

# SUSTAINABILITY OF E-LEARNING PROJECTS – THE GITTA APPROACH

T. Grossmann<sup>a</sup>, R. Weibel<sup>a</sup>, J. Fisler<sup>b</sup>

<sup>a</sup>University of Zurich, Dept. of Geography, 8057 Zurich, Switzerland - (thomas.grossmann, robert.weibel)@geo.uzh.ch

<sup>b</sup>University of Zurich, Computing Services, 8057 Zurich, Switzerland - joel.fisler@id.uzh.ch

WgS-PS: WG VI/2

**KEY WORDS:** GIS, Internet/Web, Education, Learning, Teaching, Training, Knowledge Base

## ABSTRACT:

GITTA (Geographic Information Technology Training Alliance) is an e-learning project that tries to complement the traditional way of teaching, preferably in a blended learning mode. To students it provides the possibility of extending and recapitulating knowledge taught in class. Originally a consortium of ten Swiss partner institutes created the GITTA lesson pool with every partner agreeing to contribute and utilise e-learning content. Since the original content development is now completed the recently founded GITTA Association tries to find partners outside the initial consortium to establish cooperations, which is considered as an important element of a strategy to ensure the further development and sustainability of the GITTA knowledge pool. GITTA offers a great opportunity for being integrated into GIScience curricula in manifold ways. In order to ensure its sustainability beyond the completion of the initial funding, the project is based on four strategic elements that are meant to facilitate the long-term existence of the project: First, GITTA offers one of the most comprehensive pools of GIScience e-learning content currently available (pedagogical strategy). Second, the GITTA lessons and case studies are provided as free and open content through the Creative Commons licence (open content strategy). Third, all GITTA content is based on an XML dialect named eLML (e-Learning Markup Language), providing standardised and flexible transformation into different output formats and/or presentation designs (XML technology strategy). Fourth, the GITTA Association is supposed to maintain the further development of the project, to acquire new members and continue the operation of GITTA (outreach strategy). Through these strategic elements we hope to attract many other users, as we believe that having a large community will help others in GIScience education and help us keeping our project alive and self-supporting.

## 1. INTRODUCTION

The GITTA e-learning project ([www.gitta.info](http://www.gitta.info)) has been funded by the Swiss Virtual Campus programme (SVC, [www.virtualcampus.ch](http://www.virtualcampus.ch)) between 07/2001 and 07/2008. It was originally initiated by ten institutes of seven Swiss universities, federal institutes of technology, and universities of applied sciences. These groups formed a consortium, the so-called *GITTA Consortium*. The idea was to create a pool of GIScience lessons to which every partner contributed specific lessons in their own field of specialization and expertise. With the implementation of the lessons in different fields of GI science and technology, the goal was to cover comprehensively a broad range of topics and use this to supplement traditional teaching.

Currently GITTA goes through the final maintenance period, which is still lightly financed by the SVC until 07/2008. To take care of the management and maintenance of GITTA resources after the SVC funding will have ended, the so-called *GITTA Association* ([www.gitta.info/association](http://www.gitta.info/association)) has recently been founded. This association is responsible for further development of the project and should secure its sustainable existence.

This paper attempts to highlight some of the advantages that may arise from the adoption of content of GITTA for GIScience teaching in higher education worldwide. Particular attention will be paid to strategies employed by GITTA to ensure the continuity and sustainability of the project beyond its funding by the SVC. This is made against the background that in

various countries, considerable financial resources have been invested into programmes to support the development of e-learning content and infrastructures for higher education (including Switzerland with its SVC programme). Many of the projects so generously funded by national and international e-learning programmes have since quietly vanished, mainly because issues of long-term sustainability were not taken into consideration. We hope to ensure a longer life for GITTA through a sustainability strategy that builds on four pillars, or strategic elements (Fig. 1): 1) the comprehensive content of GITTA; 2) an open content strategy; 3) the underlying technical framework; and 4) the implementation of the GITTA Association. These strategic elements will be presented in the following four sections 2 to 5. We hope that that these four elements deliver sufficient arguments to others for implementing GITTA lessons into academic curricula of GIScience.

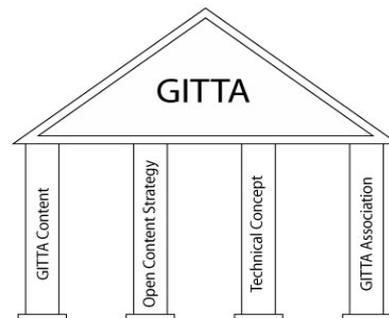


Figure 1: The four elements of the sustainability strategy for the GITTA project

## 2. GITTA CONTENT

### 2.1 Scope and organisation

GITTA covers a wide scope of GIScience topics. Nearly 50 lessons exist today, organised into thematic modules. In addition to these modules that focus on conveying the theoretical and technical concepts of the GIScience, a module exists for so-called case studies, in which the practical use of GIS is exercised.

Altogether the following 6 theory modules and 1 case study module exist (Fig. 2):

- GI-Systems Module
- Database Management and Systems Module
- Data Capture Module
- Spatial Modelling Module
- Spatial Analysis Module
- Data Presentation Module
- Case Studies

Every module contains between 4 and 13 lessons, subdivided into basic and intermediate lessons. Every lesson accounts for 2 to 3 hours of learning time for the student. The total amount of work for all of the provided lessons corresponds to about 15 credit points in ECTS (European Credit Transfer System).

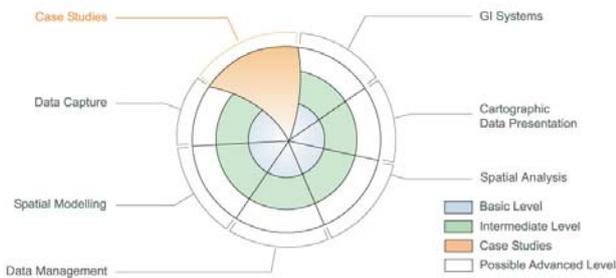


Figure 2: Thematic scope and organisation of the GITTA knowledge pool (WERNER and STERN 2003)

As can be seen from Figure 2 GITTA covers all elementary fields of GIScience and Technology. To embed GITTA content into curricula it doesn't need more than a link to the required lesson or the import of an IMS or SCORM package into a Learning Management System (LMS) such as WebCT, Blackboard, OLAT or Moodle.

### 2.2 Languages

Owing to the multilingual background of the original GITTA Consortium, which comprised institutes in the German, French and Italian speaking parts of Switzerland, the GITTA content is available in different languages. Some lessons and case studies are available in English, German and French, some are available in English and German and a few exist either in English, German or French. Although some lessons would still have to be translated to additional languages, GITTA is still a perfect candidate for being used in international curricula, in contrast to other, unilingual e-learning projects.

As becoming apparent later in this paper, the technical infrastructure of GITTA can be used easily to translate the existing lessons into additional languages. Since we use XSLT, the content is independent from its design, facilitating transfer to a new language (see Section 4.).

### 2.3 Pedagogical approach

As can be seen from Figure 3 each thematic lesson consists of different units that are based on an extension of the e-learning concept ECLASS (Entry – Clarify – Look – Act – Self-assess – Summary), originally proposed by GERSON (2000). The section below on the technical basis of GITTA will explain how the pedagogical structure ECLASS is integrated into the XML based e-Learning Markup Language (eLML).

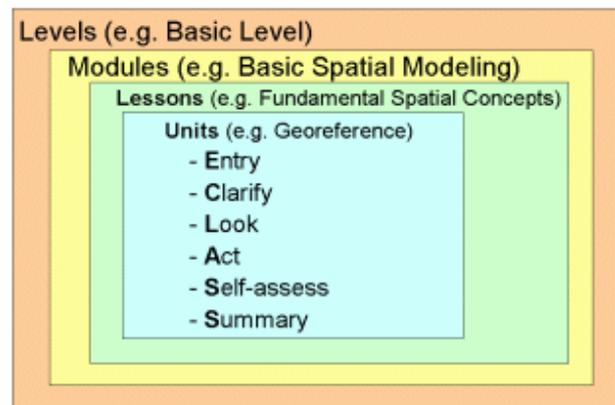


Figure 3: Organisation of GITTA content and ECLASS concept (FISLER et al. 2005)

The ECLASS concept provides a pedagogical structure that contains crucial learning elements (FISLER & BLEISCH 2006):

The **Entry** part gives students an overview of what can be learned in the lesson or unit.

The **Clarify** part is the bridge between the general concept (scenario or context) and the specific details of a lesson or unit.

The **Look** part gives opportunity to review examples or samples of what is being taught in the lesson/unit.

The **Act** part lets students practice what is being taught. Ideally, this is done by providing interactive media like Flash or SVG animations.

The **Self-Assessment** part lets students evaluate themselves what they learned during the lesson/unit, for instance through interactive multiple choice tests.

The **Summary** part recapitulates what has being taught during the lesson or unit.

It is important to note that the ECLASS structure is not as rigid as it appears to be. The sequence of the elements e.g. can be changed according to the specific needs of the author, and/or some of the elements can be omitted (FISLER et al. 2005).

More information about the e-learning structure is provided in Section 4, where we give an overview of the eLesson Markup Language.

## 3. GITTA OPEN CONTENT STRATEGY

The GITTA content is freely available. Whilst eLML (see Section 4) is released under the open source license GPL on

Sourceforge.net, the GITTA content is published under the Creative Commons license. The original idea of opening both software and content was quite pragmatic: the more people use GITTA in terms of reading, using in teaching, editing, further development etc., the lower are the costs of maintenance and the higher are the chances that the content will be long-lasting with only minor financial resources .

In particular the Creative Commons (CC) license allows to copy, distribute, display and use lessons under the following conditions (FISLER & WEIBEL 2006):

- **Attribution (by):** It must be apparent that the lessons used are part of the GITTA project.
- **Non-Commercial (nc):** Only non-commercial use of the GITTA lessons is allowed.
- **Derivatives:** It is allowed to create derivatives of GITTA lessons.
- **Share Alike (sa):** The created derivatives (e.g. updated lessons, new lessons etc.) must also be published and made available under the same Creative Commons license (“by-nc-sa”).

The GITTA content can be used in two different ways. First, students and teachers can access the content for free simply by subscribing themselves to the GITTA newsletter. They will then receive an email message with the URL that allows free access to the GITTA content. Second, individuals or institutions who intend to modify the content of particular lessons according to their specific needs or who want to create new lessons, are allowed to do so as long as they become active members of the GITTA Association (at a very modest membership fee). This will grant them the right to contribute their content to the project and vote on the further evolution of GITTA. The GITTA Association acts as a vehicle to integrate new authors who are not part of one of the original members of the former GITTA Consortium (see the bylaws on [www.gitta.info/association](http://www.gitta.info/association)).

The open source / open content philosophy brings advantages for the adoption of GITTA content into GIScience curricula at external, international institutions. Since the use and modification of the existing lessons is *a priori* allowed, no long-winded negotiations are necessary to arrange for collaborations.

#### 4. GITTA TECHNICAL CONCEPT

GITTA is based upon eLML, which is an XML dialect. eLML was developed by Joel Fisler and Susanne Bleisch (FISLER et al. 2005; FISLER & BLEISCH 2006) especially for the needs of e-learning projects. It is now hosted by the Multimedia and E-Learning Services (MELS) of the Computing Services at the University of Zurich and is being used for the realization of many other e-learning projects as well.

##### 4.1 What is eLML?

eLML and the ECLASS model introduced in Section 2 are intimately related. eLML is based on XML and contains the elements of the ECLASS model, plus additional elements such as glossary, bibliography, and metadata (FISLER et al. 2005; FISLER & BLEISCH 2006).

Influenced by the work of GERSON (2000), it was decided to transfer the learning elements into a structure that provides a

framework for the design of e-learning content. By doing this, e-lessons have to be developed in a manner that 1) gives different lessons a consistent form and 2) provides authors with a guideline of how lessons have to be structured.

##### 4.2 Structure of an eLML lesson

Figure 4 shows the structure of an eLML lesson. As can be seen, the elements of the ECLASS model compose the structure of the eLML lesson and the units that make up a lesson. The first structural layer of a lesson always consists of an introduction (entry), the learning objectives of the lesson (goals), and the sections which host the main content of a lesson (called units). Additionally, a lesson may contain a self-assessment section, a summary, a further reading section, glossary, bibliography, and metadata (providing descriptive information about the lesson such as author, technical requirements, and estimated time needed for completion, etc.).

The thematic units of a lesson may contain an entry section, the goals, a self-assessment and a further reading section. They must contain at least one learning object (LO), composed of a clarify, a look and an act section.

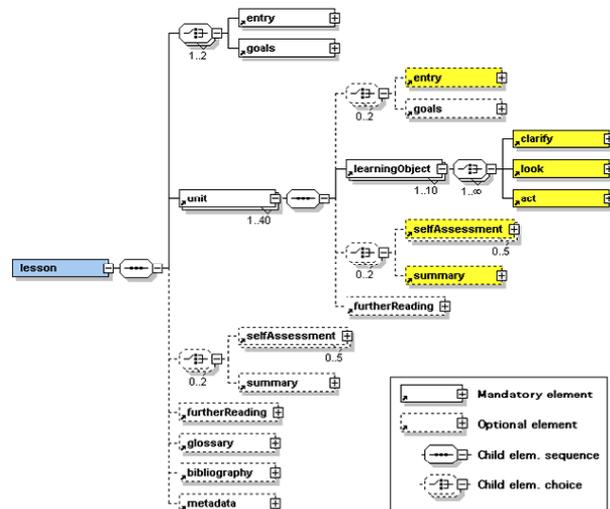


Figure 4: Structure of a lesson in eLML (FISLER et al. 2005)

##### 4.3 Flexibility

GITTA lessons that have been written in eLML (i.e. XML) must be transformed into a file type that makes it possible to display the content in commonly used web browsers. In this regard many options exist, e.g. the transformation into XHTML or PDF. Also, it is possible to create content packages such as IMS or SCORM, which can be imported into Learning Management Systems such as Moodle, WebCT, or OLAT. Hence, platform independence is truly given, so that GITTA content is accessible to a large, worldwide community.

The transformation into the file formats is accomplished by using XSL (Extensible Stylesheet Language). This declarative language allows translating self-defined elements (e.g. ECLASS) into the favoured output file format by assigning stylesheets that contain information on how the content has to be displayed. Since the content is detached from its design, one and the same content can be translated into many different formats (Fig. 5).

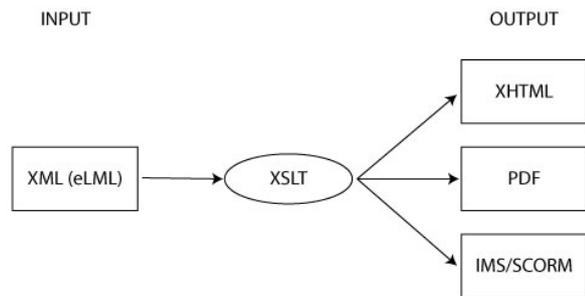


Figure 5: Transformation of eLML into different output formats

## 5. GITTA ASSOCIATION

As mentioned above, we understand the foundation and implementation of the GITTA Association as an important strategic element as regards to ensuring the further existence of this project. In this context the Association has two main functions: 1) to continue the business of the project, and 2) to acquire new partners that use our contents.

The Association consists of active or passive, individual or collective members. The general assembly of the Association is responsible for the election of the executive board. Active members are granted the right to contribute their content to the project and vote on the further evolution of GITTA. That is, they get also write access to the GITTA content through a content versioning system. According to the bylaws, anybody can become an active member of the GITTA Association, at a very modest membership fee and as long as he/she can provide evidence that he/she is knowledgeable in the GIScience domain and as long as he/she wants to actively contribute to the maintenance and further development of GITTA content. For details, bylaws, and the electronic membership application form, see <http://www.gitta.info/association>.

## 6. CONCLUSION: A CALL FOR COLLABORATION

We hope that the above discussion has shown that an integration of GITTA lessons into GIScience curricula at external institutions that did not originally participate in the GITTA project does not imply great efforts. The GITTA content already exists and provides opportunities for adaptation to local requirements, as well as for extension by further lessons and case studies. The adoption of GITTA content does not pose any legal barriers (owing to the simple format of the Creative Commons licence). To date, an estimated number of 700 users have already gained access to GITTA content. Furthermore, the technical implementation is made easy by the use of the eLML framework that is based on the XML standard.

We are presently working on the development of a versioning framework and web front-end that links to the content versioning system (CVS) that is already used to maintain the master version of the GITTA lessons. This additional infrastructure and guidelines will make it easier for authors internal and external to the original GITTA Consortium to add and track their new or modified lessons and case studies. This versioning framework will have to be in place by July 2008 at the latest, as that will be the point when the project funding provided by the SVC will terminate and hence the GITTA Association will have to fully take over from the original GITTA Consortium.

We extend a cordial invitation for any form of collaboration, formal or informal, and we hope that we may soon be able to welcome your proposal for collaboration, or application for membership in the GITTA Association.

## REFERENCES

- [Note: All articles (and many more) are also available from [http://gitta.info/website/en/html/about\\_furtherReading.html](http://gitta.info/website/en/html/about_furtherReading.html)]
- Fisler, J., Bleisch, S., Niederhuber, M., 2005. Development of Sustainable e-Learning Content with the Open Source eLesson Markup Language eLML. *ISPRS Workshop*, June 2nd/3rd 2005. Potsdam, Germany.
- Fisler, J., Bleisch, S., 2006. eLML, the eLesson Markup Language: Developing Sustainable e-Learning Content Using an Open Source XML Framework. *WEBIST 2006 - International Conference on Web Information Systems and Technologies*, April 11th-13th 2006. Setubal, Portugal.
- Fisler, J., Weibel, R., 2006. GITTA: Open Content Material for GIS Education. *EUGISES 2006 Conference*, September 7th-10th 2006, Krakow, Poland.
- Gerson, S. M., 2000. E-CLASS: Creating a Guide to Online Course Development For Distance Learning Faculty. *Online Journal of Distance Learning Administration* [online], Vol. 3, No. 4. Available from: <http://www.westga.edu/~distance/ojdla/winter34/gerson34.html> [Accessed 09 May 2008]
- Werner, M., Stern, B., 2003: Active and self-controlled web based education in GIS-technology and cartography: the GITTA Project. *Proceedings of the 21st International Cartographic Conference - Cartographic Renaissance*, August 10-16, 2003, Durban, South Africa.