Argomenti di interesse in campo ICT in H2020

Dott. Mauro Morandin (INFN-Padova)

ICT in H2020 - prime calls

H2020: 70.2 B€(2011) (FP7: 53 B€)

- Excellent Science (24,5 B€)
- Industrial leadership (17 B€)
- Societal Challenges (31 B€)

Excellent Science

European Research Council (ERC) Frontier research by the best individual teams	**13 095**
Future and Emerging Technologies Collaborative research to open new fields of innovation	**2 696**
Marie Skłodowska-Curie actions (MSCA) Opportunities for training and career development	**6 162**
Research infrastructures *(including e-infrastructure)* Ensuring access to world-class facilities	**2 488**

di sicuro interesse

di possibile interesse

ERC / Marie Curie

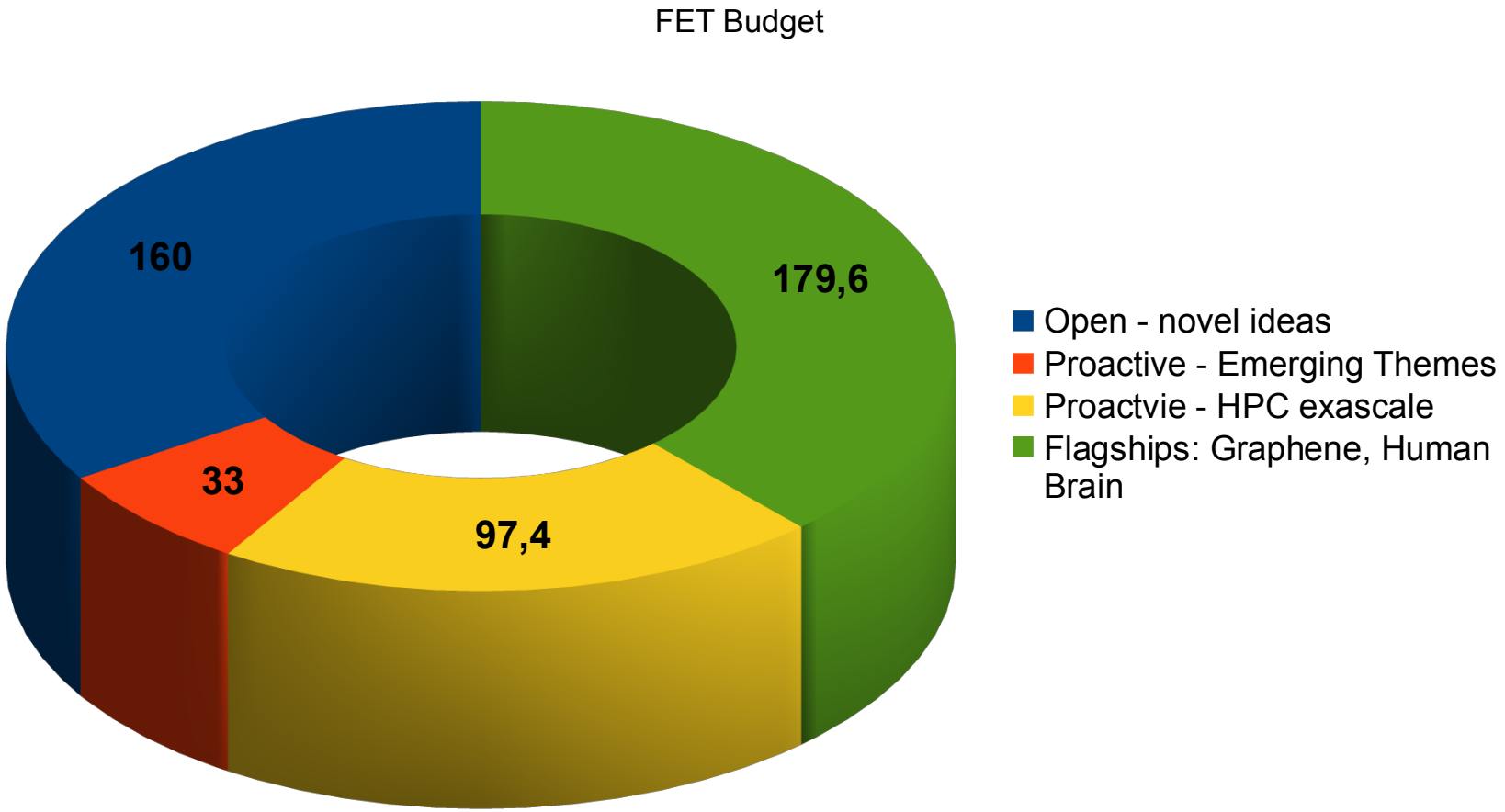
- ERC / Marie Curie
  - probabilmente non molto sfruttata in passato per supportare attività di ricerca dell'INFN in campo ICT
    - ✗ gli sviluppi ICT funzionali alle nostre attività scientifiche hanno spesso poco appeal perché non inquadrabili facilmente nelle linee di ricerca accademiche ICT, che spesso sono di carattere teorico e orientate a tematiche di maggiore impatto globale
      - problema che si ritrova anche al momento di pubblicare i lavori
  - ma si possono integrare gli aspetti di sviluppo legati all'ICT nell'ambito di progetti di ricerca legati all'attività sperimentale e teorica dell'INFN

Future and Emerging Technologies, FET: first calls

- Total budget: 470 M€
  - ~ 17,4 % del totale H2020

- Call **FET-Open** - novel ideas (160 M€)
- Call **FET Proactive** - emerging themes and communities (33 M€)
- Call **FET-Proactive** - towards exascale high performance computing (97,4 M€)
- Call **FET-Flagships** - tackling grand interdisciplinary science and technology challenges (179,6 M€)
  - Graphene (89 M€)
  - Human Brain (89 M€)

FET prime calls 2014-2015



FET-Open prime calls

	Action	*Pub. date*	*2014*		*2015*			
			Deadline	*[M€]*	*Deadline*	*[M€]*	*Deadline*	*[M€]*
Call FET-Open –novel ideas		**11/12/13**						
FETOPEN 1: FET-Open research projects	**RIA**		**30/09/14**	**77**	**31/03/15**	**37**	**29/09/15**	**40**
FETOPEN 2: Coordination and Support Activities 2014	**CSA**		**30/09/14**	**3**				
FETOPEN 3: Coordination and Support Activities 2015	**CSA**				**31/03/15**	**1,5**	**29/09/15**	**1,5**

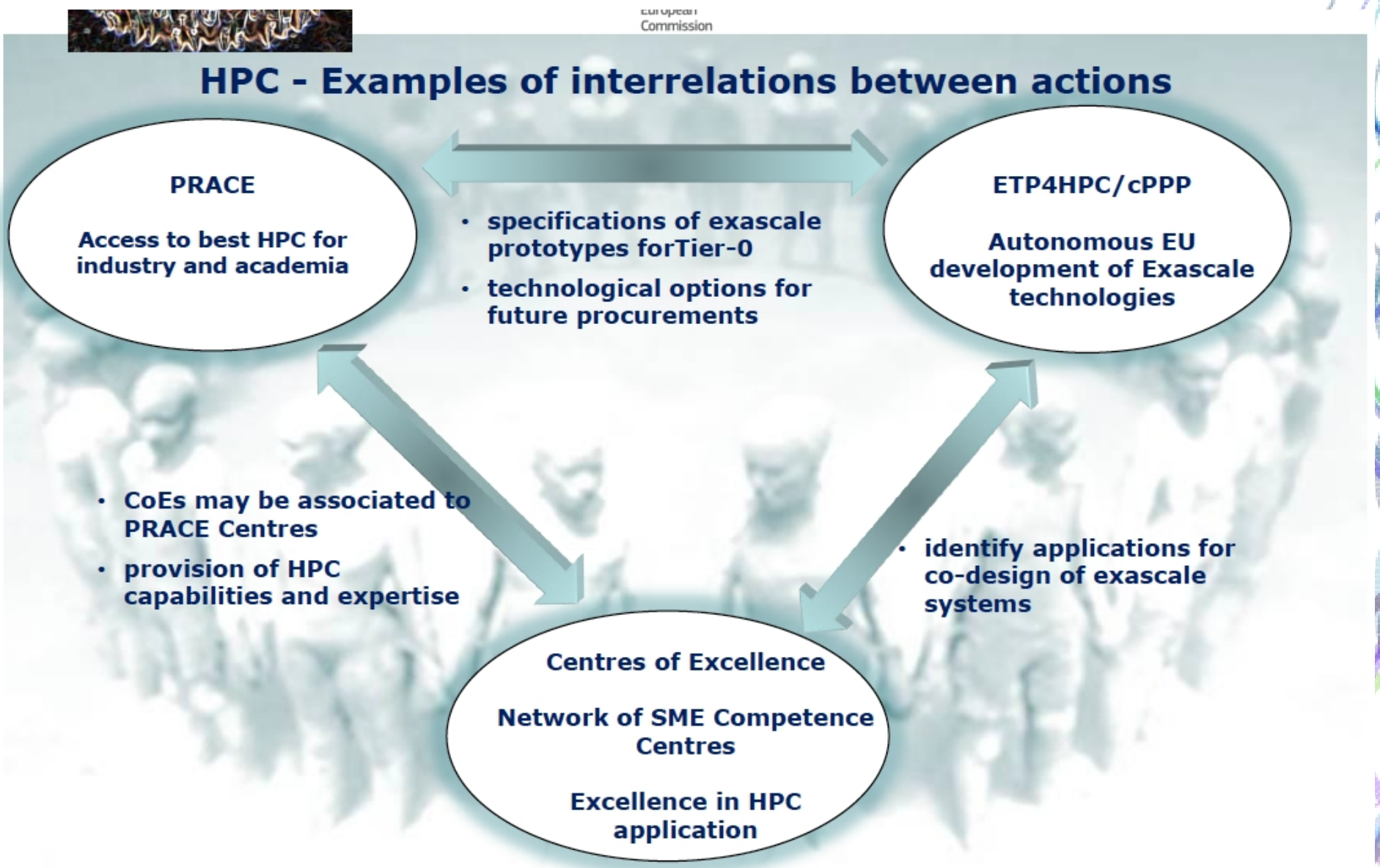
FET - emerging themes and communities

	Action	*Pub. date*	*2014*		*2015*			
			Deadline	*[M€]*	*Deadline*	*[M€]*	*Deadline*	*[M€]*
Call FET Proactive –emerging themes and communities		**11/12/13**						
FETPROACT 1 - 2014: Global Systems Science (GSS)	**RIA**		**01/04/14**	**10**				
FETPROACT 2 - 2014: Knowing, doing, being: cognition beyond problem solving	**RIA**		**01/04/14**	**15**				
FETPROACT 3- 2014: Quantum Simulation			**01/04/14**	**8**	**?**	**2**		

FETHPC

	Action	Pub. date	2014 Deadline	2014 [M€]	2015 Deadline	2015 [M€]
Call FET-Proactive - towards exascale high performance computing		**11/12/13**				
FETHPC 1 - 2014: HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications	**RIA**		**25/11/14**	**93,4**		
a) HPC core technologies and architectures				**> 65,4**		
b) Programming methodologies, environments, language and tools						
c) APIs and system software for Future Extreme Scale Systems						
d) New mathematical and algorithmic approaches						
FETHPC 2 - 2014: HPC Ecosystem Development	**CSA**		**25/11/14**	**4**		
Coordination of the HPC strategy						
Excellence in High Performance Computer Systems						

HPC


European Commission
HPC - Examples of interrelations between actions
PRACE
Access to best HPC for industry and academia
ETP4HPC/cPPP
Autonomous EU development of Exascale technologies
• specifications of exascale prototypes forTier-0
• technological options for future procurements
• CoEs may be associated to PRACE Centres
• provision of HPC capabilities and expertise
• identify applications for co-design of exascale systems
Centres of Excellence
Network of SME Competence Centres
Excellence in HPC application

Che cos'è HPC ?

- HPC per IDC (gruppo leader mondiale per ricerche di mercato e consulenza nel settore ICT)
  - IDC uses these terms to cover **all technical servers** used by scientists, engineers, financial analysts and others.
    HPC covers all servers that are used for **highly computational** or **data intensive** tasks
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, etc. “High-Performance Computing: Europe's place in a Global Race”:
  - ... HPC ... as a synonym for **high-end computing, supercomputing, world-class computing**, etc., to differentiate it from **distributed computing, cloud computing and compute servers**.
  - ... It’s usual to consider a computer to be high performance if it uses **multiple processors** (tens, hundreds or even thousands) connected together by a network to achieve the performance well above that of a single processor.

Applicazioni HPC oggi

- 2013 **IDC worldwide study of HPC end-user sites**:
  - solo il **36%** applicazioni gira su un più di un nodo di calcolo
    - 13% su un singolo core
  - **5.2%** usa più di 1000 core
  - **0.9%** scala a più di 10.000 core

Infrastructures: prime calls

- 583 M€ (23% del totale H2020)
  - Call - Developing new world-class research infrastructures:169 M€
  - Call - Integrating and opening research infrastructures of European interest: 140 M€
  - Call - e-Infrastructures: 177 M€ (~ 21%)
  - Call - Support to Innovation, Human resources, Policy and International cooperation: 38.5 M€

E-infrastructure (I)

- EINFRA-1-2014 **Managing, preserving and computing with big research data** (55 M€, RIA, deadline: 2/9/2014)
  - action 1-3: E-infrastructure for distributed data management and long term preservation, resilience, service continuity, tool federation
  - action 4-5: large scale data/compute virtualization of centers, E-infrastructure independent computing platform federating commercial/public cloud services via PaaS for scientific users
  - action 6: Evoluzione di EGI, federating resources of any kind (grid, cloud, etc.), computing and storage service to the whole European scientific communites (max. 8 M€)
  - action 7: databases and data-mining
  - action 8: scientific literature text mining

E-infrastructure (II)

- EINFRA-2-2014: E-infrastructure for open access (13 M€, RIA, deadline: 15/4/2014)
  - infrastructure for open access to and deposit of scientific information; creation of a legal entity
  - open publishing
  - world wide interoperability
- EINFRA-3-2014: Towards global data e-infrastructures - RDA (4 M€, deadline: 2/9/2014)
  - participation in the Research Data Alliance (RDA)
- EINFRA-4-2104: Pan-European HPC Infrastructure and services (15 M€, deadline: 2/9/2014)
  - actions to promote access to HPC Tier0 centers [CINECA per l'Italia] in collaboration with other e-infrastructure providers

E-infrastructure (III)

- EINFRA-5-2015 Centers of Excellence for computing applications (40 M€, deadline: 14/1/2015)
  - specifically for HPC applications
  - establishing a limited number of CoE, distributed, multidisciplinary, user-driven, sustainable
  - initially 8-10 CoE funded, more later

- The proposed initial domains are weather and climate, clean and sustainable energy, automotive/aerospace/manufacturing, bio-life sciences, particle physics and related fields, and materials science/nanotechnology.
  - For example, CERN should qualify as a center-of-excellence for European particle physics research involving HPC parallel software, hardware, and cloud computing resources.

E-infrastructure (IV)

- EINFRA-6-2014 Network of HPC Competence Centers for SMEs (2 M€, deadline: 2/9/2014)
  - support one network of existing CC
- EINFRA-7-2014 Provisions of core services across e-infrastructure (6 M€, deadline: 2/9/2014)
  - Digital Identifier e-infrastructure for digital objects contributors and authors
  - pan-European identity federations
- EINFRA-8-2014 Research and education Networking (no funding, deadline: 2/9/2014)
  - Framework Partnership Agreement

E-infrastructure: VRE

- EINFRA-9-2014 e-Infrastructures for virtual research environments (42 M€, deadline: 14/1/2015)
  - support interdisciplinary research communites, abstracting form the underlying e-infrastructures and based on scientific commuties requirements for
    - computing, modelling, simulation, data exploration, mining, visualisation
  - develop a VRE model encompassing:
    - generic services by e-infrastructure providers
    - domain specific services co-developed and co-operated by researcher, technology and e-infrastrutcture providers and possibly commercial vendors
  - 2 to 8 M€ projects

Industrial Leadership

Leadership in enabling and industrial technologies (LEITs) (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)	**13 557**
Access to risk finance Leveraging private finance and venture capital for research and innovation	**2 842**
Innovation in SMEs Fostering all forms of innovation in all types of SMEs	**616** + complemented by expected 20% of budget of societal challenges + LEITs and ***'Access to risk finance'*** with strong SME focus

Industrial Leadership: ICT

- A new generation of components and systems (ICT1-3, 142 M€)
- Advanced Computing (ICT4, 57 M€)
- Future internet (ICT5-14: 395,5 M€)
- Current technologies and information management (ICT 15-22: 260 M€)
- Robotics (ICT23-24: 89 M€)
- Micro- and nano-electronic technologies (ICT25-29: 205 M€)
- ICT Cross cutting activities (ICT30-33: 100 M€)
- Horizontal ICT innovation actions (ICT34-37: 116 M€)
- altro (fra cui collaborazioni extra-europee, in particolare con Brasile e Giappone)

Innovative component, systems, advanced computing

sinergie con progetti su sensoristica

sinergie con sviluppi per sistemi DAQ, HPC, ecc.

Future Internet

sinergie con progetti Smart Cities

Content technologies and information management

Altre

Altre

ICT 4 Customised and low power computing

- deadline: 21/4/2015
  - RIA (37 M€)
    - LC Next generation servers, micro-server and highly parallel embedded computing systems based on ultra-low power architectures ... Specific emphasis is given on **low-power, low-cost, high-density, secure, reliable, scalable small form-factor datacentres** ("datacentre-in-a-box").
    - SC New cross-layer programming approaches empowering developers to effectively ... **exploit the full potential ... of computing systems based on heterogeneous parallel architectures**. .... radically increasing the productivity in programming and maintaining intrinsically parallel code .... holistic approaches hiding the complexity between the computing HW component level and the level of application families.
  - IA/LC-SC (17 M€) Activities aim at stimulating broad adoption of customised low power computing technologies
  - SA Support (3M€) LC

ICT 4 Customised and low power computing

- Reinforce and broaden Europe's strong position in low-power computing in traditional and new market segments by strengthening the technology competences of European suppliers and the academic community.
- **Reduction of energy consumption of servers by 2 orders of magnitude** as compared to state of the art in 2013.
- **Double the productivity in efficiently programming and maintaining advanced computing systems** powering cyber-physical systems as compared to state of the art in programming embedded systems in 2013.
- **Increase the adoption of form-factor data-centres and heterogeneous highly parallel computing systems**.
- Higher involvement of SMEs, both on the supply and the demand-side.
- Increased adoption of concurrency in applications across all sectors; **higher degree of parallelism in applications**; increased public trust in embedded applications due to secure and reliable architectures.

ICT 5 Smart Networks and novel Internet Architectures

- ICT 5 Smart Networks and novel Internet Architectures (24 M€, 2014)
- ICT 6 Smart optical and wireless network technologies (30 M€, 2014)
- ICT 7Advanced Cloud Infrastructures and Services (73 M€, 2014)
-

ICT 7 Advanced Cloud Infrastructures and Services (73 M€, 2014)

- deadline: 23/4/2014
- RIA-LC-SC (66 M€):
  - ✗ **High performance heterogeneous cloud infrastructures**.
    - The focus is on development, deployment and management of cloud-based infrastructures and services (IaaS, PaaS, SaaS) over large-scale, distributed, heterogeneous, dynamic computing and storage environments.
  - ✗ **Federated cloud networking**
    - Techniques for the deployment and management of federated and decentralised cloud infrastructures, in particular cloud networking techniques (within software-defined data centres and across wide-area networks) .... Approaches, including standards, to increase **interoperability between cloud services and infrastructure** providers to enable efficient interworking and migration of services, applications and data.

ICT7

- Dynamic configuration, automated provisioning and orchestration of cloud resources:
  - Tools for automatic and dynamic deployment, configuration and management of services … techniques for managing big data…. **Tools to facilitate the coherent deployment of distributed applications over heterogeneous infrastructures and platforms from multiple providers.** Mechanisms to off-load computation and storage tasks from mobile devices onto the cloud at both design and execution time.
- Automated discovery and composition of services:
  - Innovative ways to facilitate **collaboration between public administrations, users and other stakeholders as to produce, discover, mix and re-use different service components and create new public services**…
- Cloud security:
  - **Mechanisms, tools and techniques to increase trust, security and transparency of cloud infrastructures and services**, including data integrity, localisation and confidentiality, also when using third party cloud resources.

ICT7

- Innovation Actions - SC (5 M€)
  - Platforms for trusted cloud systems: collaborative development, adaptation and testing of open source software for innovative and trusted cloud-based services. Allow on-line collaboration across different platforms and different technical environments for geographically dispersed teams. Encourage the rapid prototyping and testing of open applications, including early and active involvement of users.
- Coordination and support actions (2 M€)

A seguire:

- ICT 8 – 2015: **Boosting public sector productivity and innovation through cloud computing services**
- 22 M€, 21/4/2015

ICT 15-16: Big data

- ICT 15: Big data and Open Data Innovation and take-up
  - 50 M€, deadline 23/4/2014
    - .... The aim is to improve the ability of European companies to build innovative multilingual data products and services, in order to turn large data volumes into semantically interoperable data assets and knowledge. ...

- ICT16: Big data - rearch
  - 39 M€, deadline: 21/4/2015
    - ... addressing the fundamental research problems related to the scalability and responsiveness of analytics capabilities (such as privacy-aware machine learning, language understanding, data mining and visualization)

ICT 9 – 2014: Tools and Methods for Software Development

- 25 M€, deadline: 23/4/2014
  - Software tools and methods for large, complex and data-intensive systems:
    - Tools and methods for incorporating integrity, robustness, reliability and resilience into evolving software systems across the complete software lifecycle, especially for complex and secure business-critical systems. Innovative means to manage the complexity of large software and data-intensive systems, including simulation, testing and verification.
  - Software architectures and tools for highly distributed applications:
    - Novel approaches to development, deployment, management and dynamic reconfiguration of distributed applications. Architectures and tools to maximise quality of experience in elastically scalable applications. ...

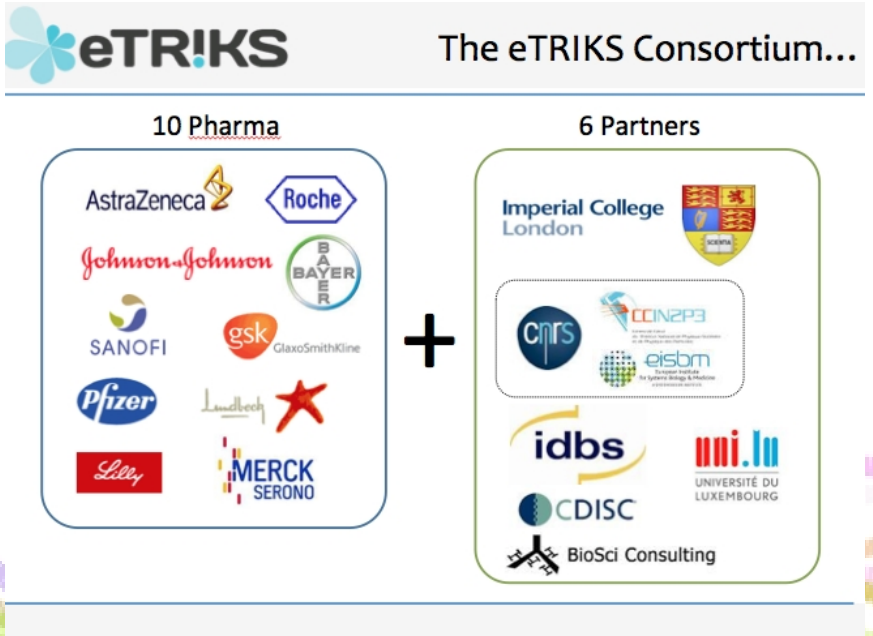
Societal Challenges

Health, demographic change and wellbeing	**7 472**
Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the Bioeconomy	**3 851**
Secure, clean and efficient energy *	**5 931**
Smart, green and integrated transport	**6 339**
Climate action, environment, resource efficiency and raw materials	**3 081**
Inclusive, innovative and reflective societies	**1 310**
Secure societies	**1 695**
Science with and for society	*462*
Spreading excellence and widening participation	*816*

* Additional funding for nuclear safety and security from the Euratom Treaty activities (2014-2018)

ad esempio...

The Innovative Medicines Initiative (IMI) is Europe's largest public-private partnership aiming to improve the drug development process by supporting a more efficient discovery and development of better and safer medicines for patients. ~ 40 project currently funded



Budget: €23.79m for 5 years (Oct 2012---Sept 2017)

CC-IN2P3 is leading WP1: platform Service Delivery
- Deliver the platform for data hosting, curation and analysis
- Resource & Manpower budget is provided for the project

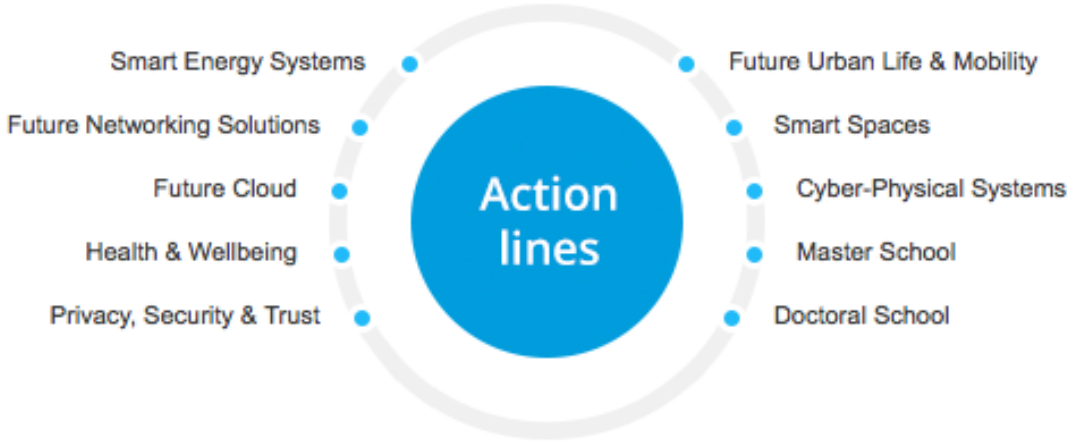
E questo ?

	Proposed funding (€ million, 2014-2020)
European Institute of Innovation & Technology (EIT) Combining research, innovation & training in knowledge and Innovation Communities	**2 711**
Joint Research Centre (JRC)* Providing a robust, evidence base for EU policies	**1 903**

* Additional funding for the JRC for Euratom Treaty activities

EIT ICT Labs

Action Lines



Partner Classification

35	26	21	9	6
Universities	Industries	Research Institutes	Eco Systems	CLCs and central

Partner ICT Trento: Engineering, Telecom Italia and FBK and Trento University as Core Partners, Fiat Research Centre and ST Microelectronics
as affiliate Industrial Partners, CNR (National Research Council), Politecnico of Milan, Politecnico of Turin, SSSUP (Scuola Superiore Sant'Anna) and University of Bologna, FT Coop, Poste Italiane, Reply.