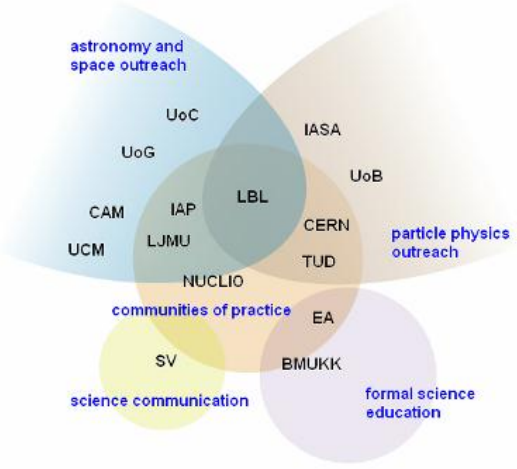
# Discover the COSMOS
## (Sept 2011-August 2013)
### FP7-INFRASTRUCTURES-2011-2 coordination action

*A few words as an introduction:*

The project aims to introduce innovative ways to encourage young people into science and scientific careers. This will be achieved engaging teachers and students in **eScience** through the use of **e-Infrastuctures** which the consortium **has already developed in astronomy and high energy physics,and which will be brought to synergy.**

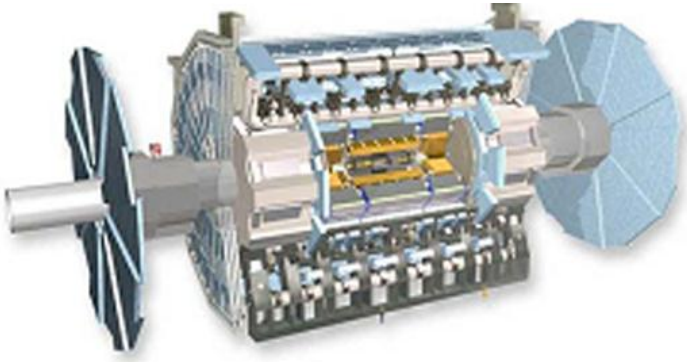
# Consortium (15 partners)



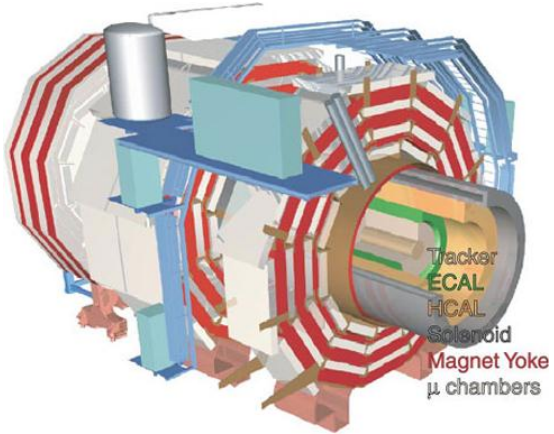

| No | | Name | Short name | Country |
|---|---|---|---|---|
| 1 | | INSTITUTE OF ACCELERATING SYSTEMS AND APPLICATIONS | IASA | Greece |
| 2 | | EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH | CERN | Switzerland |
| 3 | | CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE | CNRS | France |
| 4 | | UNIVERSIDADE DE COIMBRA | UC | Portugal |
| 5 | | University of Glamorgan | UOG | United Kingdom |
| 6 | | THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE | CMSUC | United Kingdom |
| 7 | | LIVERPOOL JOHN MOORES UNIVERSITY | LJMU | United Kingdom |
| 8 | | TECHNISCHE UNIVERSITAET DRESDEN | TUD | Germany |
| 9 | | THE UNIVERSITY OF BIRMINGHAM | UB | United Kingdom |
| 10 | | ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE | EA | Greece |
| 11 | | Nucleo Interactivo de Astronomia | NUCLIO | Portugal |
| 12 | | ELLINIKH ENOSI DIMOSIOGRAFON EPISTIMIS, SYGGRAFEON EPISTIMIS KAI EPIKOINONIOLOGON EPISTIMIS | SCIENCE VIEW | Greece |
| 13 | | Bundesministerium für Unterricht, Kunst und Kultur | BMUKK | Austria |
| 14 | | UNIVERSIDAD COMPLUTENSE DE MADRID | UCM | Spain |
| 15 | | THE REGENTS OF THE UNIVERSITY OF CALIFORNIA | LBL | United States |

# Research Infrastructure (CERN)

The Large Hadron Collider (LHC) is the new CERN particle accelerator providing the highest energy particle collisions in the world

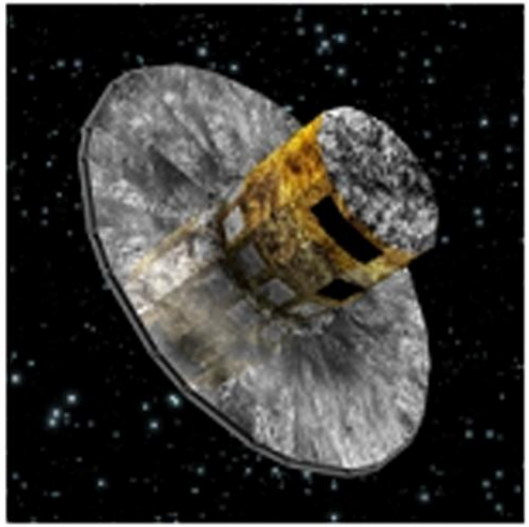


ATLAS (www.atlas.ch) is a general purpose particle physics experiment at the LHC at CERN.



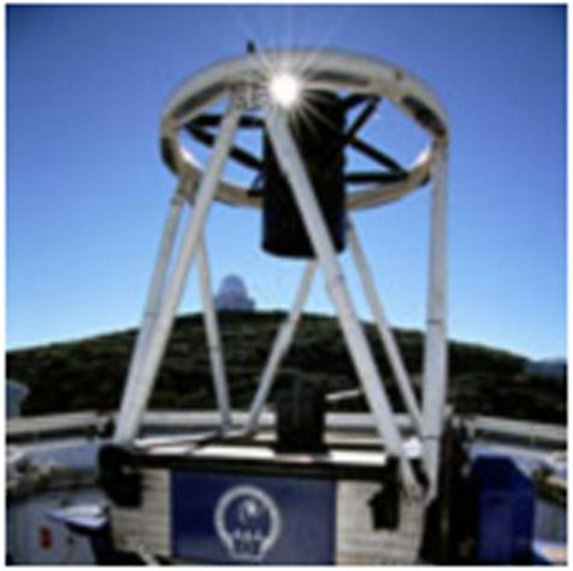

CMS (http://cms.web.cern.ch/cms/) is the second general purpose particle physics experiment at the LHC at CERN.

# Research Infrastructures



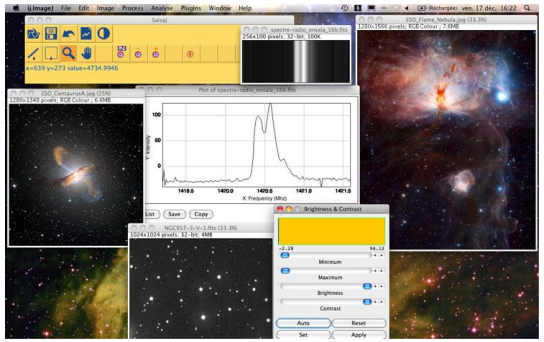
**Gaia (http://www.esa.int/science/gaia)** is an ambitious ESA mission to chart a three-dimensional map of our Galaxy, the Milky Way,

**The Faulkes Telescope Project** (http://www.faulkes-telescope.com/) is the Education arm of Las Cumbres Observatory Global Telescope Network.



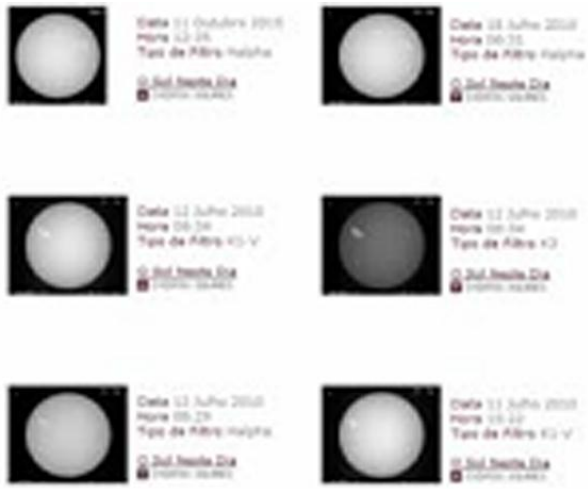
**The Liverpool Telescope**, http://telescope.livjm.ac.uk, is a fully robotic astronomical telescope (located on the Canary Island of La Palma)

# eScience Applications (from astronomy)



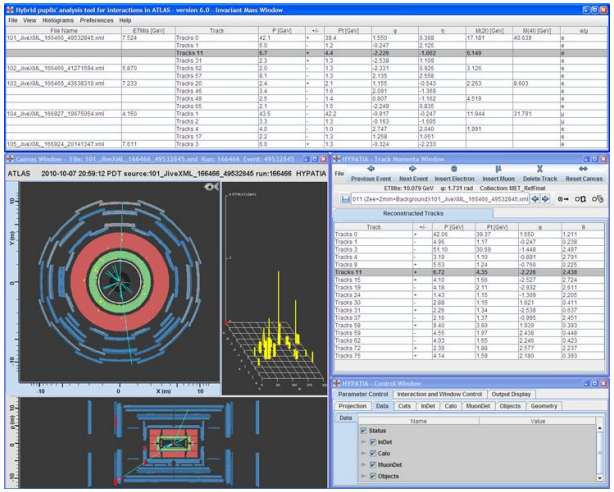
**SalsaJ http://www.euhou.net/**
is a student-friendly astronomical images analysis tool.

**LTImage**
http://www.schoolsobservatory.org.uk/
**astro/tels/ltimage** is a simplified image processing tool

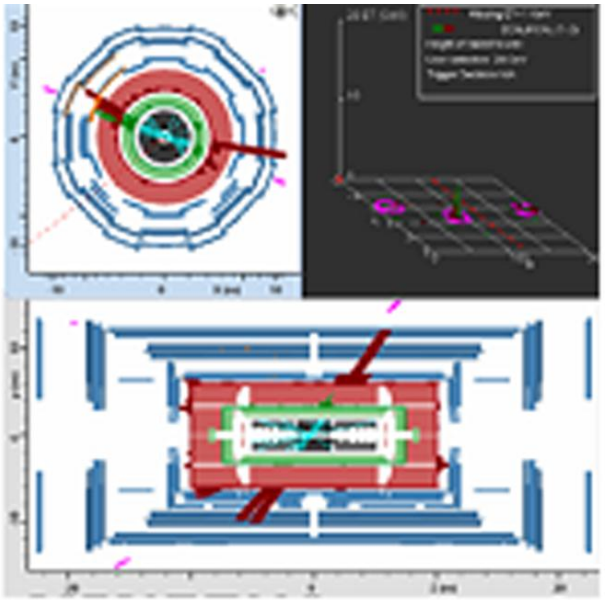


The "**Sun for all"** scientific archive
**http://www.mat.uc.pt/sun4all/**
includes over 30.000 Sun images captured the last 80 years.

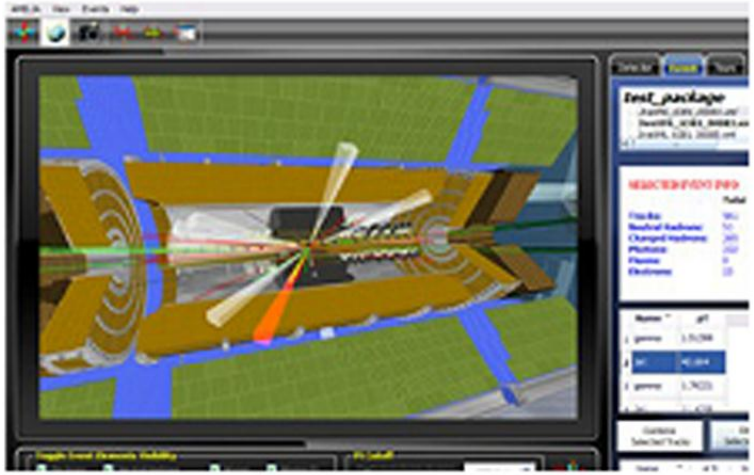
# eScience Applications (from HEP-ATLAS experiment)



**HYPATIA** http://hypatia.phys.uoa.gr/ (Hybrid Pupil's Analysis Tool for Interactions in Atlas)



**MINERVA**
http://atlas-minerva.web.cern.ch/
atlas-minerva



**AMELIA** http://amelia.sourceforge.net/index.html is a **3D application**

# eScience Applications (portals)

**The Discovery Space Portal (www.discoveryspace.net):** The portal offers access to **6 robotic telescopes** seamlessly into one virtual observatory and provides the services required to operate this facility. The service has 1,100 registered users (teachers and students).

**COSMOS Portal (www.cosmosportal.eu):** The COSMOS portal is an experimental laboratory for students and teachers,


**The Learning with ATLAS@CERN Portal (www.learningwithATLAS-portal.eu),** contains educational resources, such as access to near real-time data and interactive analysis tools for the ATLAS experiment

# Table of WP's and Leaders

Table 2.1.2: *The Work Package Leaders.*

| WP# | Work Package Description | Work Package Leader |
|---|---|---|
| 1 | Project Management and Coordination | IASA |
| 2 | Pedagogical Framework and Implementation Scenarios | TUDD/IAP |
| 3 | Developing the *Discover the COSMOS* Users Community | IASA/TUD |
| 4 | Implementation | EA/CERN/NUCLIO |
| 5 | Validation | BMUKK |
| 6 | Raising Awareness and Exploitation | SV/BMUKK |

# WP 1: Management

Includes :

- Full Consortium meeting(twice /year)
- General Assembly (legal reps:once/year)
- Steering Committee : (once/month)

| | |
|---|---|
| Prof. Christine Kourkoumelis (IASA) | Project Coordinator |
| Dr. Sofoklis Sotiriou (EA) | Quality Manager |
| Prof. Dr. Michael Kobel (TUD) | Outreach Programme Coordinator |
| Prof. Emmanuel Tsesmelis (CERN) | Implementations Manager |
| Dr. Rosa Doran (NUCLIO) | User Communities Coordinator |
| Elisabeth Zistler (BMUKK) | Validation Manager |
| Dr. Carl Pennypacker (LBL) | International Cooperation Manager |

- Project office (IASA): M.Sotiriou,S.Vourakis,N.Theofilopoulos, P.Eskioglou
- Yearly and quarterly reports
- Amendments

***EU recommendation:collaborate with GLORIA and e-Science talk***

***EU demmands more on ethics:to be discussed later***

# **WP 2**: Pedagogical Framework and Implemenation Scenaria: Create the tools=Demostrators INTEGRATE THE ACTIVITIES

- Review and evaluate the existing eScience applications (software tools, archives,databases)
- **Select and define the best practices**
- Design and develop a number of exemplary teaching practices and activites **(=demostrators) under *COMMON* methological approach** to promote collaboration between schools and research centers

# WP 3: Different communities to be integrated **effectively** to form the virtual Users Community)

# INTEGRATE THE COMMUNITIES (reseachers,students,educators)

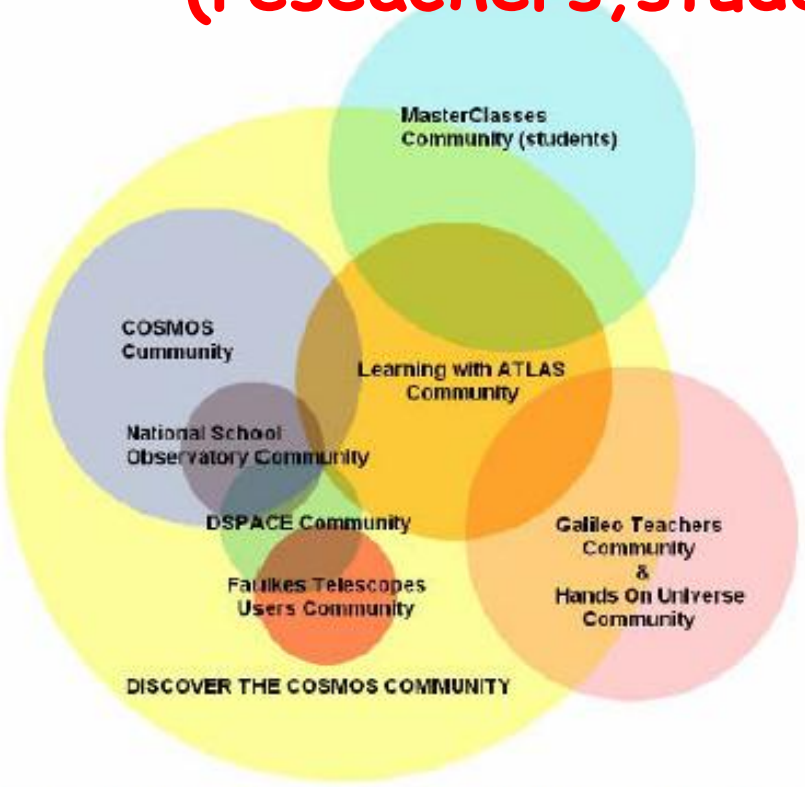



**Figure 2.3:** *The Discover the COSMOS coordination action aims to create a large virtual educa community by integrating effectively teachers and students from already existing, and well estab communities of practice in the fields of Astronomy and Particle Physics. The members of communities are already involved in eScience activities in the framework of European and na projects and initiatives.*

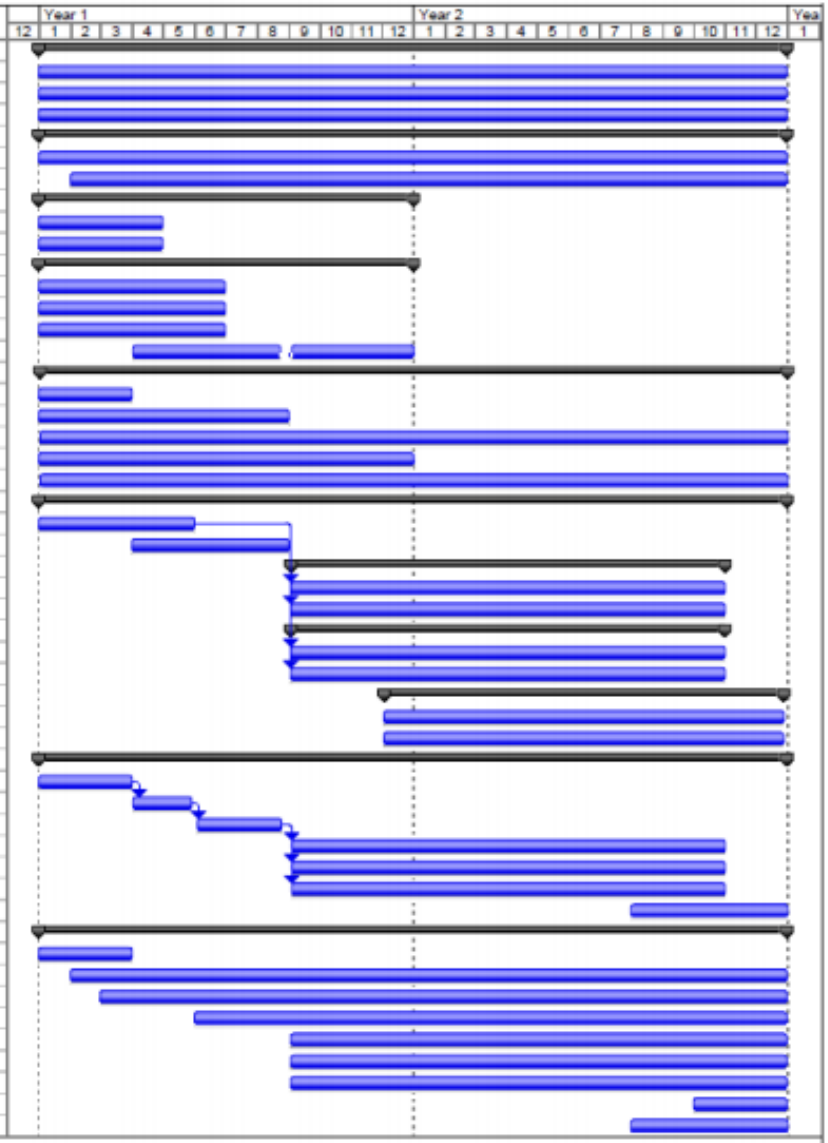
| | | |
|---|---|---|
| Galileo | teach | 5,000 |
| Masterclasses | stud | 6,000 |
| COSMOS | teach | 3,000 |
| DSPACE | teach | 1,000 |
| NSO | Std+teac | 1,150 |
| LA@CERN | Std+teac | 500 |
| Hands on Universe | teach | ~300 |
| Faulkes telescopes | Std+teac | 100 |
| | | |
| | | |

**WP 4: Implementation**
(activities, training workshops, e-Masterclasses, summer schools)

**WP 5: Validation** (efficiency and effectiveness of approaches and activities - BMUKK)

**WP 6: Raising Awareness** (raise strategy, Masterclasses, science festivals and exhibitions, roadmap/guidelines for stakeholders) **and Dissemination** (conferences, publications, outreach activities)

| ID | Task Name |
|---|---|
| 1 | **WP1 Project Management and Coordination** |
| 2 | T1.1 Project Coordination and Reporting |
| 3 | T1.2 Set-up and Operation of the Project Office |
| 4 | T1.3 Communication and Meetings |
| 5 | **T1.4 Quality control and Management Assessment** |
| 6 | T1.4.1 Internal Processes and Partnership Quality Control |
| 7 | T1.4.2 Deliverables Assessment |
| 8 | **WP2 Pedagogical Framework and Implementation Scenarios** |
| 9 | T2.1 The Pedagogy of Inquiry Teaching: Strategies for Developing Inquiry as part of Scientific Literacy |
| 10 | T2.2 Review of eScience Applications (software tools, archives, databases) |
| 11 | **T2.3 Defining Best Practices (Tools and Methods) that promote effective school-research center collaboration** |
| 12 | T2.3.1 Best Practices in Particle Physics |
| 13 | T2.3.2 Best Practices in Astronomy |
| 14 | T2.4 Implementation Scenarios Definition and Analysis (Templates) |
| 15 | T2.5 Design of Initial Implementation Scenarios and Activities (Discover the COSMOS Demonstrators) |
| 16 | **WP3 Developing the Discover the COSMOS Users Community** |
| 17 | T3.1 Users Profiles and Task Analysis |
| 18 | T3.2 Analysing the needs and generating creative options |
| 19 | T3.3 Participatory Engagement Activities |
| 20 | T3.4 Create Discover the COSMOS Tool-Kit (Guidelines and Supporting Materials for Teachers and Outreach Groups) |
| 21 | T3.5 Discover the COSMOS Communities Support Environment |
| 22 | **WP4 Implementation** |
| 23 | T4.1 Implementation Plan |
| 24 | T4.2 Localised Implementation Plans |
| 25 | **T4.3 Organisation of Implementation Activities at Local Level** |
| 26 | T4.3.1 Demonstrations at Schools and Teachers Training Centres |
| 27 | T4.3.2 School Based Activities |
| 28 | **T4.4 Organisation of Implementation Activities at National Level** |
| 29 | T4.4.1 National Training and Demonstration Activities |
| 30 | T4.4.2 National Contests for students and teachers |
| 31 | **T4.5 Large Scale International Implementation Activities** |
| 32 | T4.5.1 International Contests for Students and Teachers |
| 33 | T4.5.2 International Training Seminars, MasterClasses and Summer Schools |
| 34 | **WP5 Validation** |
| 35 | T5.1 Development of validation plan |
| 36 | T5.2 Development of validation & feedback tools |
| 37 | T5.3 Localised Validation Plans and Training Workshops |
| 38 | T5.4 Validation of local activities |
| 39 | T5.5 Validation of national activities |
| 40 | T5.6 Validation of international activities |
| 41 | T5.7 Integration of results - Validation Report |
| 42 | **WP6 Raising Awareness and Exploitation** |
| 43 | T6.1 Development of the Dissemination and Exploitation Plan |
| 44 | T6.2 Project's website |
| 45 | T6.3 Development of the Information Materials |
| 46 | T6.4 Presentations and Publications |
| 47 | T6.5 Promoting project's outcomes at International Level |
| 48 | T6.6 Development of a partner affiliation program |
| 49 | T6.7 Clustering with projects and initiatives in the field |
| 50 | T6.8 Organisation of an International conference on eScience Environments for Education |
| 51 | T6.9 Roadmap for the Design and Implementation of Outreach and Educational Activities for Schools |



# DISCOVER THE COSMOS

## e-Infrastructures for an Engaging Science Classroom

Demonstration of innovative ways to involve teachers and students in eScience through the use of existing e-infrastructures in order to spark young people's interest in science and in following scientific careers.


The Discover the COSMOS coordination action aims to demonstrate innovative ways to involve teachers and students in eScience through the use of existing e-infrastructures in order to spark young people'sinterest in science and in following scientific careers. It aims to support policy development by

a)*demonstrating effective community building* between researchers, teachers and students and empowering the latter to use, share and exploit the collective power of unique scientific resources (research facilities, scientific instruments, advanced ICT tools, simulation and visualisation applications and scientific databases) in meaningful educational activities, that promote inquiry-based learning and appreciation of how science works

b) *demonstrating effective integration of science education with e-infrastructures* through a monitored-for-impact use of eScience activities, which will provide feedback for the take-up of such interventions at large scale in Europe and

c) *documenting the whole process through the development of a roadmap* that will include guidelines for the design and implementation of effective educational and outreach activities that could act as a reference to be adapted for stakeholders in both scientific research outreach and science education policy.

The *Discover the COSMOS* project is financed by the European Commission within the Seventh Framework Programme

DISCOVER THE COSMOS

e-Infrastructures for an Engaging Science Classroom

Demonstration of innovative ways to involve teachers and students in eScience through the use of existing e-infrastructures in order to spark young people's interest in science and in following scientific careers.

### The main objectives of the Discover the COSMOS project:

- Select a series of eScience initiatives that successfully introduce the scientific methodology in school science education.
- Systematic validate the proposed approaches and activities in order to identify their impact in terms of the effectiveness and efficiency.
- Integrate these initiatives under a common educational approach and develop the Discover the COSMOS Demonstrators that could be exploited and widely used from the educational communities in Europe and beyond.
- Design and implement a systematic raising awareness strategy.
- Implement the Discover the COSMOS Demonstrators at large scale in Europe, and organize a series of raising awareness activities that will introduce students and teachers to eScience
- Create virtual learning communities of educators, students and researchers.

The *Discover the COSMOS* project is financed by the European Commission within the Seventh Framework Programme

We are starting EVEN before the project starts and that's very good because we have lots to do!!!!

# Call: FP7 – ICT-2011-8

- General Call Information
  - Call identifier: FP7-ICT-2011-8
  - Date of publication: 20 July 2011
  - Deadline: 17 January 2012, at 17:00.00 Brussels local time
- Challenge Information
  - Name : ICT 2011.8.1Technology-Enhanced Learning
  - Instruments Available: IP/STREP, NoE,CSA
  - Budget: EUR 53 million with a minimum of 40% to IPs and 30% to STREPs
  - **Educational technologies for science, technology and maths:** Supporting European wide federation and use The service shall enable online interactive experimof remote laboratories and virtual experimentations for learning and teaching purposes. entations by accessing and controlling real instruments, or using simulated solutions. Open interfacing components for easy plug-and-play of remote and virtual labs should be made available to stimulate the growth of the network of labs. Research shall include work on the user interfaces that mediate the complexities of creation and usability of experiments, for specific pedagogical contexts in primary and secondary schools and higher education, including at university level. This part of the target outcome should be pursued by IPs that include large scale pilots

# BACK UP

# Concept and Objectives

- It aims to support policy development by :
- a) Demonstrating effective community building between researchers, teachers and students and empowering the latter to use, share and exploit the collective power of unique scientific resources (research facilities, scientific instruments, advanced ICT tools, simulation and visualisation applications and scientific databases) in meaningful educational activities, that promote inquiry-based learning and appreciation of how science works
- b) Demonstrating effective integration of science education with e-infrastructures through a monitored-for-impact use of eScience activities, which will provide feedback for the take-up of such interventions at large scale in Europe and
- c) Documenting the whole process through the development of a roadmap that will include guidelines for the design and implementation of effective educational and outreach activities that could act as a reference to be adapted for stakeholders in both scientific research outreach and science education policy.

# The project approach

Select a series of eScience initiatives that are offering access to large research infrastructures (telescopes, accelerators, particle detectors)
These initiatives have proven their effectiveness in promoting the scientific methodology and in increasing students motivation and interest
Coordinate the organization of these initiatives under a common methodological approach for the design and implementation of large scale outreach activities in the school communities
Demonstrate these initiatives in the framework of a variety awareness raising activities (masterclasses, summer schools, science contests, science festivals and exhibitions) along with teachers training activities at large scale in Europe.
Evaluate the impact of these activities to the participants (teachers and students)
Form a series of guidelines and recommendations (a guide of good practice) for future reference and use from the outreach groups of the research infrastructures

# Large Scale Awareness Raising Activities for Teachers and Students

Training Courses for Teachers (Local, National and International)
Physical and Virtual Visits to the Research Infrastructures
Summer Schools
Science Contests for Teachers and Students (National and International)
MasterClasses
Discussion Forums and Debates
Demonstrations, Exhibitions and School Events