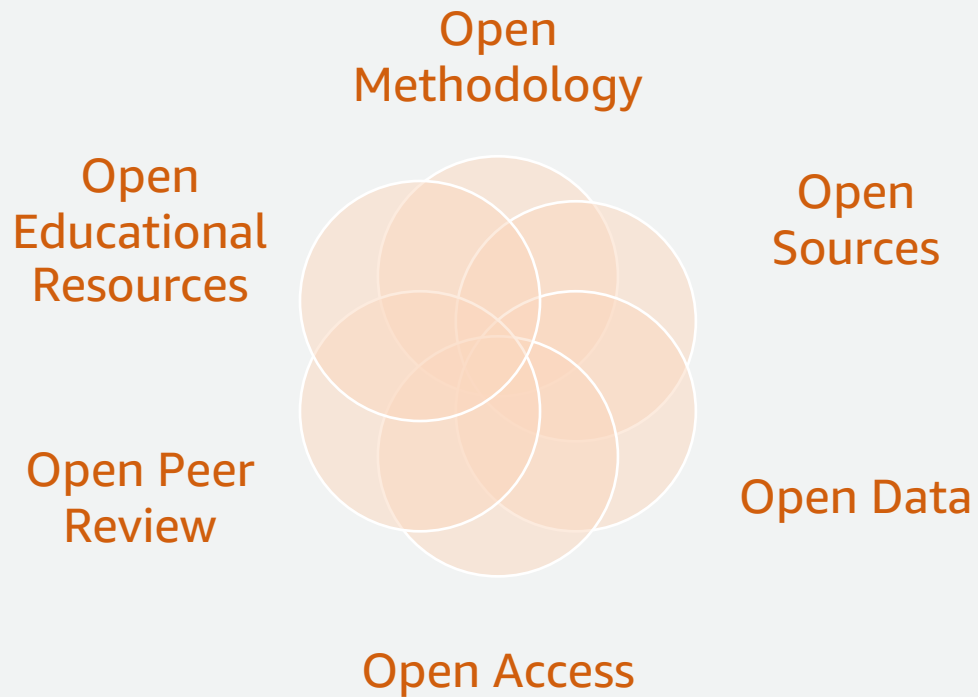


Image: <https://book.fosteropenscience.eu/>

Sharing becomes a reality

Open Science and EOSC



Accelerating international collaboration



189% increase in co-authored publications in the EU

European Parliament Research Service

Universities and nations cannot tackle global issues alone

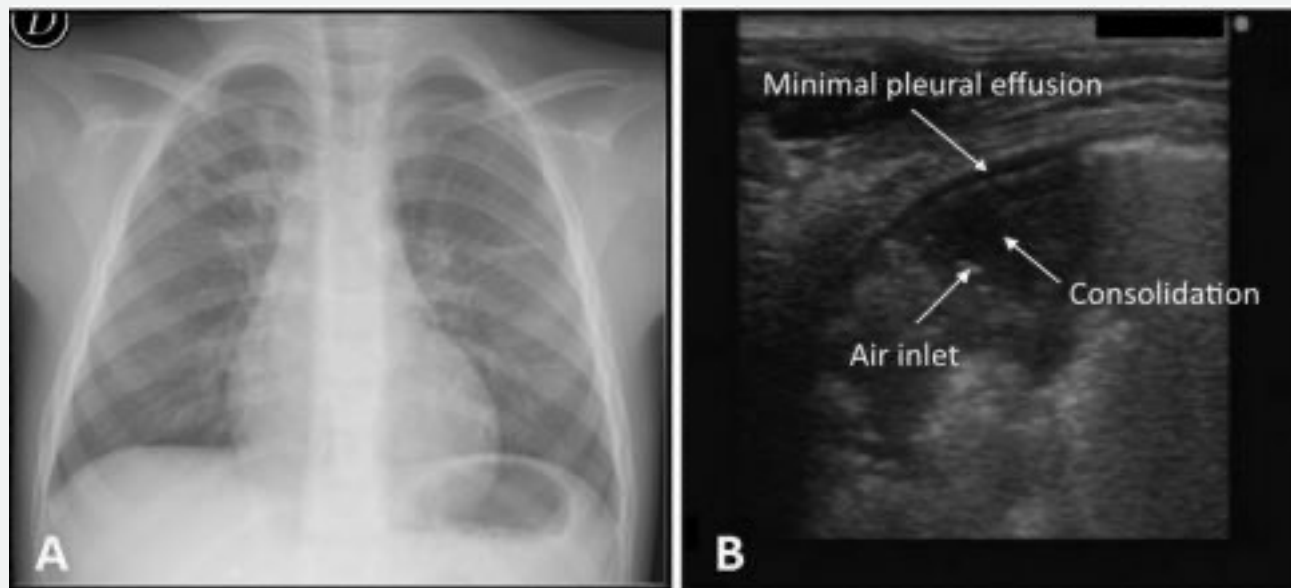
“Cloud computing is an essential part of modern research. A streamlined operating model for using cloud services will benefit all of our researchers”

Patrick Grant, Pro Vice-Chancellor for Research, University of Oxford

UniTrento - ICLUS

SOLUTION

University of Trento's Department of Information Engineering and Computer Science used AWS to run a International Project (<https://www.disi.unitn.it/iclus>) where AI algorithms were used to analyze ultrasound images of lungs to determine possible Covid infections.





Thank you!

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