

The European Commission's science and knowledge service

Joint Research Centre



AI drivers: the HPC, Data, Energy nexus

*AI/ML and **Big Data** technologies are two sides of the same coin*

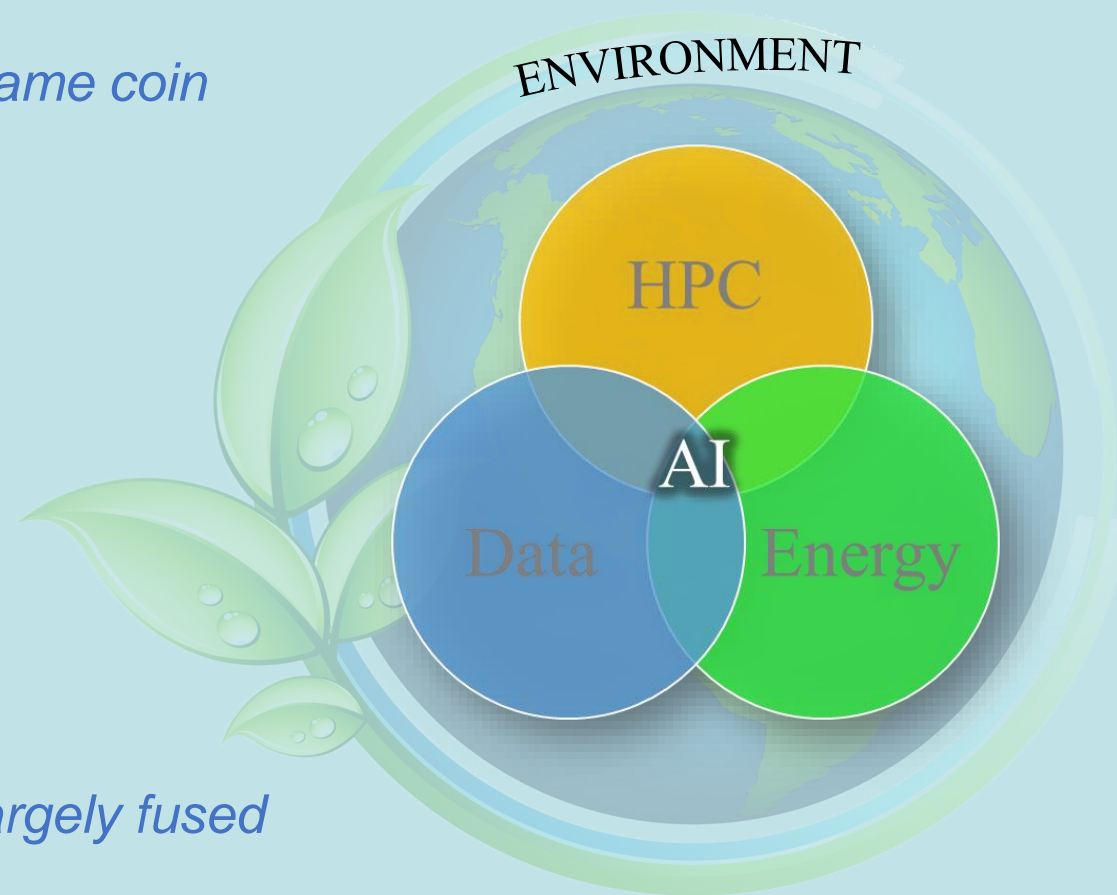


ENERGY

CYBERSECURITY

ETHICS

*In the next future, **HPC** and AI/ML technologies will be largely fused and users will not be able to distinguish them*



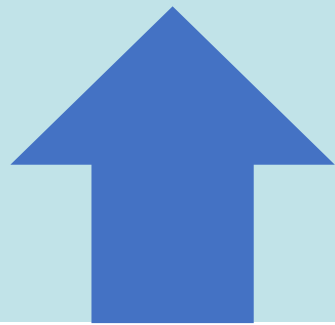
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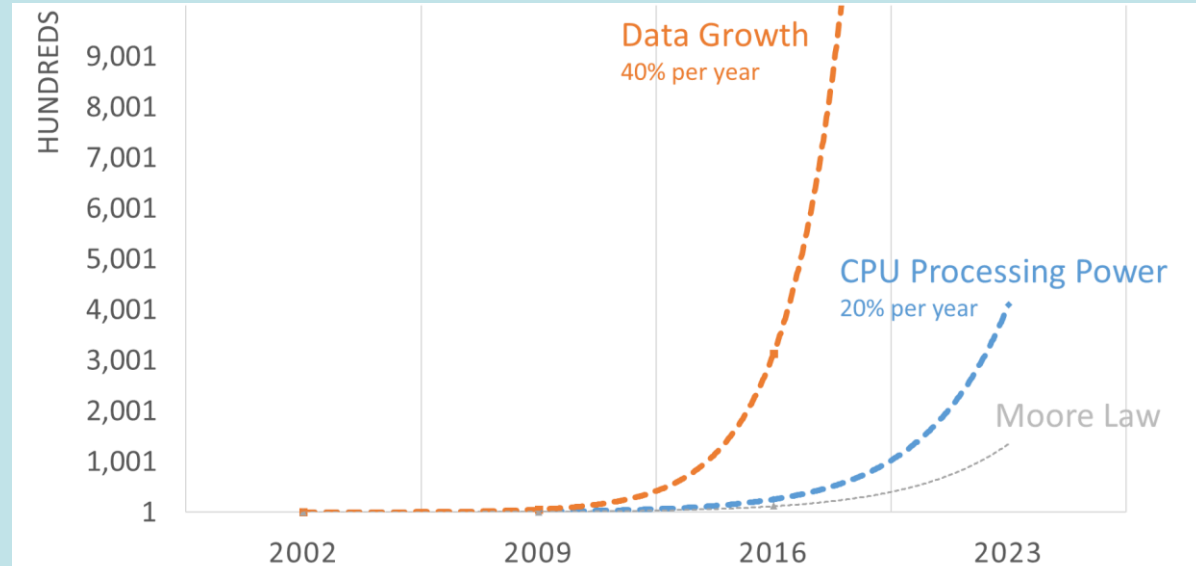
- After decades, CPU power growth is decelerating
- Limiting factors are energy consumption and transistors miniaturization



- the amount of data generated yearly is meaningfully accelerating



As a result, data growth will largely outpace foreseeable improvements in computational power –Energy?

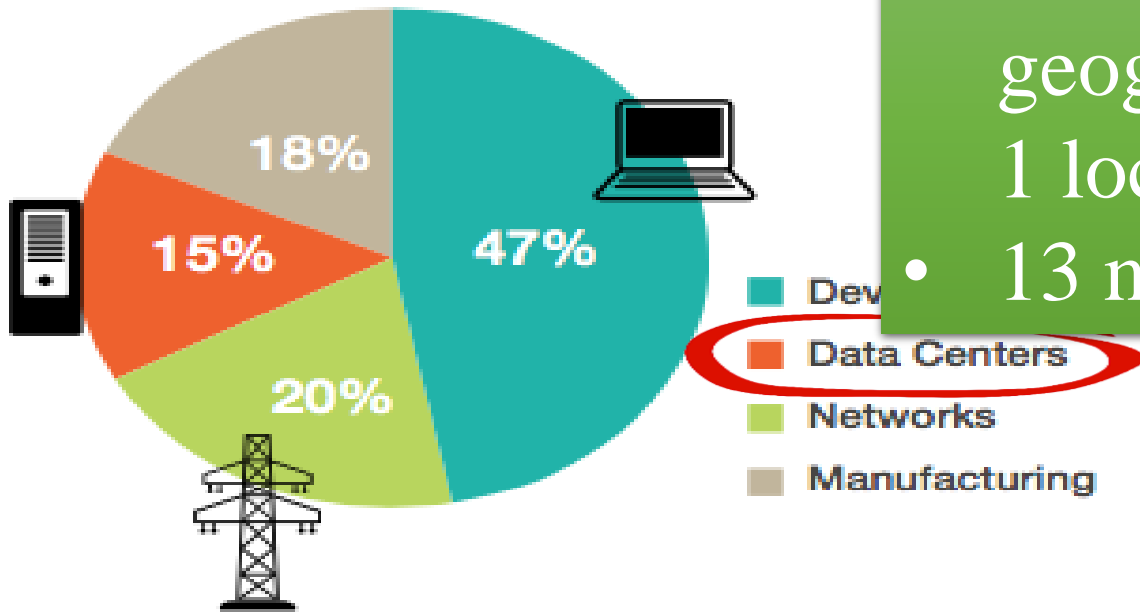


Energy consumption for ICT sector

An AWS zone infrastructure consumes between 100 and 160 MW power

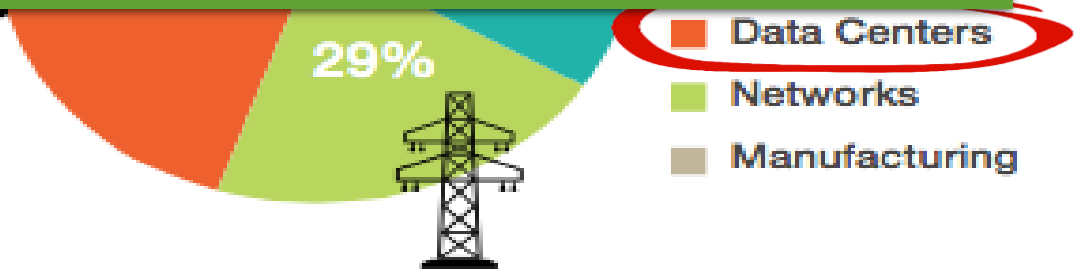
Main components of

2012



Main components of electricity consumption for the IT sector, 2012. From "Emerging Trends in Electricity Consumption for Consumer ICT"

- 69 Availability Zones (within 22 geographic regions around the world) + 1 local zone
- 13 more zones are planned



Main components of electricity consumption for the IT sector, 2017 estimate. From "Emerging Trends in Electricity Consumption for Consumer ICT"

Environmental footprint : a quick look

- In 2018, online video viewing generated more than **300 metric tons of carbon dioxide equivalent** (MtCO₂), **similar to Spain's footprint**.
The advent of 5G and IoT will (significantly) increase this numbers
- Digital technologies now emit **4%** of all Greenhouse Gas (**GHG**) globally, **more than civil aviation**
- By 2025, the projections consider an **8%** of all **GHG**, **the same as the current emissions from cars worldwide**

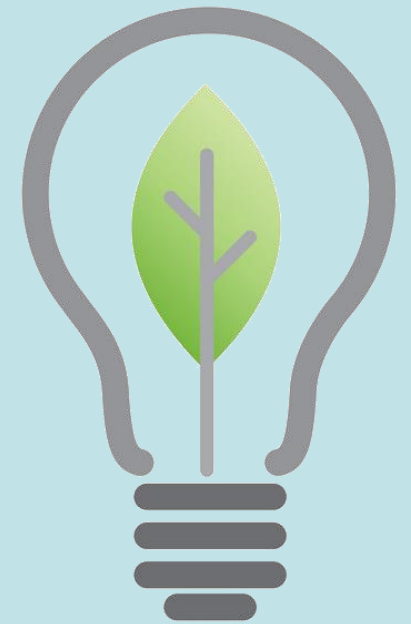


Possible study topics

Theme: Sustainability of hyper-connected Society and Datafication processes needed by AI

- **Interesting lines**

- Reduce the energy consumption of *processing units* and *servers*
- Reduce data movement energy consumption by *moving intelligence to the edge* of the network
- Ensure more *sustainable architecture for Big Data and Machine Learning applications*



thank you!



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