Discover the Cosmos Deliverable

D4.5 Interim Report on Implementation Activities (National Level)

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Short Description:

This report documents the implementation activities of Discover the COSMOS undertaken at national level throughout the first year of the project, as they have been described in Deliverable 4.1. This deliverable is best read in conjunction with the interim reports on local and international level implementation activities.

List of Recipients: Discover the COSMOS participants

Contents

1. Introduction

In addition to the local and international implementation activities there are the national implementation activities for Discover the Cosmos (DtC). They are structure in different formats:

- Training and demonstration activities with the aim to promote interaction and collaboration between members of the national education community. These events are designed to encourage the promotion of professional practice interchange, sharing of experiences, support and collaboration alliances, and network between members of different parts of the country and communication channels establishment. The involvement of the science community is an integrating part of these events in order to promote the establishment of links between schools and research facilities.
- National contests for secondary schools (more events on the second year of the proposal are expected)
- Masterclasses and e-Masterclasses that integrate the use of eScience tools and e-infrastructures in school environments. These events promote the use of reach scientific data and instruments in a user friendly environment while involving students and teachers on their use.

The use of the tools and resources available for DtC was promoted in these events and in particular the pilot of the use of DtC Demonstrators.

This document has a detailed list of the activities implemented by all the partners during the first year of DtC.

2. National Level Implementation Activities

2.1 National Masterclasses

2.1.1 Dresden's Day of the "World machine"

In November 2009, the first particle collisions on the world's largest particle accelerator - the Large Hadron Collider - in Geneva took place. Two years later the Institute for Nuclear and Particle Physics at the TU Dresden (IKTP) invited to the "Day of the World Machine", which was solemnized at 17 Particle physics institutes throughout Germany.

Lectures, masterclasses, guided tours through the exhibition attracted 250 visitors to this special event at the Dresden University.

All evening events across Germany started with a video talk broadcasted from CERN where Director General Rolf Heuer in an interview presented the latest results from the LHC and wished all locations a fun evening. During the day, students had taken part in particle physics masterclasses organised by the educational network Netzwerk Teilchenwelt, which also announced the winner of its particle physics video competition "(IN)VISIBLE".

Laureates of the NTW-video award

Fotografin: Juliana Socher © TU Dresden

2.1.2 Series: NTW National Masterclasses in Particle Physics

Hands on Particle Physics Activity – see: www.teilchenwelt.de

Tracking the Big Bang: With 'Netzwerk Teilchenwelt' (Network ParticleWorld) one can experience particle physics and astro-particle physics within one's reach. During workshops in schools, school labs and museums all over Germany, young people and their teachers enter the world of quarks, electrons and company.

Centerpiece of the German network are more than 100 one-day-workshops in a year at schools, in school labs and other institutions of education: Guided by young scientists, young people provide data measurements from LHC in real-life conditions like physicists do and explore the fascination of modern science. Throughout the country, young particle physicists, being mobile experts, are on the road to host "masterclasses" in schools, museums and other institutions of education.

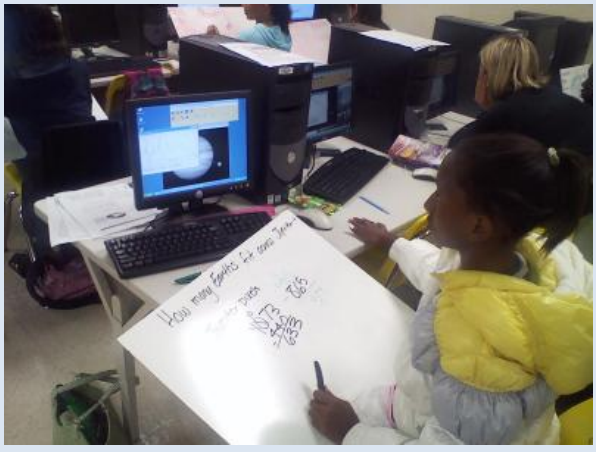
'Netzwerk Teilchenwelt' not only provides accelerator physics, but also experiments with cosmic particles. Using detectors such particles permanently reaching earth from space are getting visible. Young people and teachers also can take action at authentic locations: The Network offers workshops and project weeks at CERN and the possibility to collaborate actively at German research institutes.

The program is run by the IKTP at TU Dresden, funded by the federal ministry of education and research (BMBF) and under the patronage of the German Physical Society (DPG).

2.1.3 ASAMI (After School Science Masterclasses)

A student centered system, to teach mathematics through science and vice versa. Some piloting on the use of selected DtC demonstrators were implemented successfully. The piloting effort includes teaching proportion, ratios, and linear equations using astronomy related topics. The piloting phase went for 9 weeks, (Feb - May) at Portola Middle School, twice a week, for two hours a week after school. Students were self-selected. Some of the activities:

1.Walk the campus in steps and scale in GoogleMaps.
2. Google maps into Salsa J: Earth/Jupiter relationship.
3. Playdoh: build and change recipes (doubling, or halving recipe, etc.)
4. Create an Earth and Jupiter scale model from the playdoh.
5. Incorporate the size of the Sun to our Playdoh model of Earth and Jupiter.
6. Scale size of distance of the Solar System.
7. Formation of the Solar System: how and why planets are spaced and sized in their position/size and relative to their orbit length.
8. Sunspots and Solar Flares relative to the size of the Earth.
9. Moon crater size based on the size/mass of object (stainless steel balls)
10. Candy Ratios, compare to constellations and star size
11. Paper tape car model- comparing
12. Rolling Marble – velocity vs. slope.
13. How many solar systems in (Pillars of Creation-Eagle) Nebula or How many galaxies across the Hubble Deep field?



2.1.4 Universe in the Classroom

A full 5-hour workshop covering both the Faulkes Telescope Project and National Schools' Observatory (both part of "Discover the Cosmos"). The aim of this talk was to encourage teachers to work with FT and NSO, to engage school students in STEM subjects through astronomy. The workshop includes demonstrations of software such as SalsaJ, Stellarium and DS9, and other "Discover the Cosmos" resources currently available online. Participants work with laptops/PCs to carry out a variety of activities, such as using SalsaJ to analyse FITS files and create Hertzsprung-Russel diagrams and animations of asteroids and solar rotation.

2.2 Summer Schools

2.2.1 Astronomy Masterclasses

A total of 3 Astronomy Masterclasses were promoted

A 4-hour workshop covering a variety of astronomy and space science topics from the UK STEM National Curriculum, with a particular emphasis on A level Physics qualification. A mixture of talks, demonstrations and hands-on activities (both PC-based and lab-based), this course covers all of the astronomy content at Key Stage 5 (ages 16-18).

2.2.2 Greek physical union masterclasses

Students selected by the Greek Physical Union attend lectures and a laboratory exercise where they look for Z and Higgs boson decays. This was especially important this time as the announcement of the discovery of the Higgs candidate by CERN was made just the previous day. There was also a live connection to the ATLAS counting room where students were presented to the experiment by Dr.S.Chouridou followed by a Q&A session.

2.3 Summer Schools

2.3.1 Physics Summer School in Crete

The Hellenic Physical Society and Ellinogermaniki Agogi organized a five day summer school with 45 high school students from all over the country, ages 16-18. The students had the opportunity to participate in workshops where a) the Faulkes Telescope was demonstrated operating in real time and the connection of real data b) they engaged in an educational activity where they used thedata analysis tool HYPATIA in order to the hunt for Higgs particle.

2.3.2 Physics Summer School in Birmingham

12th grade students from all over the country, 50 in total, coming from 47 different schools, participated in the Physics Summer School promoted by the University of Birmingham. Among other activities they had the opportunity to use Minerva software.

2.4 Training Sessions

Several national training sessions took place throughout the first year of the project. A couple of examples below.

2.4.1 NTW Teachers Programme at CERN for teachers from several European Countries:

Portugal, Spain, Germany, Austria, UK, Switzerland, France and Greece

Example of NTW session:

Bringing CERN to the School Classroom

Date of Event: 20 August 2012 Place of Event: CERN, Switzerland

Seventy-six Greek and four Cyprior teachers and teacher trainers participated in a special training session organised in the context of the National Teacher Programmes (NTP) at CERN with the aim to get famliar with IBSE and DtC. DtC's portal, resources and tools (e.g. HYPATIA), and activities associated with bringing science, physics, particle physics and science closer to the school classroom were presented. A discussion on ways in which the DtC Demonstrators can be used by teachers in the context of the "projects" part of the Greek school curriculum was followed. Ideas about eMasterclasses were also exchanged. The prospective visit of CERN's Mini-Expo to Cyprus in October was finally discussed with the Cypriot participants. In the framework of the this NTP, teachers had also the opportunity for hands-on activities, including two training sessions on "How to Build a Cloud Chamber".

2.4.2 Academia do Cosmos (Cosmos Academy)

Monthly training events in Portugal about specific eScience tools and resources from the DtC repository and demonstrators. In these sessions, teachers and students from different parts of the country meet and are presented to new material. During the events they have the opportunity to use the eScience tool or eInfrastructure being presented. It is also a space where they have the opportunity to meet peers from other schools, discuss their experiences and share results. Scientists are also present in most of the session and very interesting discussion about

implementation of real research examples are raised during the events. The day always ends with a presentation given by a scientist.

The complete list can be found in the table presented in annex to this document.

3. Conclusions and Steps Ahead

The implementation phase is the heart of this proposal. During this phase we will be working in the field with the teachers and students and designing the successful path for Discover the Cosmos. Important steps will be taken towards the School of the future and this is the moment we will pilot the first steps of the journey. The use of the demonstrators in classrooms around Europe will determine the steps needed to engage teachers and students to embrace the use of real research in classroom. The first implementation efforts already started with very successful outcomes.

In the first year of DtC these the implementation activities followed the distribution bellow.

Country	Events	Teachers	Students	Other
Austria	1	3	5	12
France	1	0	60	0
Germany	4	50	184	90
Greece	2	20	45	0
Portugal	8	165	0	0
Spain	1	15	0	7
Switzerland	8	371	0	0
UK	9	116	260	0
US	3		425	25
Total so far	36	740	979	134

Discover the Cosmos have reached over 700 teachers and nearly 1000 students across Europe in implementation actions at a national level. Now is the time when most of the practice reflection workshops will be taking place helping the consortium tailor the demonstrators and engage the teachers and science community to build a strong support network.

4. ANNEX

Table 1 and 2 show lists of all national level implementation activities conducted during the project's first twelve months (September 2011 – August 2012). The type of the event is marked according to the following table:

Type	Event	Classification	Coverage
SS	Practice Reflection Workshop	Implementation	National
T	Training and demonstration activities: workshop or seminar	Training / Implementation	National
MC	MasterClasses	Implementation	National

4.1.1 Year 2011 / Month 1 to 4 (M1-M4)

Type	Event	Date (Project Month)	Location	Purpose	Partner	Participants
September 2011						
T	NTW Portuguese Teachers Programme	04-09/09/2011 (M1)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics and related subjects, hands-on sessions and visits to experiments at CERN	CERN	90 Portuguese high school teachers
T	Noite do Professores (http://www.pavconhecimento.pt/visite-nos/programacao/detalhe.asp?id_obj=591)	8/09/2011 (M1)	Pavilhão do Conhecimento (Lisboa)	Teacher training. Project presentation	UoC	~50 teachers
T	NTW Spanish Teachers Programme	11-16/09/2011 (M1)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics, GRID and related subjects, hands-on sessions and visits to experiments and Microcosmos at CERN	CERN	40 Spanish high school teachers
October 2011						
T	NTW German Teachers Programme	02-07/10/2011 (M2)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics, Astrophysics and related subjects, hands-on sessions and visits to experiments at CERN	CERN	36 German High school teachers

Type	Event	Date (Project Month)	Location	Purpose	Partner	Participants
T	Academia do Cosmos	08/10/2011	Centro de Interpretação Ambiental da Pedra do Sal: Cascais - Portugal	Training sessions on the use of digital soft. and science research projects implementation Discover the Cosmos was introduced to teachers working with the Portuguese node of GTTP	NUCLIO	20 school teachers
T	Academia do Cosmos workshop	08/10/2011	Cascais, Portugal	2011/2012 projects presentation and a brief introduction on the use of eScience e eInfrastructure in classroom	NUCLIO	~30 School teachers
T	Academia do Cosmos	12/10/2011	Centro de Interpretação Ambiental da Pedra do Sal: Cascais - Portugal	Training sessions on the use of digital soft. and science research projects implementation International Asteroid Search Campaing – Real research exemple for classroom activities implementation. Datamining and eScience research	NUCLIO	20 school teachers
T	NTW Project weeks at CERN	16-28/10/2011	CERN	Research projects, Workshops	TUD, CERN	4 qualified high school students
T	NTW Teachers Workshop	16-21/10/2011 (M2)	CERN	Introduction into Particle Physics, CERN	TUD, CERN	40 high school teachers

Type	Event	Date (Project Month)	Location	Purpose	Partner	Participants
T	CERN UK Teachers Programme	24-27/10/2011 (M2)	CERN, Switzerland	Theoretical classes for high-school teachers on Particle Physics and related subjects, hands-on sessions and workshops supplemented with audiovisual material, and visits to experiments at CERN	CERN	39 UK high school teachers
November 2011						
T	NTW Austrian Teachers Programme	13-18/11/2011 (M3)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics, Astrophysics and related subjects, hands-on sessions and visits to experiments at CERN, all in German language	CERN	31 Austrian high school teachers
T	Teacher workshops on inquiry based teaching methodology and eScience applications	18 & 25/11/2011 (M3)	Ellinogermaniki Agogi	Presentation of a) inquiry based teaching methodology in a classroom and b) educational tools and eScience applications to teachers. Workshop followed on the data analysis tool HYPATIA.	EA	~20 high school teachers
MC	Day of the "World machine"	23/11/2011 (M3)	Technische Universitaet Dresden (TUD) (also in 14 other cities in Germany)	Masterclass, Informing about CERN, presenting German Network "Teilchenwelt"	TUD	~ 250 participants in Dresden (150 students, 10 teachers, 90 general public)

Type	Event	Date (Project Month)	Location	Purpose	Partner	Participants
T	NTW UK Teachers Programme	28/11/2011 – 01/12/2011 (M3)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics and related subjects, hands-on sessions and visits to experiments at CERN	CERN	30 UK high school teachers
December 2011						
T	Universe in the Classroom	09/12/2011 (M4)	National Space Centre, UK	Training teachers on available astronomy resources for use in the classroom	UoG ESERO-UK	~20 high school teachers
T	Universe in the Classroom	16/12/11	Cambridge University	Training teachers on available astronomy resources for use in the classroom	UoG	~20 high school teachers
T	Academia do Cosmos	17/12/2011	Centro de Interpretação Ambiental da Pedra do Sal: Cascais - Portugal	Training sessions on the use of digital soft. and science research projects implementation	NUCLIO	10 school teachers

Table 1: Implementation Activities 2011

4.1.2 Year 2012 / Month 5 to 12 (M5-M12)

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
January 2012						
T	Academia do Cosmos	07/01/2012	Centro de Interpretação Ambiental da Pedra do Sal: Cascais - Portugal	Training sessions on the use of digital soft. and science research projects implementation	NUCLIO	15 school teachers
February 2012						
T	Academia do Cosmos	04/02/2012	Centro de Interpretação Ambiental da Pedra do Sal: Cascais - Portugal	Training sessions on the use of digital soft. and science research projects implementation Salsa J and science research in classroom. Project in partnership with European Hands-on Universe.	NUCLIO	10 school teachers

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
T	CERN Blended Learning Course	09.-11.02.2012	CERN, Switzerland	Presentation and discussion about Inquiry based teaching, scientific tools and services delivered by the Discover the COSMOS project and the Virtual School Austria. Visits of exhibitions and research facilities	BMUKK	3 teachers, 5 students, 12 other
T	Universe in the Classroom	24/02/2012\	National Science Learninng Centre	Training teachers on available astronomy resources for use in the classroom	UoG	~18 high school teachers
T	NTW UK Teachers Programme	February 2012 (M6)	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics and cosmology, hands-on sessions and visits to experiments at CERN	CERN	25 UK high school teachers
MC	ASAMI (After School Science Masterclasses)	9 weeks, (Feb - May)	Portola Middle School,	A student centered system, to teach mathematics through science and vice versa. Some piloting on the use of selected DtC demonstrators were implemented successfully.	LBL	15 students
March 2012						
T	Pupils workshop	10/03/2012 (M7)	Brétigny, France	Hands-on astronomy including robotic telescopes observations	IAP/CNRS	~ 60 pupils from UNESCO school network

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
T	UK National Astronomical Meeting	27/03/12 – 30/03/12 (M7)	Manchester University	Talks and workshops on project and available resources	LJMU	~50 UK university astronomer researchers
T	Particle Physics Masterclass	28/3/2012 (M7)	UB	Talks & workshops incl use of Minerva software tool	UB	~120 students aged 17/18
April 2012						
MC	"Astronomy masterclass"	04/04/12	University of Glamorgan	A 4-hour workshop covering a variety of astronomy and space science topics from the UK STEM National Curriculum, with a particular emphasis on A level Physics qualification. A mixture of talks, demonstrations and hands-on activities (both PC-based and lab-based), this course covers all of the astronomy content at Key Stage 5 (ages 16-18).	UoG	35 High school students (ages 16-18) 3 High school teachers
MC	"Astronomy masterclass" (A level)	26/04/12	Cyfarthfa High School, Merthyr, S Wales	A 2-hour workshop covering a variety of astronomy and space science topics from the UK STEM National Curriculum, with a particular emphasis on A level Physics qualification. A mixture of talks, demonstrations and hands-on activities (both PC-based and lab-based), this course covers all of the astronomy content at Key Stage 5 (ages 16-18).	UoG	15 High school students (ages 16-18) 1 High school teachers
May 2012						

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
MC	"Astronomy masterclass" (GCSE)	12/05/12	University of Glamorgan, Pontypridd, South Wales	A 4-hour workshop covering a variety of astronomy and space science topics from the UK STEM National Curriculum, with a particular emphasis on the contents of the GCSE Astronomy qualification. A mixture of talks, demonstrations and hands-on activities (both PC-based and lab-based), this course covers all of the astronomy content at Key Stage 4 (ages 14-16).	UoG	40 High school students (ages 12-18) 4 High school teachers
June 2012						
T	NTW High School Students Workshop at CERN	31/05-03/06/2012 (M10)	CERN	Introduction into Particle Physics, CERN, Inqu. Learning, Meeting scientists	TUD, CERN	~ 30 high school students
T	e-HOU conference	22/06/2012	Yerkes Observatory and onlie	This was the first US-HOU conference broadcasted via web. Several participatns were able to accompany the sessions and the teacher training via web	LBL	25 teacher resource agents
MC	US-IASC	All school year	US	Schools participated in the search for asteroids using robotic telescopes	LBL (HOU)	410 students
July 2012						
T	Datamining and Robotic Telescopes	01/07/2012	Cascais	Special training session devoted to the exploration of scienctific databases and the	NUCLIO	10

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
				use of robotic telescopes for research in school. The session was promoted by Professor Patrick Miller		
SS	Summer School for students	1-6/7/2012	Panormo, Greece	The Hellenic Physical Society and Ellinogermaniki Agogi organized a five day summer school with high school students from all over the country, ages 16-18. Students were engaged in astronomy and high energy physics activities using various online applications.	EA/IASA	45 High School Students
T	Discover the COSMOS' presentation at the Scientific Meeting of the Spanish Astronomical Society in Valencia.	10/07/2012	Valencia, Spain	During the X biennial meeting of the Spanish Society of Astronomy (SEA), UCM implemented an activity together with colleagues from the Image Processing Laboratory (IPL) at the University of Valencia. The public targeted was mainly secondary school sciences' teachers, though as the environment was a national reunion of national astronomers, some teacher trainers, researchers and staff of museums and science centers.	UCM	15 teachers, 2 trainees, 2 researchers and 4 science center staff
SS	Physics Summer School	11-12/7/2012 (M11)	UB	Labs included a PP computer lab using Minerva software	UB	50 Y12 students from 47 different schools across UK

	Event	Date (Project Month)	Location	Purpose	Partners	Participants
August 2012						
T	NTW Greek Teachers Programme	20 August 2012	CERN, Switzerland	Theoretical classes for high school teachers on Particle Physics and cosmology, hands-on sessions and visits to experiments at CERN	CERN	76 Greek high school teachers

Table 2: Implementation Activities 2012 (until 31st August)