



**TOWARDS AN ACCESSIBLE SCIENCE: FACILITATING
ACCESS TO SCIENTIFIC
DIGITAL RESOURCES FOR VISUALLY IMPAIRED
STUDENTS**

Progress Report

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¹ OJ L 79, 24.3.2005, p. 1.

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2 Summary

The aims of this period were:

- dissemination towards specialist and non specialist organizations of guidelines and best practices to prepare accessible scientific content (textbooks, educational material, etc.) in digital formats accessible for visually impaired;
- activities to give rise to awareness about access to science for visually impaired and especially about accessibility solutions (best practices, best experiences and guidelines);
- promotion of collaboration activities to pave the way to network long-term sustainability.

To achieve these objectives the following activities were undertaken throughout this period:

- dissemination together with the JEM network. This activity started in January 2008 with the participation of @Science members to the 3rd JEM workshop, then with the invitation of the JEM network co-ordinator to the first @Science workshop in Paris. This activity went on as follows:
 - participation of @Science members to the 2nd JEM seminar: Scientific Communities of Practice in Bremen on June 26th-27th. Results achieved:
 - best practices in creating XHTML+MathML documents were presented to JEM network members;
 - collaboration between @Science network members and Jacobs university in Bremen in order to make the ArXiv repository of scientific papers fully accessible both to blind and partially sighted. Jacobs university has undertaken the conversion of papers in the ArXiv repository into XHTML++MathML. Together with @Science members accessible XHTML+MathML papers have been produced and were evaluated for accessibility. Up to now about 230000 papers out of about 450000 have been converted. This result was presented in the @Science conference in Milan in October. The papers are not publicly available at the moment. They will be publicly available in the near future. They are anyway accessible at: http://arxmliv.kwarc.info/retval_detail.php?retval=no_problems;
 - the tutorial named "Producing Scientific Documents Accessible to Blind and Visually Impaired People" was held at the JEM training day on September 11th in Trondheim. Result achieved:
 - among participants were present member of Helsinki university, members of Jacobs university in Bremen, members of GeoGebra working group, members of Kingston university. These participants are active in preparing scientific learning objects for the JEM repository. They learnt how to produce these objects in accessible formats;
 - among the participants was present prof. Hunter from Kingston university who is working at input by speech. Early collaboration in input by speech of mathematics was undertaken;
 - prof. Hunter was invited to participate to the @Science conference in Milan;
 - at the @Science conference in Milan was invited the co-ordinator of the JEM network. She illustrated how to use JEM network to educate about accessible scientific content in conjunction with the @Science network;
- further collaboration activities were undertaken with JEM network:

- @Science chose to use the same repository of JEM network so as to simplify sharing of learning objects;
- @Science rebuilt the website by using the CMS Drupal 5, which is used by JEM network. That facilitates many operations in sharing content and also in enabling users to be simultaneously subscribed to both websites;
- collaboration with Associazione Italiana Editori (AIE), went on:
 - guidelines to prepare accessible scientific textbooks were based on collaboration with AIE. The publishing workflow was analyzed with members of AIE. The choice of PDF format to be analysed in details derived from the needs of publishers;
 - two members of AIE were invited to the @Science special thematic session at ICCHP 2008. Results achieved:
 - close collaboration with publishers led to guidelines which can be employed in the publishing workflow;
 - members of AIE gained awareness about accessibility problems but especially on emerging solutions which may be taken into account in future published works;
 - close collaboration with AIE paved the way to future meetings with publishers;
- university support services were involved as follows:
 - through conferences. In particular at ICCHP @Science special thematic session were present representatives of support services in: Karlsruhe university, Dublin City University, Dresden university, Norwegian University of Science and Technology, Comenius university in Bratislava, Masaryk university in Czech Republic, and more. Results achieved:
 - the paper Transnational Support to Students with Visual Impairment in University Scientific Courses was presented. That paper summarized the best practices for support services;
 - a follow-up seminar was requested by members of Masaryk university to be held especially for support services. This seminar was held in Comenius university on October 10th;
 - through meetings. In particular:
 - meeting with representatives of university support services in Slovakia. It was held on June 17th in Comenius university. In particular there were representatives from Technical University of Kosice, University of Banska Bystrica, which took up @Science practices and guidelines to prepare scientific educational material in accessible format;
 - the co-ordinator of the recently established university support service in Chisinau was invited to @Science Milan conference. This support service is taking up @Science best practices and guidelines;
- collaboration with companies and universities which do not focus on disability, but which focus on tools for scientific content management. In particular collaboration went on with:
 - Design Science Inc.. Collaboration activities went on:
 - about localization of MathPlayer software for Braille and speech. A Design Science representative presented at ICCHP the new MathPlayer with speech output localized for Italian and German in addition to other languages. This a result of close collaboration with @Science members;
 - integration of UMCL library for national Braille codes. The result was presented at the @Science conference in Milan;

- MathPlayer was used to access ArXiv repository converted into XHTML+MathML. That evaluation activity led to the improvement of MathPlayer, especially for management of parallel MathML markup. The new version was presented in Milan conference;
- dissemination of transnational use of MathPlayer for rendering mathematics by speech, Braille and in magnified form. A Design Science representative was invited to ICCHP conference (both in the @Science workshop and in the special thematic session) and to the @Science conference in Milan;
- Design Science products to produce accessible scientific documents were made available and distributed to conferences (ICCHP, @Science conference in Milan) in the CD of the proceedings of the @Science workshop in Paris;
- procedures to make educational resources in accessible formats were experimented especially through Design Science MathType and MathPlayer;
- collaboration with Science Access Net in Japan. It went on closely with @Science members:
 - thanks to the collaboration with Pierre et Marie Curie Université InftyReader is able to produce XHTML+MathML documents from printed material which can be rendered in national Braille codes
 - Science Access Net representatives were invited to present InftyReader at ICCHP, both in the special thematic session and in the workshop. The Science Access Net co-ordinator was invited to participate to @Science conference in Milan. The latest version of InftyReader was presented. It embeds support for recognizing text in multiple languages thus producing scientific documents combining text and mathematics;
 - early collaboration was undertaken to improve text recognition for Italian language;
- collaboration with VEIA Progetti SRL. It went on especially as for the localization of the LAMBDA system in Slovakia. After ICCHP conference further localization of this system was undertaken for Czech Republic and Austria. Members of this company were invited to present the results of transnational use of the LAMBDA system both at ICCHP and in the @Science conference in Milan;
- collaboration with the MathML-in-DAISY working group. Since this working group is promoting embedding of MathML in the DAISY format, which would bring great advantages to transnational use of scientific documents by visually impaired (see Deliverable 4.2), members of this working group were invited both at ICCHP workshop and at the @Science conference in Milan. Since this working group is preparing guidelines to produce DAISY documents embedding mathematics, references to this work were reported in the @Science guidelines to produce textbooks accessible to visually impaired (Deliverable 4.2);
- collaboration with universities where advanced projects about access opportunities to science for blind and partially sighted. Collaboration went on especially with universities already involved in Paris workshop: Technical University in Dresden, San Francisco University, New Mexico University and also Politecnico di Milano and Federico II university in Naples. Representatives of these universities were involved in ICCHP @Science workshop and special thematic session as well as in @Science conference in Milan;
- collaboration with university libraries. Results achieved:
 - presentation of accessibility problems and solutions to the European Library Automation Group;

- presentation of possible collaboration activities based on sharing metadata about resources in repositories to the Dandelon network of libraries. Dandelon is a network of libraries (at the moment some tenth of libraries are associated) which aims at sharing catalogues, table of contents and abstracts of resources. Dandelon members were interested in collaborating by making available catalogues of accessible digital resources in libraries. Collaboration modalities will be discussed at the Dandelon annual meeting which is expected to be held in January 2009.

Dissemination and awareness activities through participation at conferences went on. Papers about the best techniques to make scientific content accessible were presented at: Cambridge workshop on Universal Access and Assistive Technology, European Library Automation Group, Web senza Barriere 2008 (an Italian conference promoted by the Italian webmaster Association), ACM Advanced Visual Interfaces by ACM, ACM Computer Human Interfaces 2008, Vision 2008, EIPub 2008, ICCHP 2008, International Conference on Mathematics Education, Mathematical Knowledge Management 2008, workshop Towards digital Mathematics Library within MKM conference, SVG Open, Accessible Design in the Digital World.

3 Status

3.1 Resources employed

Resources employed for the reporting period (person-months)							
Beneficiary short name	WP 01	WP 02	WP 03	WP 04	WP 05	WP 06	TOTAL
USM	2		0.5	2	2.5	2	9
JKU-IS	0.05					0.5	0.55
K.U.Leuven	0.05					0.5	0.55
FMFI UK	0.05					0.5	0.55
UICVR	0.2					0.5	0.7
UPMC	0.05					0.5	0.55
TOTAL	2.4		0.5	2	2.5	4.5	11.9

3.2 Work Package Overview

Work package description					
Work package number :	1	Start date:	1	End date:	24
Work package title:	Project Management				

Objectives for the period
<p>The main objectives were:</p> <ul style="list-style-type: none"> • co-ordination of planned activities, in particular: organization of ICCHP @Science Workshop and @Science Special Thematic Session; participation to conferences; organization of meetings; accomplishing best practices and guidelines (Deliverable 3.1, 4.2, 4.4); • planning network long-term sustainability; • monitoring of key performance indicators.

Description of work carried out and achievements
<p>Most of the work was done to:</p> <ul style="list-style-type: none"> • enforce collaborations undertaken in the previous activity periods. In particular: collaboration with JEM Thematic Network, collaboration with Associazione Italiana Editori, collaboration with Science Access Net, collaboration with universities (Dublin City University, Karlsruhe University, San Francisco University, New Mexico State University, Helsinki University, etc.), and collaboration with companies (VEIA Srl, Design Science Inc., Dedicon as a representative of the MathML-in-DAISY working group). Achievements: collaboration with all of these groups went on through joint organization of @Science events and in planning together the future activities (e.g., localization activities, sharing of content and competencies, meetings, etc.); • establish new collaborations. Achievements: <ul style="list-style-type: none"> ○ meetings with new associations, universities and companies were organized. In

particular with: Dandelon network of digital libraries, River Valley Technologies (UK), Slovak Association of the Blind, Library and Publishing Centre in Bratislava, Department of Informatics Education in Comenius university (Bratislava), Technical University of Kosice, Barthimeus institute for the blind in the Netherlands, Masaryk University in Brno, Jacobs university in Bremen, International Webmaster Association (Italy), secondary schools in Slovakia, Direzione Scolastica Regione Lombardia (Italy). Collaboration is going on with: Jacobs University in Bremen about converting ArXiv content into an accessible format, River Valley Technologies about making available proceedings of scientific conferences in accessible multimedia formats on the web (River Valley Tech works with Elsevier publisher to make available conference proceedings), Kosice University about educating blind students in computer science, Masaryk University about the use of the LAMBDA system in an international context, Slovak Association of the Blind about making chemical formulae accessible, Direzione Scolastica Regione Lombardia about spreading best practices in secondary schools in Italy;

- monitor key performance indicators. They were monitored through statistics. Since some KPIs (e.g. those concerning mailing list and forum) were high enough, but people did not use to contribute to these to communication strategies, an attempt to make people communicate was to make available more meetings to share experiences. In particular: at ICCHP two sessions were organized, in @Science Milan conference pre-conference was available time for meetings among participants, a meeting was organized in Comenius university on June 17th and a seminar on Oct 10th, a meeting was organized by Unione Italiana Ciechi in Roma in August and at Dublin City University on August 20th;
- ensure long-term sustainability. It was planned around the following activities:
 - localization activities for applications which render scientific content in national speech and Braille codes. In particular among: Design Science, Science Access Net, VEIA Srl, Milan university, Linz university, Comenius university, Pierre et Marie Curie Université;
 - improving of conversion libraries into Braille codes for mathematics from/to formats used for scientific representations (in particular LaTeX). It is going on with Dublin City University. A PhD student from Milan university is going to work together with Dublin City University about this problems;
 - conversion of ArXiv papers into accessible XHTML+MathML. This work started in collaboration with Jacobs university in Bremen. Since this university aims to go on with other repositories (e.g. repositories of the European mathematical society) this work will go on in collaboration with @Science;
 - sharing of content and users with the Joining Educational Mathematics network. That started in these months and the proper architectural changes to the @Science website were done. In particular the same CMS (Drupal 5) and the same learning object repository were employed;
 - the new @Science website. The @Science website was rebuilt in order to ensure better communication with the JEM network, to improve reusability of its content, to facilitate making updates, to make available objects in the repositories through OAI-PMH protocol so as to increase metadata harvesting (that facilitates the creation of value-added services based on OAI protocols and standards). The new website can be reached at: www.ascience-thematic.net . Redirection mechanism will be ensured from www.ascience.eu.
 - preparation of textbooks in accessible formats. Thanks to collaboration with Associazione Italiana Editori, involvement of publishers to prepare textbooks in accessible formats will go on;
 - preparation of educational resources in accessible formats. Thanks to the collaboration with universities spreading of these best practices will go on. Most of these

universities will go on informing the teaching staff through their support services. The @Science repository will be a reference for examples of accessible content and success experiences.

Deviation from work plan & remedial action

The work on the guidelines has been delayed due to the attempt to proceed together with the target group (e.g. publishers, university support services, university teaching staff) in the preparation of the guidelines. For example, considerations about the actual publishing workflow and about PDF in Deliverable 4.2 were discussed with Associazione Italiana Editori.

The remedial action was to go on disseminating already well-established guidelines and best practices through papers, presentations and tutorials in conferences and meetings. Moreover, references of people potentially interested to the guidelines were collected in order to send them the books of guidelines as soon as ready. After the @Science conference in Milan, 226 people were interested to receive the books. That facilitates future contacts with interested people.

Many potentially interested participants and speakers (in particular from AIE, JEM and Science Access Net) to the @Science conference planned in Milan for the end of September requested to post-pone the conference.

Remedial action. In order to make possible wide dissemination of knowledge and to enforce collaborations through the @Science conference in Milan, authorization was requested and received from European Commission in August. Post-poning the conference required much work to organize again some conference related activities and post conference preparation of proceedings.

Work package number :	3	Start date:	2	End date:	24
Work package title:	University Support Services				

Objectives for the period

Two objectives:

- collecting best practices and guidelines in deliverable 3.1;
- dissemination of best practices for university support services.

Description of work carried out and achievements

Best practices were disseminated through the following events:

- meeting with Slovak university support services in Bratislava university on June 17th;
- ICCHP. In the pre-conference and after the @Science special thematic session meetings with university support services representatives were organized. In particular the meeting with Masaryk university support service in Czech Republic led to the @Science seminar in Bratislava university on October 10th. (See <http://cezap.sk/akcie/access-to-scientific-sources-for-the-blind/Program.rtf>). The meeting with Dublin City University representative led to a further meeting in Dublin on August 20th with Milan university. That paved the way to enable a blind graduated student in computer science in Milan university to start PhD in computer science in Dublin City University;
- meeting between Comenius University representatives and the co-ordinator of Moldova

State university in Chisinau on September 16th. University support service in Chisinau has been recently founded. It took up best practices promoted by @Science;

- invitation of the co-ordinator of Moldova State University to the @Science conference in Milan.

The guidelines were made available in early November on the @Science website. Persons contacted in the meetings were contacted again to receive the guidelines by e-mail or by surface mail. (23 persons have been contacted again)

Deviation from work plan & remedial action

Delayed collection of best practices in a document.

The remedial action was to disseminate anyway the practices which were discussed and presented even without a specific deliverable available, but through papers and slide presentations. (e.g., ref. the paper "Transnational support to visually impaired in university scientific courses", C. Bernareggi, V. Brigatti, B. Hengstberger in proceedings of ICCHP 2008, LNCS, Springer).

Work package number :	4	Start date:	4	End date:	24
Work package title:	Scientific Resources Usable by Visually Impaired: Textbooks, Lessons, Examinations				

Objectives for the period

The main objectives were:

- definition and dissemination of guidelines to prepare scientific textbooks and to prepare educational material and examinations accessible for blind and partially sighted;
- set up of a document repository which can receive/send contributions from/to many repositories and distribute accessible content to blind and partially sighted persons.

Description of work carried out and achievements

In order to define guidelines for accessible textbooks the work went on as follows:

- the two publishers proposed by AIE, namely Fabbri and ETAS-RCS made available in May the digital files of two books:
 - "Galileo" corso di scienze + materiali di scienze, 2 volumi, autori Flaccavento-Romano, ed. Fabbri, ISBN 8845106195;
 - "Matematica Tre", autore coautore: Lamberti Lamberto, Mereu Laura, Nanni Augusta, ed. ETAS (RCS Libri), ISBN 8845131831.
- the two books were analyzed and samples of accessible PDF files were prepared by @Science members. The samples were given back to AIE and the publishers for dissemination purposes of best results among publishers;
- a meeting on June 23rd was done with AIE representatives to discuss problems and solutions to make accessible PDF according to the publishing workflow;
- two AIE representatives were invited to ICCHP conference in July to give rise to awareness about state-of-the-art solutions for blind people and emerging opportunities;
- in September accessibility experiments were done with the new Adobe Acrobat 9, very recently released so as to ensure step-by-step procedure compliant with the last version which embeds better accessibility features;
- in September a meeting was organized with Italian publishers to be held in to illustrate guidelines;
- the guidelines were written and completed within October.

The book of guidelines was delayed. Nonetheless, it was accomplished in collaboration with the publishers who will use them. That will ensure applicability to the publishing workflow.

As for the preparation of guidelines about making accessible educational material, lessons and examinations (Deliverable 4.2), the work went on as follows:

- proposed step-by-step procedures were tested with software being localized. In particular they were tested with MathPlayer localized for European languages within August by @Science members;
- step-by-step procedures to prepare accessible slide presentations were tested with MathType 6, recently released. It ensures better accessibility than more accessible slide presentations.

These experimentation led to guidelines which can be reliably applied thus guaranteeing good results for blind and partially sighted students who will get advantage of the content produced.

As for the creation of the @Science repository the work went on as follows:

- problems were met in making a reliable and installation of some of the most known digital repository system managers (in particular D-Space and GreenStone were tried) so that the system exposed an accessible web interface for blind and partially sighted and in a way that the @Science users were recognized and selectively enabled to upload/download content;
- on May 26th and 27th, Milan University participated to a meeting on Open Access at CILEA in Milan focused on D-Space. The problems met were discussed and it was clear that no short-term improvement in D-Space was to come about this problems;
- the JEM Network started to use a repository compliant with OAI standards and which could be integrated in Drupal 5;
- the @Science network decided to use the same repository system by making the web interface accessible. That ensured easier content management both to import JEM learning objects and to export learning objects for the use of JEM network members. Furthermore, this repository is compliant with OAI specifications and that ensures advantages coming from harvesters;
- the repository has been available since the end of July on the new @Science website.

Deviation from work plan & remedial action

The guidelines were delayed.

The remedial action was to deliver anyway the samples and the best practice both at conferences and meetings.

The second remedial action concerned the organization of devoted meetings with AIE so as to ensure applicability of guidelines.

Delay in making the repository available.

The remedial action was to choose a repository which may ensure collaboration with JEM Network members so that more accessible content can be delivered in the future.

Work package number :	5	Start date:	13	End date:	24
Work package title:	Shared Information Network and Devoted Knowledge Bases				

Objectives for the period

Two objectives:

- continuous updating of website content;
- support communication among institutions and users.

Description of work carried out and achievements

The website has been continuously updated with step-by-step achievements: events to which the network members took part, @Science upcoming events, dissemination material (namely slide presentations at ICCHP, paper abstract at ICCHP workshop, slide presentations and audio file of speeches of @Science Milan conference were uploaded in the @Science repository and are reachable from the website). In particular, screen casts about how to produce accessible content were made available through the website.

Deviation from work plan & remedial action

The mailing list has been mostly unattended.

Remedial action: since the mailing list has not been very used throughout the project, attention was mainly drawn on face-to-face meetings and contributions to the website.

Work package number :	6	Start date:	1	End date:	24
Work package title:	Awareness and Dissemination				

Objectives for the period

In this period, four dissemination and awareness objectives were supposed to be achieved:

- participation to national and international conferences with papers and poster presentations and informational brochures;
- organization of meetings with institutions and individuals interested in science accessibility opportunities;
- organization of the @Science workshop at ICCHP and of the @Science Special Thematic Session at ICCHP;
- organization of the @Science conference in Milan.

Description of work carried out and achievements

The @Science members went on presenting papers, communications, posters, and delivering brochures at international conferences:

ACM-CHI 2008

This conference was held in Florence on April 8th. It focused on Computer Human Interaction. Milan University presented the poster: "A multimodal interactive system to create and explore graph structures", C. Bernareggi, C. Comaschi, M. Marcante, L. Parasiliti, P. Mussio, S. Vanzi.

In this conference people from English universities (Lancaster, Nottingham) and from the University of Barcellona were informed about accessibility problems in science for the blind.

Meeting with Biblioteca Italiana per Ciechi

Unione Italiana Ciechi representatives met on April 3rd, 8th and 24th the transcribers of

Biblioteca Italiana per Ciechi. They were trained about software to make mathematical textbooks accessible. In particular, InftyReader was introduced and techniques to introduce scientific content in MS Word document through Design Science MathType were introduced.

ELAG 2008

At European Library Automation Group, Milan University and Unione Italiana Ciechi gave a slide presentation entitled “Toward a Scientific Digital Library Accessible for Visually Impaired”.

This presentation gave rise to awareness and interest. Dandelon Library Network co-ordinator contacted Milan University for further collaboration about this problems. A meeting with Dandelon co-ordinator was held on May 19th .

Web Senza Barriere 2008

Milan university participated to this conference especially to inform through brochures IWA members about upcoming @Science events: ICCHP Workshop and Special Thematic Session and @Science conference in Milan.

ACM-AVI 2008 and ACM-AVI-MYTH Workshop 2008

Milan University took part, together with a representative of Unione Italiana Ciechi. The following two papers were presented:

- “Haptic Mathematics: why and how”, C. Bernareggi, C. Comaschi, L. Parasiliti, P. Mussio, A. Marcante;
- “Enhancing a multimodal interactive system to work with graphs through exploration driven by forces”, C. Bernareggi, C. Comaschi, G. Dalto, P. Mussio, L. Parasiliti

These two papers aimed at illustrating how scientific content can be explored through audio-haptic interaction and how a larger availability of scientific content exploitable through audio-haptic interaction would bring advantages to visually impaired.

Meeting between Pierre et Marie Curie Université and Linz university

It was focused on preparation of ICCHP workshop and special thematic session. It was held in May in Linz.

Meeting with representatives of Slovak universities, publishers and associations

It was held in Bratislava at Comenius university on June 17th. The following participants were involved: C. Bernareggi, Milan University, L. Annoni, Unione Italiana Ciechi, E. Mendelova, P. Lecky, A. Frantova from Comenius University Support Service, I. Kohanova, lecturer at Department of Algebra, Geometry and Didactics of Mathematics at Comenius University, L. Jaskova, lecturer at the Department of Informatics Education in Comenius University, M. Benesova from Slovak Library and Publishing Centre, B. Mamojka, president of Slovak Blind and Partially Sighted Union, D. Simsik, co-ordinator of the Access Centre at the Technical University of Kosice.

EIPub 2008

EIPub 2008 was held in Toronto on 25th-27th June. Representatives of Leuven University participated. They disseminated information about Open Access repositories and accessibility related issues.

Meeting with Science Access Net

It was done in Tsukuba University in June, the week from the 21st to the 27th. Pierre et Marie Curie Université participated. Close collaboration was established to insert UMCL library into InftyReader software so as to produce scientific document in national Braille codes from printed mathematics.

2nd JEM Seminar: Scientific Communities of Practice

In this seminar Milan University and Unione Italiana Ciechi presented a slide presentation entitled “How to Use XHTML+MathML to Make Scientific Content Accessible for Visually Impaired”.

This presentation arose the interest of Jacobs University co-ordinator for a work to convert arXiv repository of papers into XHTML+MathML documents. Therefore, collaboration between the @Science Network and Jacobs University was undertaken and is going on.

EdiTech

This conference was organized in Milan on June 27th by Associazione Italiana Editori. Milan University representatives participated to understand trends in publishing and to discover the features of Adobe Acrobat 9 which was recently released. Adobe presented the new accessibility features of Adobe Acrobat 9. These features were used for the guidelines to prepare textbooks (see deliverable 4.2).

ICME

From July 6th to 13th, 2008, a representative of Comenius University took part at the International Congress on Mathematics Education - ICME 11 in Monterrey, Mexico. This congress is held every four years. Mathematics educators from the entire World meet here and inform each other about their recent researches and results in field of Mathematics Education. About three thousands of participants worked in 38 Topic Study Groups and 28 Discussion Groups. In addition to these groups there were also time slots assigned for plenary and regular lectures, workshops, posters and round tables. The @Science representative worked within the Topic Study Group 7, whose topic was: “Activities and programs for students with special needs”. The group had 20 participants, 12 of them presented shortly their work. The group focused on 4 main topics:

- definition of special needs, Identifying students' needs and early intervention;
- the view of minority students. Programmes and activities for visually impaired students;
- activities and materials for visually and hearing impaired students;
- intervention experiences and results.

In the frame of the second section, a paper was presented: “The ways of teaching mathematics to visually impaired students” by Iveta Kohanova. In the first part, the actual situation of teaching mathematics to visually impaired students at each level of education (primary, secondary, university) in Slovakia was introduced. In the second part, best practices and guidelines to support students with sight impairment were presented. Within the Poster slot was presented the poster with name: “@Science Project”, which informed about the problems of students with visual impairment when studying mathematics, sketch of best practices and references to further papers and website.

ICCHP 2008

ICCHP 2008 was held in Linz Johannes Kepler universitet from July 8th to July 12th. At ICCHP the @Science Workshop and Special Thematic Session about access to science for visually impaired were organized. The proceedings are available in audio format, together with the PDF files of the papers, in the CD of the conference proceedings (Deliverable 6.4). Furthermore, papers presented in the Special Thematic Sessions were published in Lecture Notes in Computer Science, Vol. 5505/2008, published by Springer.

The list of talks of the @Science Workshop and of papers of the @Science Special Thematic Session are available at: <http://www.ascience-thematic.net>

VISION 2008

The 9th International Conference on Low Vision was held in Montreal from July 7th to July 10th. Pierre et Marie Curie Université participated. A slide presentation illustrated main

problems in scientific knowledge management for visually impaired and solutions coming up through the use of UMCL library to be embedded in applications to enable transnational Braille access to MATHML documents.

Mathematical Knowledge Management 2008 and Workshop “Towards a Digital Mathematics Library 2008”

Milan University, UIC representatives and Science Access Net co-ordinator attended the conference. They contributed to the discussion about the possibility to generate scientific papers in DAISY+MathML format. Furthermore, the manager of River Valley Technologies (www.river-valley.tv), who collaborates with Elsevier to prepare scientific publications showed interest in the @Science project. He was invited to the @Science conference in Milan and is actively disseminating the video recordings of Milan conference on the River Valley Technologies website. This website collects recordings of conferences concerning scientific publishing all over the World (conferences of TeX User Group are archived in this website).

Meeting to present and share study practices

Unione Italiana dei Ciechi organized on August 11th a meeting with blind students from many Italian regions to give the possibility to present and discuss study practices in scientific studies. Best practices were illustrated by students who were finishing scientific university courses. 9 participants were involved.

Meeting with Dublin City University representatives

It was held at Dublin City University on August 20th and 21st. Representatives of Milan University participated. The meeting concerned the results about audio-graphics achieved in Dublin City University, and future collaboration about extending UMCL library and about working on haptic applications. A collaboration was established by enabling a blind student graduated in computer science in July at Milan University to undertake his Ph.D. course in Dublin City University, with the aim of extending and improving the performance of UMCL library.

SVG Open

It was held in Nuremberg (Germany) on August 26th-29th. A representative of Leuven university attended the conference and presented how to use SVG format to present scientific images accessible for partially sighted.

4th European Workshop on Mathematical and Scientific e-Contents

It was held on September 11th in Trondheim. It was organized by the JEM network. Milan University, Unione Italiana Ciechi, and Pierre et Marie Curie Université representatives participated. The tutorial "Producing Scientific Documents Accessible to Blind and Visually Impaired People" was organized at the training day. Especially teachers, university professors and researchers were present. In particular, among participants there were members of Helsinki University, Jacobs University in Bremen, the GeoGebra working group, and Kingston University. The members of Kingston University were interested to collaborate further with @Science. They were invited to the @Science conference in Milan.

Accessible Design in the Digital World

It was held at York University on 22nd – 24th September. Representative of Leuven University participated. Best practice for designing accessible web pages embedding mathematics were presented.

Meeting with Dublin City University

A meeting to set up future collaboration about UMCL was organized on October 10th

between Milan University and Dublin City University. Future activities concerning the Ph.D. course about UMCL were planned.

Meeting with secondary school teachers

On September 26th a meeting with secondary school teachers was held in Bratislava at Comenius University. They were introduced to the opportunities for blind and partially sighted to access scientific university courses. 23 teachers were present from Slovakia.

Seminar: Access to Scientific Sources for the Blind

It was organized in Comenius university on October 10th, 2008. Milan University representatives, UIC members, and Comenius University participated. The aim was to illustrate the best practices to Slovak and Czech Republic interested working groups. Future collaboration was planned with Kosice Technical University about presenting user experiences in accessing computation software (a paper about this issue was submitted by Milan University members, Kosice University members and UIC members for CVHI 2009 conference).

The list of presentations follows:

- “Producing Scientific Documents Accessible for Blind Students: State-of-the-art Techniques and Emerging Opportunities”, Cristian Bernareggi, Università degli Studi di Milano, Italy
- “System LAMBDA: What It Is and How It Works in Slovak Environment”, Peter Lecky, Comenius University, FMFI, Bratislava, Slovakia
- “Free Access to Desktop and Web 2.0 Applications”, Peter Vagner, Matej Bel University, FPV, Banska Bystrica, Slovakia
- “User Experiences in Working with Computation Programs at University”, Sauro Cesaretti, Unione Italiana Ciechi, Italy
- “Reading and Creating Molecule Patterns by Blind People”, Peter Teplicky, Slovak Blind and Partially Sighted Union, Slovakia
- “Approach to Study of Mathematics and Informatics at Technical University of Košice”, Jana Andrejkova, Dusan Simsik, Technical University in Kosice, Slovakia
- “Educational Study at FMFI CU and Competences for Inclusive Education”, Ludmila Jaskova, Comenius University, FMFI, Bratislava, Slovakia
- “IT for Handicaped People in Student Bachelor Theses at Faculty of Science PJSU”, Jozef Zapotocky, Pavel Jozef Safarik University, FPV, Kosice, Slovakia
- “Universal Learning Design and Scientific Sources for the Blind: State-of -the-art in the Czech Republic”, Petr Penáz, Svatoslav Ondra, Masaryk University Brno, CZ
- “Our Integration Into the Empire of the Blinds”, Miroslava Sudolska, Jozef Krnác, Matej Bel University, FPV, Banska Bystrica, SK
- “Accessibility on the Fly”, João de Sousa e Silva, Instituto Politecnico de Leiria, Portugal
- “Access to Mathematics - Motivation for Studying Sciences”, Elena Mendelova, Comenius University, FMFI, Bratislava, SK

Making Science Accessible: emerging opportunities for blind and partially sighted

This is the @science international conference organized in Milan on October 20th. All details about the program and the content of each presentation can be found in deliverable 6.7 and 6.8. At the conference subscribed 103 people. These persons required the books of guidelines, which will be send them by surface mail.

Deviation from work plan & remedial action

The @Science conference in Milan was post-poned to October instead of September. This was due to the possibility of wider participation of multiplier organizations (see Work Package 1).

3.3 Deliverables Status

Deliverables List

Deliverable No ¹	Deliverable title	Delivery due date ²	Actual date of delivery ³
D4.1	Copyright Management	15	24
D3.1	Best practices for university support services	18	25
D4.2	Guidelines to prepare scientific textbooks usable by visually	18	25
D4.3	Tools to enable communication among university libraries and distributed digital library implementation	18	25
D1.6	3 rd periodic report	19	24
D4.4	Guidelines to prepare scientific educational resources, to hold scientific lessons, to prepare examinations achievable by visually impaired.	24	26
D6.7	2 nd international workshop proceedings	24	25
D6.8	Brochure presenting @Science project final results	24	25
D6.9	Final assessment and evaluation report	24	26
D1.7	4 th periodic report	25	26
D1.8	2 nd annual report	25	26
D1.9	Final financial statement	25	26

3.4 Performance Indicators

Indicators	Expected vs Actual					
	Year 1 (exp.)	Year 1 (act.)	Year 2 (exp.)	Year 2 (act.)	Year 3 (exp.)	Year 3 (act.)
Number of accesses to @Science website	100	1304	300	8721		

¹ Deliverable numbers in order of delivery dates: D1 – Dn. Deliverable numbers must indicate which workpackage they relate to, e.g. D2.1 for the first deliverable from workpackage 2).

² Month in which the deliverables will be available. Month 0 marking the start of the project, and all delivery dates being relative to this start date.

Number of subscription at @Science mailing list	20	18	40	37		
Number of subscriptions at @Science forums	20	18	40	37		
Number of downloaded documents	15	25	30	53		
Number of available titles	50	22	100	67		
Number of involved universities/high schools	10	11	20	47		
Number of involved students' associations	5	2	10	7		
Number of participants contributing to workshops, conferences, meetings	10	8	20	54		
Number of organisations contributing to workshops, conferences, meetings	5	8	15	41		
Number of countries covered in any workshops, conferences, meetings organised by the network	10	16	15	33		
Number of relevant workshops, conferences, meetings where a representatives of the network has participated	4	14	6	45		
Number of workshops, conferences, meetings where results of the network have been presented	3	12	5	53		
Number of stakeholders who have been informed about the network and its results	10	60	20	138		
Number of scientific text books prepared by stakeholders according to tex books guidelines	-	-	2	2		
Number of courses/examinations prepared according to guidelines for educational resources	-	-	-	2		
Take-up of any guideline developed by the network	-	-	8	6		

4 Awareness and Dissemination

4.1 Overview of awareness and dissemination activities

Dissemination and awareness actions focused on participating to international and national conferences, on preparing and submitting contributions for future events, on organizing devoted meetings, and on planning @Science international events, which involve a worldwide public. In particular, events and meetings were chosen in order to reach all the target groups: universities, libraries, publishers, associations for blind and partially sighted and the scientific community which produces contents for publishing. Details about events are reported in section 3.1 in Work Package 6.

4.2 Events and meetings

List of Events & Meetings

Name	Location	Date
ACM - CHI 2008	Florence, Italy	05-10/04/2008
Meeting with Biblioteca Italiana per Ciechi	Italy	03, 08, 24 /04/2008
ELAG 2008 – “32 nd ELAG Library System Seminar”	Wageningen, The Netherlands	14-16/04/2008
W4A – “International Cross-Disciplinary Conference on Web Accessibility”	Beijing, P.R. China	21-22/04/2008
SightCity Frankfurt 2008	Frankfurt, Germany	07-09/05/2008
Web Senza Barriere 08	Rome, Italy	08/05/2008
Meeting with Dandelon Library Network co-ordinator	Germany	19/05/2008
ACM – AVI 2008 / ACM – AVI – MYTH Workshop 2008	Napoli, Italy	27/05/2008-01/06/2008
Meeting between Pierre et Marie Curie Université and Linz University	Linz, Austria	05/2008
Meeting with Representatives of Slovak Universities, Publishers, and Associations	Bratislava, Slovakia	17/06/2008
Meeting with Science Access Net	Tsukuba, Japan	21-27/06/2008
ELPUB 2008	Toronto, Canada	25-27/06/2008
2 nd JEM Seminar: Scientific Communities of Practice	Bremen, Germany	26-27/06/2008
EdiTech	Milan, Italy	27/06/2008
ICME	Monterrey, Mexico	06-13/07/2008
ICCHP 2008	Linz, Austria	07-12/07/2008
VISION 2008	Montreal, Canada	07-10/07/2008
Mathematical Knowledge Management (MKM) 2008 and Workshop “Towards Digital Mathematics Library 2008”	Birmingham, UK	28-30/07/2008

Meeting to present and share study practices	Rome, Italy	11/08/2008
Meeting with Dublin City University representatives	Dublin, Ireland	20-21/08/2008
SVG Open	Nuremberg, Germany	26-29/08/2008
4 th European Workshop on Mathematical and Scientific e-Contents	Trondheim, Norway	11/09/2008
Accessible Design in the Digital World	York, UK	22-24/09/2008
Meeting with secondary school teachers	Bratislava, Slovakia	26/09/2008
Meeting with Dublin City University	Dublin, Ireland	10/10/2008
Seminar: "Access to Scientific Sources for the Blind"	Bratislava, Slovakia	10/10/2008
Making Science Accessible	Milan, Italy	20/10/2008

5 Conclusions

Even if delayed, most of the objectives foreseen were achieved in the final period of the project. These results pave the way to long term sustainability. For further details, please reference the Final Annual Report.