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Dissemination and Use Plan

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1 General dissemination and exploitation strategy

MoWGLI aims to build a technological infrastructure providing context based access to mathematics in the web, semantic mark-up of documents and interactive usage of mathematical formulas, comprising automatic checking and theorem proving. MoWGLI's tools and solutions represent a highly sophisticated and innovative approach which has to be promoted in a special way to the potential user, because the applications will not be trivial, the efforts to adjust documents to such an offer will not be negligible and benefits for the user may not be immediately clear. Furthermore, the project goes for an extension and enhancement of several current services, which requires co-ordination with what has been done already and potential co-operation for basing the own investigations on the achievements of other projects. Hence information dissemination on various levels is essential for the success of the project, and exploitation of the achievements will be obligatory anyway. The dissemination and use plan systematically should develop ideas how to reach this goal. Here, at first some general strategic remarks in this direction are written down.

1.1 Target Communities

The project is of twofold interest. Naturally, everybody interested in mathematics may benefit from the achievements. But also information providers should know about the facilities offered by MoWGLI, and researchers in the domain of knowledge management will notice these investigations with high interest. Hence the core target community consists of the mathematicians, pure as well as applied, and as natural extension of all professionals who have to deal with mathematics. There are aspects in MoWGLI which also are of interest for education in mathematics, though admittedly some extra efforts will have to be undertaken to care about the special needs of this target community. Logicians and computer scientist may look at the project and its results more from a theoretical point of view. But to make the results accessible to users and to preserve them, also librarians are an important target community for the information dissemination. Finally, scientific editors and publishers have to be approached for the implementation of the new structures in the documents they are publishing and distributing.

1.2 Dissemination strategies

According to the various target communities different dissemination strategies have to be applied. The main part will consist of talks at congresses, workshops and other meetings. In accordance with the character of the corresponding meeting MoWGLI may be part of a more comprehensive presentation, it may get a presentation of its own, or even only special aspects of MoWGLI may be addressed by a talk. In the latter case some member of the group caring about the particular work-package may be the most suitable person to give that talk. Talks at bigger conferences should be accompanied by papers on MoWGLI in the corresponding proceedings, as it had been done already in the initial phase of the project. In a later phase of the project we shall submit articles to journals like "Online Information Review". A publication in the Lecture Notes of Computer Science is on the schedule already. To reach the mathematical community, shorter notes have to be submitted to newsletters of societies or interest groups.

In addition to the information dissemination through articles and talks, contacts to projects representing potential external partners for MoWGLI provide an alternative dissemination strategy. For example, talks at meetings of such projects will be the first step, and a co-operation supporting MoWGLI will be an advantageous consequence.

1.3 Related projects

In relation to the different aspects of MoWGLI there are several projects or activities we should keep in touch with. A main first category are E-publishing projects like the Electronic Library in EMIS (European Mathematical Information Service), Sparc Europe, Dissertations Online, EMANI (Electronic Mathematics Archiving Network Initiative) or even the various electronic offers from

commercial publishers. Going beyond the European borders Project Euclid at Cornell University or the preprint repository provided by the arXive will be potential partners. Including retrodigitised documents contacts to ERAM (Electronic Research Archive in Mathematics) or the European approaches to contribute to a world-wide DLM (Digital Library in Mathematics) will be of interest for MoWGLI.

Thinking of metadata shall care about contacts to and co-ordination with the OAI (Open Archive Initiative), the EULER service, having developed a meta-data format co-ordinated between several big libraries in mathematics, and clearly the Dublin-Core group has to be taken into account. Finally, talking about interfaces, we shall check what is provided by the mathematics gateways like Math-Gate, Math-Net, Math-Guide and also Phys-Net, because they may become provider for MoWGLI tools later on. We have to investigate what is available on the reviewing database level like for Zentralblatt Math and the Jahrbuch, for which Cellule MathDoc has developed a quite strong database management tool including an indexer, multilingual search interfaces and look up tools for data import and export. These developments are pursued further in the LIMES-project (Large Infrastructures in Mathematics - Enhanced Services).

1.4 Important conference series

There are some conferences which take place periodically and also series or clusters of conferences were we expect to present the results of MoWGLI. At first the MKM-conferences (Mathematics Knowledge Management) should be mentioned. Furthermore the series provided by ISSAC (International Symposium on Symbolic and Algebraic Computation) and IAMC (Internet Accessible Mathematical Computations) are of relevance.

Concerning library technologies and electronic publishing the ECDL-conferences (European Conference for Digital Libraries) are important, and there is a whole bulk of other conferences dealing with these themes. We have to keep contact with the MathML-meetings (Mathematics Mark-up Language) and potentially with the TEX-user meetings for those who concentrate on the LATEX-tools. The "Online meeting and exhibition" taking place every year in London in December will be a further option, in particular if somebody of our group will take part in this anyway.

Finally the big mathematical congresses should be on our schedule like the ICM this year, where MoWGLI has been presented at a satellite meeting dealing with electronic information and communication. The next big congress in Europe will be the European Congress of Mathematicians in 2004.

The co-ordination of the participation in congresses and meetings takes place in connection with the conference calendar installed on the MoWGLI webpage. Participation in special events is permanently solicited through the MoWGLI list server and also announcements of participation in special events are circulated through this server by the corresponding members of the group.

1.5 Relevant international institutions

To keep contact to the target communities co-operation with scientific societies and institutions are extremely important. From mathematics the main international institutions are the EMS (European Mathematical Society) on the European level and the CEIC (Committee for Electronic Information and Communication) of IMU (International Mathematical Union) on the world-wide level. The contacts to EMS are institutionalised because the exploitation manager of MoWGLI is chairman of the Electronic Publications Committee of the EMS. Also contacts to the IWI (Institut für Wissenschaftliche Information) in Osnabrück, the MathML consortium and the national Information and Communication Initiatives are highly desirable.

To keep track on all these dissemination activities and reports are prepared summarising the participation at conferences, the publication of articles on MoWGLI and co-operations with external partners.

2 Dissemination and Use Plan for MoWGLI's prototypes

2.1 XML Exportation module for the Coq Proof Assistant and associated DTD's

Delivery date: september 2002.

Target communities: Coq users, Developers of Proof assistant applications.

Description Currently, libraries in logical frameworks are usually saved in two formats: a textual one, in the specific tactical language of the proof assistant, and a compiled (proof checked) one in some internal, concrete representation language. Both representations are obviously unsatisfactory, since they are too oriented to the specific application: they restrict the access of the libraries to the users of the given application, and at the same time they are too sensible to the evolution and the maintenance of the application itself. On the other side, as soon as the information is put in a standard format on the Web (read XML), *any* kind of research becomes virtually possible, and *anybody* could start developing his own *spider* for implementing his own searching requirements. This is clearly a major improvement w.r.t. the present situation. Currently, you must not only rely on the searching facilities offered by the specific applications, but even if you wish to implement your own searching algorithm, you would be prevented by the simple reason that the information is not accessible (in any reasonable sense of the word).

The exportation module aims to prove the feasibility of the previous approach, and the possibility of decoupling from the applications the burden of implementing many functionalities such as rendering or searching that are largely independent from the application itself and its logical dialect.

Dissemination Information dissemination on this activity will be done on the general project level, but also by the partner in charge of this at special events organised by the target communities. In a period of three months after the delivery of the first version of the prototype of the XML Exportation module this should be tested by a representative set of potential users. Further exploitation will be decided on that basis.

2.2 MathML Rendering/Browsing engine

Delivery date: march 2003.

Target community: Professional interface developers

Description The tool is conceived as a software component whose main core is a platform independent C++ rendering engine for MathML presentation markup. Different interfaces can be provided depending on the platform of interest. We plan to provide at least two interfaces, for GTK and PostScript.

The GTK interface will be used to render MathML inside GTK applications. It will allow users to view MathML, interact with the markup (selection, activation of `<mathaction>` elements) and possibly support editing. Given the wide range of potential applications, interaction semantics should be easily customizable by the programmer. The GTK interface could be used to provide MathML support in any math-oriented application (calculators, converters, proof-assistants).

The PostScript interface will allow quality rendering of MathML for embedding in larger documents and printing.

Dissemination Information dissemination on this activity will be done on the general project level, but particular contacts should be kept to the MathML developers and to other projects caring about the development of interfaces for publishing mathematics. In a period of three months after the delivery of the first version of this engine it should be tested by a representative set of potential users. Further exploitation will be decided on that basis.

2.3 Metadata models and Tools

Delivery date: september 2003.

Target Communities: Digital libraries, indexing and retrieving systems.

Description Most part of MoWGLI's indexing and retrieving functionalities will be based on the definition of a sophisticated metadata model and its exploitation via a suitable query language. The main bulk of these metadata will be automatically extracted from documents, taking advantage from the content encoding of the mathematical information. We shall jointly develop a unified way of allowing users to query the metadata model. Our solution should be general enough and flexible enough to return mathematical equations (in a format chosen by the user), proofs, definitions, whatever. It should basically be an API (application programming interface) that could be implemented in a variety of ways. A web publisher could, for example, provide a graphical search interface that hides the complexity of the query language behind user-friendly buttons and options, in the end composing a query to the search engine. Other websites could do their own implementations that may look very different. Similarly, the way the website does the search in response to the query would be very document dependent. The query language itself can be something the whole community agree on and share.

Dissemination Information dissemination on this activity will be done on the general project level, but particular contacts should be kept to a variety of metadata developers in mathematics. This will be guaranteed by a permanent exchange of information with other projects in mathematics where also metadata will be discussed. The exploitation manager will participate in a series of conferences where the investigation of metadata structures is one of the main topics. These contacts will be used to get advice from the mathematical community and a group of librarians to see if the structures are reasonable from the mathematical point of view and in accordance with similar developments from the librarian's point of view. Any tools developed in this context should be tested by a representative set of experts.

2.4 Stylesheets and DTD's

Delivery date: september 2003.

Target Communities: Mathematicians and professionals users.

Description One of the ambitions of MoWGLI is that of promoting the development of coherent and well maintained collections of stylesheets to be used for passing from the content encoding of mathematics to a final presentational format (MathML presentation, HTML, etc.). A similar goal was already advocated by OpenMath, but practically failed for lack of documentation and maintenance of the repository, and the absence of an adequate dissemination plan.

Dissemination Information dissemination on this activity will be done on the general project level and follow the same lines as the MathML rendering in particular. At first the target communities have to be convinced that MoWGLI is developing useful tools in this direction. Then a core set of potential users could be identified and serve for the first version of an adequate dissemination plan. These users already should have agreed on a tentative level to cooperate with the project.

2.5 LaTeX-based authoring tool

Delivery date: september 2003, march 2004.

Target Communities: professional users of scientific digital libraires and authors of original contributions.

Description This tool should provide functionalities for creating content-based mathematical information from standard digital repositories by means of a suitable \LaTeX -based authoring system. A first prototype will be available since september 2003, and will be first tested among the authors of the electronic review journal, *Living Reviews in Relativity*, edited by Albert Einstein Institute (AEI) in Golm (Germany), which provides refereed, regularly updated review articles on all areas of gravitational physics. Since its release in January 1998 the journal has become a primary entry point for students, lecturers and researchers alike for up-to-date information on the current status of research in gravitational physics. Moving this unique repository and communication forum of current physical and mathematical knowledge in relativity to content mark-up, making it available for semantic search, and for re-use and evaluation e.g. in math algebra systems actually motivated AEI's involvement in the MoWGLI project. The advanced prototype, integrated with

other MoWGLI features (especially for indexing and retrieving), should serve as a showcase to demonstrate how content-mark-up in mathematics improves the usability and information depth of electronic science journals.

Dissemination Information dissemination on this activity will be done on the general project level, but special emphasis will be given to conferences dealing with digital libraries. Depending on the progress obtained at AEI and their capacity to deal with further external partners, the set of journals providing a test bed will be enlarged in order to extend the test to other types of mathematical journals. In particular academic and commercial publishers will be contacted for integrating some of their journals in such a test. The man power to care about this mainly will have to be provided by the editors. The capacity at AEI only will suffice for coordinating the work and helping with the application of the tools.

2.6 MoWGLI Prototypes

Delivery date: september 2003, march 2004, septmber 2004.

Target community: users.

Description The MoWGLI system should provide a light, simple and friendly interface to most of MoWGLI's feautures. Several prototypes will be available, starting from september 2003, along with the integration of new functionalities in the system.

MoWGLI's demos should be the most natural way for disseminating the Project results in potential user communities.

Dissemination Information dissemination on this activity will be done step by step on the general project level. The plan to contact users will be a follow up to the different activities described above. In addition to the testing and discussion of the tools developed in the project the subsequent validation plan will be pursued.

2.7 Advanced Demos

Delivery date: september 2004.

Descriptipion As testing and validation of the system proceeds, specific, advanced demos will become available. According to the workplan, validation will be based on the following three main case studies, all of which could serve as major vehicles of dissemination in different communities.

2.7.1 Validation 1: Education

Full development of a fragment of the library covering a typical undergraduate course in algebra or analysis.

2.7.2 Validation 2: Certified Code

The aim is to be able to present the formalization and the demonstration of some security properties related to the code embedded into a smart card. The presentation must be in a format understandable by the company in charge of the evaluation of the code and in accordance with the Common Criteria standard.

2.7.3 Validation 3: Journal interface

The aim is to test the L^AT_EX-based authoring tool and to demonstrate how an electronic physics journal benefits from the exploitation of content markup in journal articles.