



eduGI.net

International Network for Education in
Geographic Information Science



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eduGI.net International Network for Education in Geographic Information Science - Implementation Plan – Apr 17, 2002

The implementation plan provides background statements of the objectives of the Memorandum of Understanding. Then, we summarize the input of the personal discussion of IfGI with all eduGI.net partners on each objective and suggest action items. The eduGI.net objectives are:

1. International exchange of Master and PhD students
2. Exchange of teachers
3. Annual summer school for Master and PhD students
4. Harmonization of curriculum contents, introduction of Bachelor/Master degrees, accreditation
5. Certification and development of modules and courses, and exchange of teaching material
6. Organizational framework and conception of a business model
7. Cooperation with non-European universities.

The following table provides an overview of the relevance of objectives for the eduGI.net partners. The partners were asked for a factor naming their relevance of the eduGI.net objectives by

High relevance, factor of relevance: 3

Medium relevance, factor of relevance: 2

Low relevance, factor of relevance: 1

Objective	Average factor of relevance
1. Students exchange	2,67
2. Teachers exchange	2,89
3. Summer school	2,67
4.a Curriculum harmonization	2,44
4.b BA/MA introduction	2,00
4.c Accreditation	1,33
4.d ECTS introduction	2,11
5.a Certificated teaching modules	2,33
5.b Exchange teaching material	2,77
6. Business model eduGI.net	2,67
7. Non-European cooperation	2,89

1 International exchange of Master and PhD students

An international exchange of Master and PhD students is a key requirement of the improvement of students' skills. In addition, the personal contacts enhance the cooperation of the partner universities in education and research. The educational requirements for the exchange of students are described in sections 4-5. Besides this, there are psychological and organizational barriers of studying and living in a foreign country. The exchange requires advertising for concrete student mobility measures within each partner university and a contact point within the institute.

The easiest and best known funding opportunity is ERASMUS. It is a mass program, meaning that the EC funds little amounts for the mobility of many students. The advantage for the student is the status as an ERASMUS student. This means that there is no fee for studying and that the student is integrated in the university organization, e.g., housing, and language courses. Also known are the Marie Curie Fellowships, which provide European placements for pre- and post-doctoral researchers (<http://www.cordis.lu/improving/fellowships/home.htm>).

Yet there are numerous national and international organizations for mobility funding, which are hard to keep track of. The combined experience and knowledge of a partner network could provide more funding opportunities.

An additional barrier for student exchange is language. For example, a German student going to Italy has to learn or improve two languages at one time: Italian as the language of the courses of studies and English as the language of GI science. Therefore, an increase of GI courses in English language is needed. In addition, foreign students need English information about the universities, GI institutes, programs of study, and courses.

1.1 Partner input

The interest of eduGI.net partners in exchanging students is very high. The most prospective funding opportunity is the ERASMUS program. IfGI currently works on a multi-lateral ERASMUS agreement for the cross-wise exchange within entire network. This spares the eduGI.net partners from filling bilateral agreements with every partner, currently resulting 72 bilateral agreements. Very few national funding opportunities are known, although the eduGI.net partners will keep track on it.

The biggest impediment in exchanging students is language. Very few foreign students are able to follow lessons in German, Spanish, Portuguese, or Greek. Some partners offer English courses, but only few. The solution is students working in ongoing projects of the hosting university. All eduGI.net partners can host students in projects, where communication in English is possible. And all eduGI.net partners can – after individual proof and with conditions for the proof of achievements – certify this kind of exchange as a regular teaching module.

In addition, IfGI plans to offer English teaching units worth 30 ECTS credit points in summer semester 2003. This enables foreign students to study one complete semester in English language at IfGI.

1.2 Action items

We suggest the following activities:

- Sign multi-lateral ERASMUS agreement on the exchange of students (in preparation)
- In-house advertisement for students mobility (within regular courses and ongoing research projects)
- Name a contact person for students exchange at each partner university, to be published on eduGI.net homepage
- IfGI provides the English ECTS information package “Studying at IfGI” (published soon).

2 Exchange of teachers

The exchange of teachers (professors, research assistants) improves the quality of teaching, and trains research assistants in international teaching. The personal contacts of eduGI.net feed enhanced cooperation into common research activities. Typically, an exchange of teachers will be possible within short visits. The ERASMUS program funds teaching mobility with a minimum stay of one week and a minimum of eight teaching lessons. These lessons have to be integrated into the regular courses of studies.

The teacher exchange in one-week blocks can improve education within eduGI.net. For guest lecturers the effort for preparation is small, because the lessons can be the same as taught at home. Yet it improves the teaching offers at the inviting university by new topics, new approaches, and units in English language. While teaching eight hours within one week, there will be plenty of time for using the visit at a foreign university research, contacts, discussions, and tourist aspects. In return, the guest lecturer's university will get a free eight-hours teaching unit.

2.1 Partner input

The exchange of teachers is highest priority of the eduGI.net objectives. The ERASMUS program is the targeted option for realization. eduGI.net partners keep track on additional, national opportunities. The eduGI.net partners can integrate the one-week courses in their respective programs as stand-alone units, combine two courses to a regular course, or integrate the course into an existing regular course. The partners require formal standards for their execution (see section 5).

The idea proofed to be successful; 6-9 teachers already offered support for the realization of an "English semester" at IfGI in summer semester 2003.

A (restricted) black board the eduGI.net homepage realizes communication on offered and requested courses.

2.2 Action items

We suggest the following activities:

- Sign multi-lateral ERASMUS agreement on the exchange of teachers (in preparation)
- Realize "black board" for offered and requested courses on the eduGI.net homepage (in preparation)
- Develop formal standards for the execution and exchange of one-week teaching units (see section 5) (in preparation)
- Detail plans of IfGI's "English semester".

3 Annual summer school for Master and PhD students

Summer schools are successful instruments for the organization of high-quality teaching units. Summer schools intensively and effectively mediate research content and methodologies. The participants experience and learn to work in an international cooperation. First, summer school is targeted to master students (or final year students in non-consecutive curricula); to them it is a regular, certified course of studies. Second, summer school is targeted to PhD students, for which it is an event for qualification. The eduGI.net partners contribute with tutorials, lectures, and workshops. In addition, summer school can be used for an eduGI.net management meeting.

3.1 Partner input

The eduGI.net partners establish an annual summer school for Master and PhD students. The events will be organized alternating by partner universities; the first summer school will take place in Muenster (Jul 29 – Aug 6, 2002). A targeted funding opportunity is ERASMUS - IP (Intensive Program); other options have to be evaluated.

3.2 Suggestions for eduGI.net activities

We suggest the following activities:

- Organize and participate in the first summer school, Muenster 2002
- Apply for ERASMUS-IP (intensive program) in September/October 2002 for year of study 2003/04
- Plan a location for summer school 2003.

4 Harmonization of curriculum contents, introduction of Bachelor/Master degrees, and accreditation

The „Bologna-Declaration“ of 29 European countries (<http://www.crue.upm.es/eurec/bolognaexplanation.htm>) reforms the structures of their higher education systems in a convergent way. The “Bologna-Declaration” has been executed by many states, e.g., in Germany bachelor and masters degrees are replacing the traditional non-consecutive curricula.

4.1 Curriculum harmonization

The curriculum harmonization is a basic means of educational cooperation and facilitates the exchange of students, personnel, and teaching modules. It assures quality against the background of the international state-of-the-art and new requirements. As David Rhind (AGILE conference 2001, see <http://agile.uni-muenster.de/Conference/Brno2001/Opening.pdf>) stated, GIS is breaking out of the hardware/software ghetto. A wide range of knowledge, awareness and skills (e.g., GI business, GI policy, and environmental or governmental applications) is needed on the part of those working with GIS. This requires a new generation of courses of studies.

One solution was realized within the Masters degree in Geographic Information (MGI) at City University (see www soi.city.ac.uk/mgi) and could serve as a basic content of harmonized curricula.

Some top-level contents of MGI are:

- Geographic Information Science
- Fundamentals of Information Science
- Key GIS technologies and Java programming
- Information as a resource or asset
- Knowledge organisation
- Business, professional and scientific practices involved in GI use
- Management and visualisation of information
- Information law and policy
- Applications of GI use in geodemographics, epidemiology, insurance, transport, environment and government.

MGI offers transparency in its quality procedures, a comprehensive learning resource and pro-active student involvement (see D. Rhind, AGILE 2001).

The NCGIA Core Curriculum (<http://www.ncgia.ucsb.edu/giscc/>) provides further input for cooperation in curriculum harmonization.

4.2 Introduction of bachelor and masters degrees

The harmonization of contents within curricula leads to an organizational harmonization within the introduction of bachelor and masters degrees. In Germany and other countries, the need of universities for internationalization has led to the political consequence of slowly abolishing the traditional system of diploma. New curricula have to be adapted to the bachelor and masters degrees.

4.3 Accreditation

The quality of curricula is assured by accreditation. In the US this procedure is well established, e.g., by the IEEE/ ABET (Institute of Electrical and Electronics Engineers, Inc./Accreditation Board for Engineering and Technology, Inc., see <http://www.ieee.org/organizations/eab/apc/overview.htm>). ABET is a federation of 31 engineering, professional and technical societies and is recognized by the Council on Higher Education Accreditation (CHEA) to accredit programs in engineering, engineering technology, computing science, and applied science programs within the United States. IEEE is the largest of ABET's societies.

In Germany, new curricula are subject to a similar accreditation procedure (see www.akkreditierungsrat.de). Criteria for admission are:

- Requirements of quality and internationality of the curriculum concerning content, course of studies, and organization.
- Career opportunities for Bachelors and Masters
- Potential of personnel
- Equipment of university
- Requirements for admission to master curricula
- Coherence of curricular concepts with qualification for careers in the private and public sector
- Transition from traditional to new curriculum.

There is an international cooperation of accreditation organizations, but yet there are no common standards.

4.4 Partner input

The relevance of harmonization of curricula and introduction of BA/MA still is quite different for the eduGI.net partners. This results from

- Different national strategies and time-tables to implement the Bologna-Declaration and
- Different estimations about the influence of GI departments on the decision process.

In some countries, the introduction of BA/MA is quite advanced. For example, NTU Athens and New University of Lisbon have introduced Master programs, in Austria a national law requires introduction in winter semester 2003/04. In other countries national constraints do not require a quick implementation.

Most of the GI departments are embedded in higher-level schools. Currently, there are few options for GI degrees. Nowadays, a typical degree within eduGI.net is in “Geography with specialization in GI”.

Within the introduction of Bachelor degrees GI departments have limited influence in integrating GI content. In addition, high-level university committees have the legal power on curriculum development and introduction BA/MA.

Future MA programs are more focussed on GI; several eduGI.net partners introduced or plan MA degrees in Geographic Information Science. This is the opportunity to harmonize GI curricula and implement GI specific requirements into Master programs. A cooperation of eduGI.net partners improves the curricula and Master programs. In addition, high-level university committees can hardly reject a harmonized concept of several European partners.

Based on the bilateral partner discussions, IfGI suggests the following for cooperation:

- Constraints and strategies of eduGI.net partners are heterogeneous. This results cooperation on different levels of engagement.
- Constraints and strategies of eduGI.net partners are many-sided. This requires gathering and evaluating information.
- eduGI.net cooperates in the development of a GI curriculum. The focus is on a Masters program. A core group develops a curriculum with the vision of a common GI curriculum. Further eduGI.net

partners will be informed of the process and give their feedback. Those use the eduGI.net curriculum for an evaluation of their existing curriculum.

- Basic input for the GI curriculum are MGI top-level content (see D. Rhind, AGILE 2001), and NCGIA Core Curriculum (<http://www.ncgia.ucsb.edu/gisc/>).
- A core group of eduGI.net cooperates on the introduction of BA/MA. The focus is on Master programs.

Accreditation is of low relevance for eduGI.net. For most of the partners, it is not a topic at all, or subsets of accreditation, e.g., assurance of career opportunities for Bachelors and Masters, are already integrated in the formal introduction of BA/MA. An accreditation at US seems to be too much effort for few advantages.

4.5 Suggestions for eduGI.net activities

We suggest the following activities:

- eduGI.net partners express their interests in
 - Development of a common GI curriculum focussed on Master programs
 - Observing the development and giving feedback to the process
 - Cooperation in introduction of new degrees focussed on Master programs.
- Gather and evaluate information.
- Provide a concept for cooperation.
- Apply for ERASMUS/PROG (funding of curriculum development) and/or ERASMUS/DISS (funding of introduction of curricula/courses of studies) in September/October 2002 for year of study 2003/04.
- Cooperation on accreditation is skipped.

5 Certification and development of modules and courses, and exchange of teaching material

The cooperation in modules and courses encloses the following aspects:

1. Certification by ECTS, and regulations by eduGI.net
2. Development of modules and courses
3. Exchange of teaching material.

5.1 Certification by ECTS, and regulations by eduGI.net

Certificated courses of studies are a core requirement for the exchange of students. Its basis is the introduction of ECTS (European Credit Transfer System). ECTS credits target the *quantity* of courses of studies. All courses of studies and other students` activities required by the university`s curriculum add up to 60 credits per year. The students` workload is estimated by 45 working weeks per year, which equals 1800 working hours per year or 30 working hours per credit (standard in Germany, differences in other countries). In addition, the *quality* of courses of studies is standardized, yet the standards are quite weak. They require teaching modules; meaning thematically focused teaching units of four to ten semester hours, finalized by some kind of success control. Still for each student exchange both universities have to compare and assure the quality in an extensive case-to-case procedure (bilateral learning agreements, transcripts of records).

A goal is to organize quantity and quality certification of all partners` modules and courses on the basis of ECTS. Standards could be:

- The course is classified within ECTS (European Credit Transfer Systems), 1 credit equals a workload of 30 hours of lectures, seminars, work on a project, and homework.
- The content is the state-of-the-art of a topic, based on recent publications, and current research and project experience.

- The students are graded by
 - Participation in the lessons
 - Short presentations
 - Paper, minimum 4 pages, in order to solve a problem (theme, goals, problem statement, methods, results, discussion and outlook).

If the goal of a certification on the basis of ECTS will turn out too ambitious, eduGI.net should provide internal eduGI.net regulations.

5.2 Development of modules and courses

There are ongoing national and international projects for the development of GI modules, e.g., GITTA project in Switzerland (see www.gitta.info). They target the improvement of existing modules as well as the effective use of resources by cooperation. Cooperation on single courses seems to be rather limited to university departments.

5.3 Exchange of teaching material

The network provides the opportunity to use resources more effectively by an exchange:

- For traditional courses, documentation is available in the Internet for eduGI.net partners:
 - Syllabus, concepts of lessons
 - Materials (publications, slides for lessons, information about used software, software applications, students results, evaluation)
 - Student work (slides of lectures, scientific papers).
- New Internet-based media and teaching units are shared and/or developed.

5.4 Partner input

Cooperation on ECTS faces two limitations:

- Different constraints for official introduction
- Different standards.

The European standard of ECTS is interpreted in many different ways. The required number of ECTS credit point differs (e.g., 42 in the Netherlands, 60 in Germany) as well as the student workload of one ECTS credit point (e.g., 10 in Spain, 40 in Finland). Even in one country there are different regulations, e.g., in North-Rhine-Westphalia, Germany, a student workload of 1.800 hours per year is required; other German states require something between 1.500 and 1.800 hours per year.

However, certification standards are the basis for students exchange. The heterogeneous implementation of ECTS leads to a low-level conclusion: eduGI.net will not provide a common ECTS standard, but the national standards can be transferred to each other. For this purpose, IfGI suggests the following eduGI.net regulations:

- The workload of modules and courses is documented (contact hours, homework).
- The content of modules and courses is documented.
- Students' achievements are documented.

Universities who cooperate in the introduction of BA/MA can achieve a further harmonization of ECTS.

An additional regulation concerns the foreseen exchange of teachers. The exchange focuses on one-week/eight-hours teaching units. Partners require some formal standards, e.g., for workload, grading, and documentation. By this, hosting universities “know what they get” and can easier integrate the courses into their regular program of study.

The common development of modules and courses results a heterogeneous feedback. It ranges from being already involved in projects on internet-based GI modules to low relevance. An interesting observation is that modules of approximately 100-130 contact hours/300 hours workload could be used in various university contexts, e.g., MA programs, post-doc courses, special programs. Additionally, the exchange of resources in the development of modules and courses can be supported by the exchange of teachers for their execution.

A further approach for cooperation is the need for more efficient use of teachers' resources. Especially basic courses a hold many times, e.g., IfGI provides five parallel courses on GIS I. Internet-based teaching modules and courses could help reducing resources, and help students working more tuned to their specific knowledge, abilities, and goals.

Yet, cooperation in eduGI.net on the development of modules and courses lacks information. The next step is to gather expressions of interest in cooperation, based on the partners' specific requirements on content and workload.

The relevance of and interest in the exchange of English teaching material is high. Yet there are heterogeneous judgements about content and usability of features. Besides concepts, literature, presentations, results, and background information, software applications for teaching are required. A practical approach is the provision of teaching material by partners on the eduGI.net homepage. The input to eduGI.net will show what can be provided; the output will show the demand.

The exchange of teaching material is exclusively for eduGI.net. The partners using foreign teaching material give a feedback, also published on the eduGI.net homepage. This assures valuable information for the producer and quality control for the users.

In addition, the access to existing teaching materials, e.g., NCGIA, GITTA project, has to be proofed.

5.5 Action items

We suggest the following activities:

- Agree on eduGI.net regulations on ECTS (documentation of workload, content, grading)
- Agree on formal standards for the exchange of one-week/eight-hours teaching units (suggestions by IfGI)
- Express interest on common development of modules and courses, indicating required workload and content.
- Collect input for the exchange of teaching material of eduGI.net partners; provision on the (restricted part of the) eduGI.net homepage.
- Proof access to existing teaching materials, e.g., NCGIA, GITTA project.
- Exchange information on the status quo of ECTS, and strategic plans, and, if applicable, experiences with introduction
- For those partners who plan to introduce ECTS: apply for funding with the ERASMUS program (September/October 2002)
- Option: Apply for ERASMUS/MOD (funding of module development) in September/October 2002 for year of study 2003/04

6 Organizational framework and conception of a business model

eduGI.net develops an organizational framework for a sustainable cooperation. Within the formal establishment of eduGI.net the partners create a management and decision structure and organize common activities. Sustainable cooperation of the network requires the conception of a business model. A key issue is to acquire national and international funding opportunities. The eduGI.net partners evaluate and apply for

their specific national and regional funding organizations, and commonly apply for international funding, i.e., EC programs.

6.1 Partner input

eduGI.net is open to academic institutions that provide GI Science education. New partners enter the network by signing a membership declaration. eduGI.net bases on voluntary work on those objectives that are relevant to each partner university. The organizational framework is kept simple. Management meetings take place as side events of summer school and/or AGILE conference. Almost all eduGI.net partners think a coordination agent crucial for a sustainable network.

IfGI has applied for funding of the initiation of eduGI.net at the Internationalization Program of the University of Muenster. Therefore, IfGI is able to coordinate this process until December 2002. An ongoing funding could be provided by EC's 6th Framework Program; yet opportunities and conditions are quite vague. Some eduGI.net activities could be funded within ERASMUS. Option for national funding opportunities for eduGI.net are few (e.g., "Universitätsmilliarde" Austria, see www.bundeselternverband.at/presse/unimilliarde.php3). eduGI.net partner will keep tracking on national options.

Member fees are not approved. Most of the partners could afford small amounts, but the financial relevance would be low. And there would be little effect on attracting supporting partners against non-supporting partners only "collecting memberships". Many partners vote for a transparency of inputs and outputs to the network.

6.2 Action items

We suggest the following activities:

- Agree on and sign membership declaration
- Apply for a network funding within EC's 6th Framework program
- Keep track on national funding opportunities
- Create transparency on inputs and outputs to the network.

7 Cooperation to with non-European universities

eduGI.net targets an extended cooperation with non-European universities. First steps are the cooperation with US universities within the ISAP program (<http://www.uni-muenster.de/Auslandsamt/Programme/ISAP.html>), and to Latin-American universities within IfGI's EC program ALFA (<http://www.alfa-program.com/uk/entrada.htm>) by Jaume I, New University of Lisbon, and IfGI. Additional cooperation has to be discussed and evaluated.

7.1 Partner input

The relevance of cooperation with non-European universities is very high. The focus is on US universities. Mixed preferences are on cooperation with

- English speaking universities, e.g., Canada, Australia
- Possibly interesting universities, e.g., in Russia, China, Japan, with few information available
- "Third-world" countries.

eduGI.net partners provide information of "unknown" and "third-world" universities. eduGI.net partners recommend their specific contacts on the eduGI.net homepage. The contact board contains information of research topics, experiences of common projects, possibilities for cooperation, and best ways to contact the universities.

7.2 Action items

We suggest the following activities:

- Initiate cooperation with US universities
- Establish contact board on eduGI.net homepage (restricted to eduGI.net partners).

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