



# e-Infrastructures in Horizon 2020



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European  
Commission



## DEVELOPMENT AND DEPLOYMENT OF E-INFRASTRUCTURES AND SERVICES FOR ON-LINE RESEARCH

Jason de Caires Taylor,  
underwater statue, Cancun Mexico  
<http://www.underwatersculpture.com/>





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# Vision

- ACHIEVING DIGITAL ERA
- BRIDGE DIGITAL DIVIDES
- EVERY RESEARCHER DIGITAL







# Approach

## **Transversal**

**Cutting across disciplines and sectors**

## **Support tomorrow's science**

**Open science, open access, best solutions**

## **Enabling innovation**

**Developing and testing innovative solutions**

**Servicing industry and SMEs**

**Spinning out technologies**

# **DRIVERS for change**

- **MORE COMPUTING POWER**
- **BIG DATA**
- **GLOBAL CONNECTIONS**
- **GLOBAL PARTICIPATION**
- **OPEN IS BETTER**
- **WITHIN AND BETWEEN  
SCIENTIFIC COMMUNITIES**
- **BETWEEN SCIENCE AND SOCIETY**



## ***Policy Background (1/3): Research Data become an infrastructure for modern science***

### **Europe is “Riding the Wave” Report**

- Data e-infrastructure that supports seamless access, use, re-use and trust of data
- Physical and technical infrastructure become invisible and the **data becomes the infrastructure**

### **Commission Communication on Scientific Information** COM(2012)401

- Access, preservation and e-infrastructure (publications and data)

### **ERA Communication** COM(2012)392

- Federation of researcher electronic identities



Riding the Wave  
High Level Expert Group on Scientific  
Data, October 2010

<http://cordis.europa.eu/fp7/ict/e-infrastructure/docs/hlg-sdi-report.pdf>





## ***Policy Background 2: European HPC Strategy –integrated approach in H2020***

- **Basis:** Commission Communication "High-Performance Computing: Europe's place in a Global Race" (2012)
- **Vision:** to ensure European leadership in the supply and use of HPC systems and services by 2020 in a strategy combining:
  - (a) developing the next generation of HPC towards exascale;
  - (b) providing access to the best HPC infrastructure for both industry and academia;
  - (c) achieving excellence in computing applications - existing or new – driven by the needs of science, industry and SMEs

**Linking demand and supply** – in the spirit of Horizon 2020

**Contractual Public-Private Partnership (cPPP)** covering (a) and part of (c)





## ***Policy Background (3/3):* GÉANT Expert Group Report**

### **World Class Connectivity and Services to Knowledge Communities**

- Support ***Growth and Opening up***
- Help to close ***digital divides***
- Europe as global ***hub***
- Stimulate ***innovation***

### **Reorganize for 2020**

- ***Flexibility*** in Technology and Architecture
- ***Experimentation*** and ***standardisation***
- Improve ***Governance***
- Step up ***Funding***
- Update the ***Regulatory*** Regime





## FET

Human Brain Project,...

## LEIT

Big Data in ICT  
Manufacturing PPP  
Internet of Things...

## Societal Challenges

### SC1

Research on  
Alzheimer

### SC2...

### SC3

Earth observation

SC4, SC5, ...

### e-Infrastructure to support:

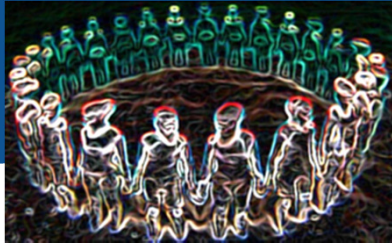
- Research under Horizon 2020
- Open Access policy
- Open Data pilot
- Data Management Planning
- ...

**e-Infrastructure  
integrates resources  
and services...**

**Networking  
Computing  
Data  
Software  
User interfaces**



**e-Infrastructures**



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## INTEGRATED e-INFRASTRUCTURE SERVICES

### VRE

E-INFRASTRUCTURES FOR  
VIRTUAL RESEARCH  
ENVIRONMENTS (VRE)

PROVISION OF  
CORE SERVICES  
ACROSS  
E-INFRASTRUCTURES

### DATA

### COMPUTING

NETWORK OF  
HPC COMPETENCE  
CENTRES FOR SMES

MANAGING, PRESERVING  
AND COMPUTING WITH  
BIG RESEARCH DATA

RESEARCH AND  
EDUCATION  
NETWORKING –  
GEANT

CENTRES  
OF EXCELLENCE  
FOR COMPUTING  
APPLICATIONS

E-INFRASTRUCTURES  
FOR OPEN ACCESS

### CONNECTIVITY

PAN-EUROPEAN  
HIGH PERFORMANCE COMPUTING  
INFRASTRUCTURE AND SERVICES

TOWARDS GLOBAL DATA  
E-INFRASTRUCTURES  
RESEARCH DATA ALLIANCE

### SUPPORT

E-INFRASTRUCTURE  
POLICY DEVELOPMENT AND  
INTERNATIONAL  
COOPERATION

NEW PROFESSIONS  
AND SKILLS  
FOR E-INFRASTRUCTURES



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# INTEGRATED e-INFRASTRUCTURE SERVICES

across...

Industry sectors

Disciplines

Societal challenges

Automotive

Oil and gas

Pharmaceuticals

Smart cities

Health

Climate change

Physics

Social sciences

... ..





## 1. Managing, preserving and computing with big research data

MANAGING, PRESERVING  
AND COMPUTING WITH  
BIG RESEARCH DATA

- Federated pan-European infrastructure for data management
  - **Access, replication, annotation, search compute, analysis, preservation**
- Services for quality and reliability
  - **including certification mechanisms and services**
- Federating data management and curation tools
- Large scale virtualisation of data/compute centre resources
- *Standards-based open platform for scientific computing*
- *Support the evolution of the European Grid Infrastructure*
- *Proof of concept and prototypes of enabling software*
- *Enabling aggregation of content for textual analysis*



## 2. e-Infrastructure for Open Access

Robust e-infrastructure supporting Open Access policies in Europe, providing reliable and permanent access to digital scientific records

E-INFRASTRUCTURES  
FOR OPEN ACCESS

## 3. Towards global data e-infrastructures

Consolidating Europe's contribution to the Research Data Alliance (RDA) and ensuring that RDA serves to foster research data interoperability at global level

TOWARDS GLOBAL DATA  
E-INFRASTRUCTURES  
RESEARCH DATA ALLIANCE



PAN-EUROPEAN  
HIGH PERFORMANCE COMPUTING  
INFRASTRUCTURE AND SERVICES

#### **4. Pan-European High Performance Computing (HPC) infrastructure and services**

- *Pool and rationalise Tier-0 resources to offer state-of-the-art services to both industry and academia*

#### **5. Centres of Excellence for computing applications**

- *Computational science enabling discovery and innovation*
- *Focus on scientific, industrial or societal challenges; new or emerging applications*
- *Integrated, multidisciplinary, user-driven and distributed*

CENTRES OF  
EXCELLENCE  
FOR COMPUTING  
APPLICATIONS

#### **6. Network of HPC Competence Centres for SMEs**

- *Exchange best practice and promote services for SMEs*

NETWORK OF  
HPC COMPETENCE  
CENTRES FOR SMEs

*HPC for SMEs also addressed in LEIT*







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PROVISION OF  
CORE SERVICES  
ACROSS  
E-INFRASTRUCTURES

## 7. Provision of core services across e-Infrastructures

### Harmonise and/or deploy core infrastructure services:

- Development and promotion of the uptake of a **Digital Identifier** e-infrastructure **for digital objects** (articles, datasets, collections, software, nomenclature, etc) **and authors**;
- Deployment and promotion of a pan-European **identity federation** for researchers, educators and students
  - **Implementing an ERA Communication action**

NB! *Core services: those needed across a broad range of communities and e-infrastructures and ensure their interoperation*



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RESEARCH AND  
EDUCATION  
NETWORKING –  
GEANT

## **8. Research and Education Networking – GÉANT**

**Towards realising the 2020 vision of GÉANT as the European « communication commons »**

- **from connectivity to advanced services e.g. in mobility and content access for users anywhere in the EU**
- **intercontinental connectivity making Europe a global hub**
- **innovate in technologies and services; e.g. testing innovative solutions with industry**
- **adapting governance, aligning policy and ensuring availability of skills**

**Longer term commitment through a Framework Partnership Agreement**

## 9. New professions and skills for e-infrastructures

Establishment of and support for emerging professions such as

- **e-Infrastructure operators**
- **Research technologists**
- **Data scientists/librarians**

Through development of

- **University curricula** – definition, updating and adoption
- **Training programmes** – lifelong learning
- **Reference model / alternative means for recognition** – establishment as distinct professions
- **Networking** and information sharing amongst professionals
- **Awareness raising** – promotion of champions, advocate new skills' needs





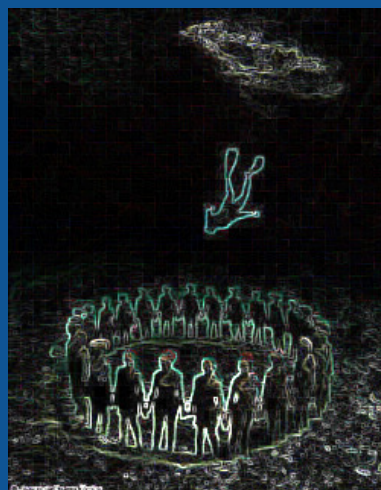
## Putting emphasis on:

- *Thinking innovation*
  - With both suppliers or users
- *Mainstreaming skills development*
- *Integration between data and computing*
- *Business plans for financial sustainability*
  - ...and partnerships with the private sector
- *Open data and software*
- *Sharing basic operations services and building blocks*
- *Monitoring performance (KPIs)*





# THANK YOU



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