EU H2020 funding opportunities

Mauro Morandin – INFN PD

Agenda

- Introduction and some general comments
- Examples of opportunities in “Excellent Science”
- National programs
- Conclusions

The issue of sustainability

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- It's an important task for the “software collaboration” to explicitly address the issue of how the common HEP software should be supported. Sustainability should be based on a dual approach:
  - maintenance, distribution, documentation, incremental evolution of existing common software should be funded mainly with resources coming from our funding agencies and labs, much in the same way as it happens for other computing costs, like the running costs of our distributed infrastructure
  - but we should aim at securing additional resources for major developments by exploiting EC and national programs

What is the scope of the S.C. ?

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- The options available in European and national programs depend on the scope of the Software Collaboration
  - what common software do we want to include in the scope of H2020?
    - only application libraries and tools like Geant or Root ?
    - what about middlware components widely adopted in our community (xrootd, CVMFS) ?
  - personally I think that, if we set up a sound collaboration framework for software development it should be exploited as extensively as possible
  - in the following I will refer to this ensemble of common core software tools and libraries simply as “HEP software (HS)”, but we need to define what it maens to make a real analysis of the possibilities

The main future effort

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- Likely the largest effort our community will have to support in the area of application software is related to the need of mastering the processor architectures evolution for maximizing the efficiency of our investments in computing resources
- this is going to be an issue for all massive users of large scale computing resources and has been elucidated in several technical reports dealing with the future of HPC computing in Europe
- there isn't a H2020 specific call that is suited to address this problem
  - the only calls that come close to what we would need, are the ones that support the evolution of HPC application software
  - this rings a bell: perhaps our community has not been so proactive and effective so far in getting the attention of the EC; the Software Collaboration may help in the future...

Opportunities

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- there might be nevertheless opportunities to get "indirect" support within the H2020 program:
  - application software developments may represent an essential component to achieve ground-breaking research goals or to exploit research infrastructures
  - libraries and tools may be part of the solution proposed for the evolution of the E-infrastructures or for providing a more effective access to them.
    - E.g. root or xrootd could be proposed as components of data management or preservation solutions
  - development of a specific software tool may be exploited to innovate an industrial product or to implement breakthrough solutions that address concerns of citizens and society/EU policy objectives (health, food, climate, environment, energy, transport, etc.),
    - Geant can be a good case

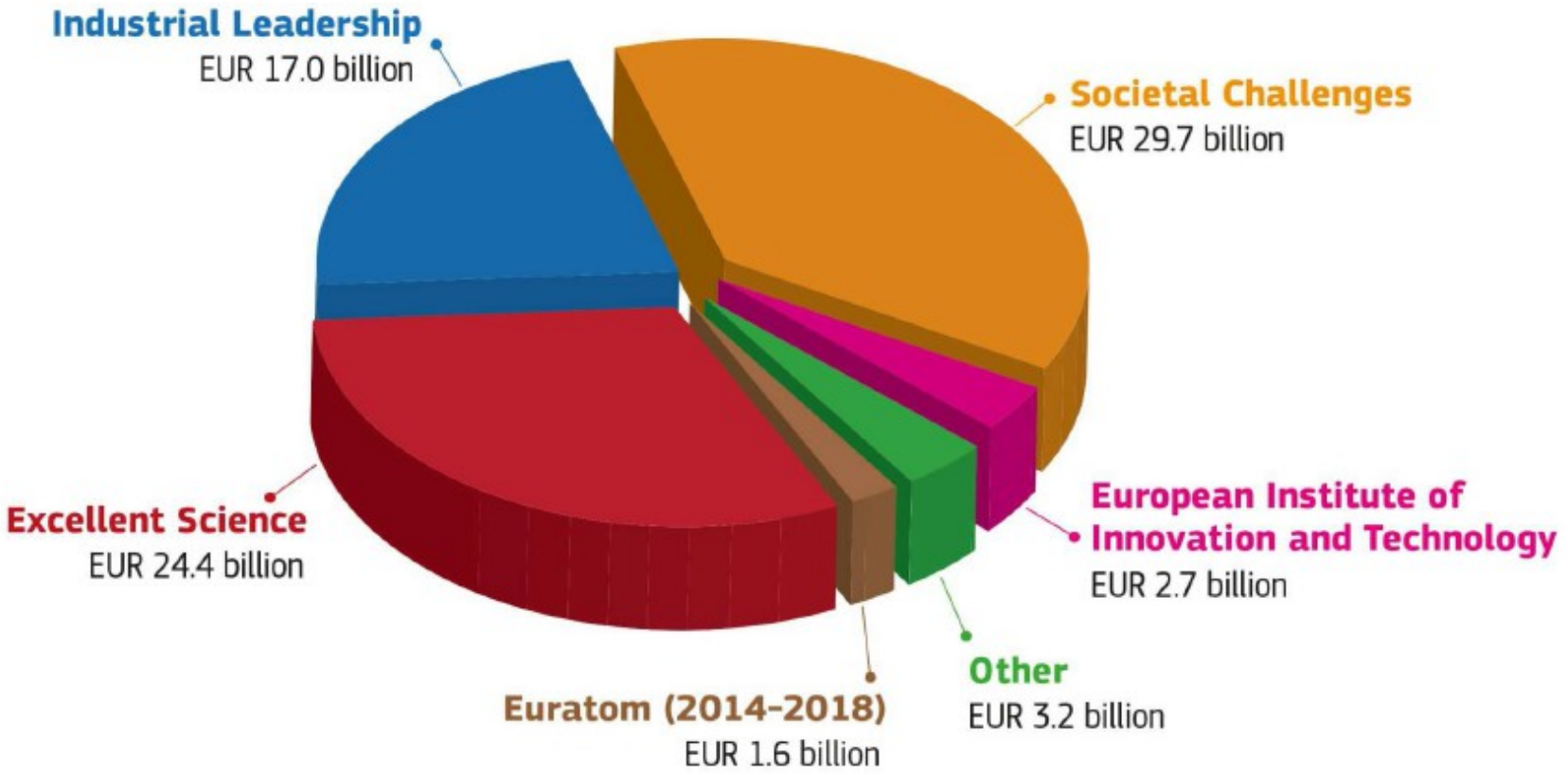
Other opportunities

- **training programmes** supported by H2020 may bring other opportunities:
  - it has been pointed out that there is a lack of experts in parallel computing software development
  - working for parallelizing our applications could represent a way to train young researchers
- a general comment:
  - the Software Collaboration may be useful in trying to mitigate the risk of a fragmented approach to the various H2020 opportunities and to enhance the possible synergies

H2020 overview

€ 79 billion from 2014 to 2020

HORIZON 2020 BUDGET (in current prices)



Opportunities

- **Excellent science will support**:
  - **World class science**
    - HS can be essential to reach scientific goals
  - **Access to the best infrastructures**
    - HS can be part of our “E-infrastructure” or “Virtual research Environment” or seminal for accessing the research infrastructures
  - **Fostering competences**
    - competences required for developing HS can be strategic for the exploitation of E-infrastructures (e.g.: new heterogeneous architectures)

Excellent Science

European Research Council (ERC) Frontier research by the best individual teams	**13.1**
Future and Emerging Technologies Collaborative research to open new fields of innovation	**2.7**
Marie Sklodowska-Curie actions (MSCA) Opportunities for training and career development	**6.2**
Research infrastructures *(including e-infrastructure)* Ensuring access to world-class facilities	**2.5**

(all figures in billion euro, over the period 2014-2020)

ERC:

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Evaluation of *excellence* at two levels:

Excellence of the Research Project

- ✓ **Ground breaking nature and potential impact** (important challenges, developments across disciplines, high risk-high gain)
- ✓ **Scientific Approach** (novel concepts/methodology)

Excellence of the Principal Investigator

- ✓ **Intellectual capacity** (achievements beyond the state of the art)
- ✓ **Creativity** (evidence of creative independent thinking)
- ✓ **Commitment** (demonstrated leadership and commitment to the project)

ERC

- rather difficult to exploit for HS developments
  - the proposal may be targeting the panel PE2, “Fundamental Constituents of Matter”
    - HEP research, that is often based on big projects, is in general not favored
    - software development cannot be anyway the leading research topic
  - if it the proposal is targeting the panel PE6 Computer Science and Informatics
    - it may be difficult to propose a development related to HS that can considered ground-breaking for ICT academic standards
- not suited for large coordinated efforts

Marie Curie program

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European Commission

MSCA in H2020

Innovative Training Networks	ITN	Doctoral and initial training
Individual Fellowships	IF	Support for experienced researchers undertaking international and inter-sector mobility
Research and Innovation Staff Exchange	RISE	International and inter-sector cooperation through the exchange of staff
Co-funding of programmes	COFUND	Co-funding of regional, national and international programmes: - doctoral programmes - fellowship programmes
Support and policy actions		European Researchers' Night (NIGHT) NCP support Non call-based activities

€ 370 M
13/1/15 (*)

€ 240,5 M
11/9/14

€ 80,0 M
28/4/15 (*)

€ 80,0 M
2/10/14

(*) first call deadline in April 2014

ITN: main features

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European Commission

- ✓ **Budget**: € 405.18 Million in 2014 (EID: 25.5 Mio, EJD: 30 Mio)
  € 370 Million in 2015 (EID: 25 Mio, EJD 28 Mio)
- ✓ Duration of projects: maximum 4 years
- ✓ Consortium agreement: required only for EID
- ✓ Support to **early-stage researchers only**
- ✓ Fellowships of 3-36 months
- ✓ Maximum **540 researcher-months** per consortium (180 for EID with 2 partners)
- ✓ Separate **multidisciplinary panels for EID and EJD**

ITN issues

- ITN proposal are evaluated on the basis of:
  - Quality of proposed research program and interactions among partners (50%)
  - Impact on researchers and collaboration (30%)
  - Implementation (20%)
- Research program must be of high quality
  - relevant evaluation panels: Physics or Information Science and Engineering
- Collaboration should be solid and not extemporary
- International mobility of PhD researchers is required
- Participation of non-academic partners is considered very important or required (EID)

Future Emerging Technologies

FET – 2014-2015 WP deadlines & budgets

- **Call FET-Open - fostering novel ideas** **160M€**
  - 77M€ 30/9/2014
  - 38,5M€ 31/3/2015
  - 38,5M€ 29/9/2015
  - Goal: **Supporting a large set of early stage, high risk visionary science and technology collaborative research projects**
  - FETOPEN2: Coordination and Support Activities 2014
    - 3M€ 30/9/2014
  - FETOPEN3: Coordination and Support Activities 2015
    - 1,5M€ 31/3/2015
    - 1,5M€ 29/9/2015
- **Call FET-Proactive - nurturing emerging themes and communities** **35M€**
  - **Deadline: 1.4.2014** Topics: Global system science, “Knowing, doing and being”, Quantum simulation
- **Call FET Proactive - towards exascale High Performance Computing** **97,4M€**
  - **Deadline: 25.11.2014**
- **Call FET-Flagships** Graphene and Human brain projects **179,6M€**

The H2020 HPC approach

European Commission

- HPC strategy combining three elements:

(a) Computer Science: towards **exascale** HPC; *A special FET initiative focussing on the next generations of exascale computing as a key horizontal enabler for advanced modelling, simulation and big-data applications* [HPC in Future and Emerging Technologies (FET)]

(b) providing **access** to the best supercomputing facilities and services for both industry and academia; *PRACE - world-class HPC infrastructure for the best research* [HPC in e-infrastructures]

(c) achieving excellence in HPC **applications**; *Centres of Excellence for scientific/industrial HPC applications in (new) domains that are most important for Europe* [HPC in e-infrastructures]

- complemented with training, education and skills development in HPC

(a) and (c) will be implemented in the context of the HPC Public-Private Partnership

cPPP- HPC

- ETP4HPC and the EC are the partners of the Contractual Public-Private Partnership (cPPP) for HPC (agreement signed on 19/12/13)

ETP4HPC members

Centers of excellence in comp. applications

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Proposals for CoEs : (general points)

- **8-10 CoEs are expected to be funded**
  - **Follow up Call is expected in the future**
- **International co-operation is encouraged where there are clear mutual benefits and the partners have the relevant HPC capacity**
- **EU contribution per proposal**
  - **4 to 5 M€ approximately**

Applications HPC – CoE

Example application/thematic areas (not limited to):

- **Medicine & life sciences;**
- **Biology, genomics and drug discovery**
- **Weather, climate & solid earth sciences;**
- **Industrial applications & engineering;**
- **Materials science, chemistry and nanoscience;**
- **Astrophysics, high-energy physics and plasma physics.**

Other examples might be oriented around societal/industrial challenges, such as '**personalised health/medicine', 'cleaner production', 'safer car', 'smart cities' etc.,**

or around industry sectors like **pharma, automotive, oil and gas etc.**

ANIYAN VARGHESE – DG Connect

INFRASTRUCTURE calls: overview

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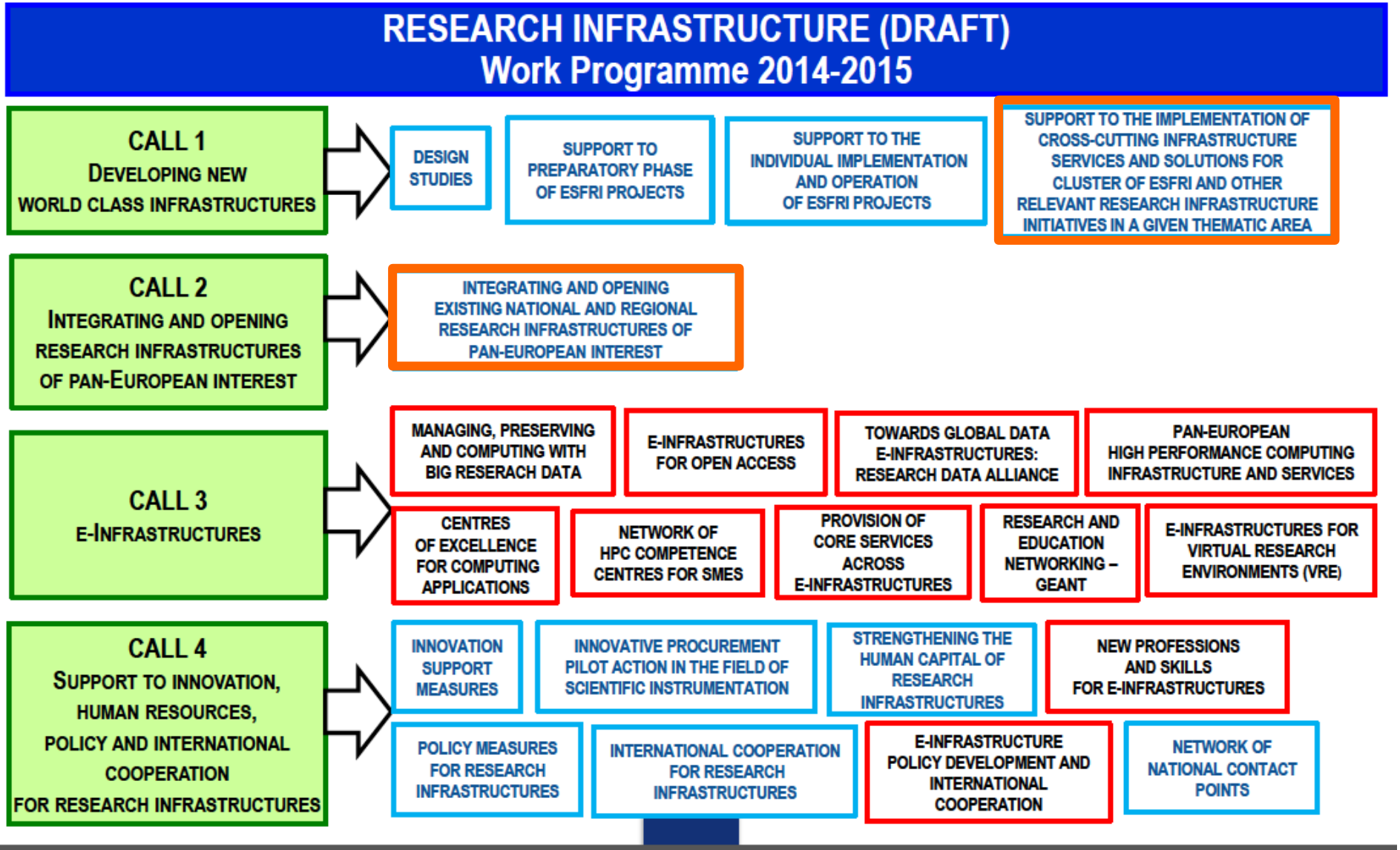

INFRAIA-1 call

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Call 2 - Integrating & opening RI of Eur. interest

Distribution of targeted areas by domain and Summary

Domain	Starting communities	Advanced communities	Number of areas
Bio Medical Sciences	5	4	9
Energy	2	1	3
Environment	4	5	9
ICT	1	1	2
Material and Analytical Facilities	1	6	7
Physics	4	3	7
Social Sciences and Humanities	2	2	4
Total	19	22	41

Research Infrastructures (RTD)	2014	2015	TOTAL	Single grant
CALL 2 - H2020-INFRAIA-2014/2015	90	50	140	Up to 5 or up to 10 M€

Deadline: **2 September 2014**

INFRAIA-1 call

- This activity aims at furthering the integration of, and access to, the key research infrastructures in Europe for the testing and development of advanced detector technologies.
  - Physical Science – starting communities
    - European laboratory astrophysics
    - Research infrastructures for high-energy astrophysics.
    - Science at deep-underground laboratories.
    - Integrating gravitational wave research.
  - Physical Science – advanced communities
    - **Detectors for future accelerators**
    - Research infrastructures for nuclear physics
    - European planetary science
  - Could a common program for the evolution of software tools across these topics be envisaged ?

The AIDA project

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- AIDA = Advanced European Infrastructures for Detectors at Accelerators
- Approved in FP7, 4-year project
- started on 1/2/2011
- € 26M budget, € 8M from the EC (~ 3:1)

AIDA structure

- Tasks:
  - Project management and communication
  - **Common software tools**
  - Microelectronic and interconnection technology
  - Relation with industry
  - Transnational access DESY/CERN/Europ. Irrad. facilities
  - Improvement and equipment of irradiation and test beam lines
  - Advanced infrastructures for detector R&D

AIDA-2 Advanced Software

- AIDA(-1) Advanced Software work package in a very good shape
  - all project going very close to the schedule
  - impressive progress
    - some of the produced software already used to generate results for scientific publications
- proposed budget for AIDA-2 Advanced Software work package
  - 950kEuro
  - typical ratio of commitment: provide 2 to 1 from EC (using average salary)
- very big interest
  - already now going 4 times over budget, will need quite some adjustments and selection

[thanks to Witold Pokorski - CERN]

AIDA-2 Advanced Software

- proposed scope of the work package
  - development of generic frameworks and reusable tools for simulation and reconstruction
  - exploration of parallelism, vectorisation and new hardware architectures
- good mixture of AIDA(-1) project proposed for continuation and some new proposals
- focus will be on development of tools relevant for large communities and future projects

AIDA-2 Advanced Software

- examples of possible tasks
  - **Core software**
    - development of high performance USolids library
    - alignment support in DD4Hep
    - tools for performance profiling
  - **Simulation**
    - simulation toolkit based on DD4Hep and Geant4
  - **Reconstruction**
    - advanced tracking tools
    - advanced particle flow algorithms

EINFRA-1

- EINFRA-1-2014 **Managing, preserving and computing with big research data** (55 M€, RIA, deadline: 2/9/2014)
  - action 1: federated data E-infrastructure providing solutions for data management and long term preservation
  - action 2: services to ensure the quality and reliability of the e-infrastructure
  - action 3: federating data management and curation tools and services
  - action 4: large virtualization of scale data/compute centers
  - action 5: E-infrastructure independent computing platform federating commercial/public cloud services via PaaS for scientific users
  - action 6: EGI evolution, 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

National programs in Europe

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- A real survey has not been possible due to lack of time, but some promising feedback has been collected
  - **Germany**
    - exploring possibilities to obtain funding for a German contribution to an international HEP software collaboration from the German Ministry of Education and Research (BMBF) in the funding period 2015–18 [Gunter Quast]
  - **Italy**
    - INFN some basic support for HEP simulation software developments (e.g.: Geant)
    - Italian Ministry of Education, University and Research (MIUR) have funded in 2012 with a call for “Research programs of considerable national interest” a project for “Development of technologies aimed at optimizing the LHC data access,...”
      - € 886k MIUR contribution – 3 years long project

      perhaps one can try next time with “optimizing the LHC data simulation and processing...”

Conclusions

- Securing support for our software evolution needs from the H2020 program is not going to be trivial, but it may represent anyway an **important ingredient** for the sustainability of the process; it requires:
  - careful analysis of the opportunities
  - evaluation of the trade off between possible benefits and the efforts needed to submit and to manage projects
- the Software Collaboration can help in this respect by:
  - **elucidate what are the priorities** for the common software our community relies on
  - **enhance possible synergies** between the opportunities of the various programs
  - **catalyze and harmonize initiatives** aimed at submitting proposal both at the National and the International level
  - **provide advice** based on past experience
  - **provide feedback** to the EC by presenting a coherent vision of the needs and the plans of our community