The current paradigm for technological progress

Scientific research

Technological development

Application and transformation

Governmental/private research programmes (e.g. EU FP7: 7a, 51 G€; H2020: 2014-2020 80 G€)

Applied and fundamental research

Innovation and commercial launch
Laboratories like CERN provide

- General
  - Founded 1954
  - 22 member states (2015)
  - Site: Meyrin at Geneva, CH
  - 2524 staff (2014)
  - 12503 visiting scientists
  - Budget 2015: 1027.7 M €

- Innovation Driver
  - Frontier Research
  - Particle detectors
  - Computer technology
  - WWW (-2), VR and WWG
  - Superconductivity
  - Antimatter ("Illuminati")
Big data is one of many disruptive technologies
Space is per se not disruptive – but a very powerful enabler
Earth observation showcases how space can benefit human society

contains modified Copernicus Sentinel data (2015–16) /CESBIO/ESA DUE GEO-Rice Innovator project
Can space help to bridge the “Digital Divide”?

The Digital Opportunity Index Worldwide, 2005

For more information about the Digital Opportunity Index, please see www.itu.int/doi.

This map is a part of the World Information Society Report 2006, available at www.itu.int/wisr.
In a global-interlinked industry scenario, Cybersecurity becomes a GLOBAL threat!
The digital age has made information widely available.

Global Information Storage Capacity in optimally compressed bytes

- **19 exabytes**
  - Paper, film, audiotape and vinyl: 6%
  - Analog videotapes (VHS, etc.): 94%
  - Portable media, flash drives: 2%
  - Portable hard disks: 2.4%
  - CDs and minidisks: 6.8%

- **280 exabytes**
  - Computer servers and mainframes: 8.0%
  - Digital tape: 11.8%
  - DVD/Blu-ray: 22.8%
  - PC hard disks: 44.5%
  - Others: < 1% (incl. chip cards, memory cards, floppy disks, mobile phones, PDAs, cameras/camcorders, videogames)

2007

% digital:
1% 3% 25% 94%

Quantum Cryptography: a tool for ultimate secure transmission?

QUESS – the Quantum Space Satellite of 500 kg mass, located at an altitude of 1000 km – is a Chinese-European Collaboration to showcase the feasibility of Quantum Key Distribution as of summer 2016.
Will Big Data enable us to build a computer with AI?

- **AI ↔ Dartmouth College, 1956**
  - Four types of intelligence: Visual / Verbal / Physical / Rational (Expert systems)
  - Strong AI: Creation of an intelligence
  - Weak AI: Simulation of intelligent behaviour
The 3 classical natural sciences form the basis for progress...

Physics

Energy

Information

Biotechnology

Chemistry

Biology

The 3 classical natural sciences form the basis for progress...
... and for a landscape of emerging risks