

# The Future of EduServ

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## Abstract

This Paper is an extension of the paper “EduServ – The Education Service of EuroSDR: Sharing Experience for Capacity Building” authored by D. Fritsch, K. Mooney & A. Oestman, which was presented at the ISPRS Congress in Melbourne, August 2012. It describes EduServ, the Education Service of EuroSDR - a European spatial data research organisation whose aim is to address the research needs of spatial data provision in Europe. With a current membership coming from seventeen European countries and a strong working relationship with related European organisations, EuroSDR has amassed considerable experience in addressing the extent and nature of these needs. In order to facilitate the transfer of outcomes of EuroSDR research activities to the user domain, e.g. to key personnel in geographic information (GI) production organisations and industry, EuroSDR commenced this annual series of e-learning courses in 2002. The Internet courses are preceded by a seminar at which participants meet tutors and receive guidelines for following the courses from their own locations. Delivery of the two-week courses requires an acceptable level of Internet connectivity, which exists in most member countries. EuroSDR is aware, however, that should such courses be shared internationally, other forms of communication will need to be addressed, such as satellite broadcasting. This would require effective collaboration with related organisations with experience with this means of communication. EduServ courses are offered in two successive years. During the courses, participants enjoy access to course tutors with a 24-hour response to queries guaranteed. Thereafter, course material for these courses is made available online. EuroSDR continues to work with past course tutors to ensure that this valuable resource is maintained as an effective and sustainable archive. This paper is aimed at sharing EuroSDR’s experience in distance education with the wider scientific community with a view to its applicability to a global audience, whereby, instead of sharing expertise within the GI community in Europe, European mapping agencies can share their knowledge and experience with the international GI community.

After 11 years of EduServ experience we will hopefully manage the second decade of EduServ courses with the same pace and dedication needed to prepare our professional personnel for the challenges in the fields of geoinformatics, photogrammetry, remote sensing and spatial data infrastructures, which lie ahead.

**Keywords:** *EuroSDR, EduServ, eLearning, Moodle, Videocasts*

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## 1. Introduction

### 1.1. General Developments in ICT

Internet technologies fascinate people of all age groups. The three buzzwords of everyday life are “always on, anywhere and anytime”. Mobile devices have become more and more powerful – they allow for learning-with-fun, creativity at any time and at any place, and public understanding of complex issues.

Most probably within the next five years we will use mobile devices with built-in Inertial Navigation sensors and general GNSS receivers which are compatible with all systems in use: GPS, Galileo, Glonass, and Baidou, to name just a few. Moreover, such devices could offer 1TB storage capacity on-board, HD photography and HD video recording, allow for communication speeds of up to 1 GBit/sec using LTE/LAN/WLAN/WiFi, and incorporate additional sensors, such as temperature, air pressure and pedometers. Such devices will communicate easily (wirelessly) with large HD displays and, as such, represent excellent tools for students of all education systems.

Learning has become, and will continue to be, more pleasant than it was before. One may argue about the consequences of this unlimited use of mobile devices. However, this discussion will not lead to any useful outcome. As a matter of fact, most people will use mobile devices instead of desktop and notebook computers, especially the younger generations. There are various public opinions about the extent of content currently taught in primary, secondary and higher education – it seems that content offered during the last 20-30 years is much too inadequate nowadays and for the future. We must double or, maybe, even triple the content! How will we perform this mammoth task? The answer seems to be simple: use the most recent technology with all its pleasant gadgets and apps.

When Apple introduced the first iPod generation (2002) nobody could foresee the success story of this mobile device. Today, close to 300 Million devices have been sold – the iTunes (Music) Store offers digital media content of all kind: music (MP3 and other formats), audio podcasts, video podcasts, TV series, movies, and e-learning content (through the iTunes U extension). Last year, the iPhone 4S (4th generation iPhone) was released, allowing for faster Internet access, HD photography, HD video capability, and other services. The iPad is a great success and is the leading device of tablet computing. The most recent iPad impresses with its high resolution display and quad core computing. Apple's app store offers more than 500.000 gadgets for download to make the iPad, iPhone or iPod Touch even more pleasant and powerful. Apple TV allows for an easy link with the home theater TV, thus the iTunes Store comes to the couch when relaxing from a hard working day. Today, we find thousands of videos in Apple podcast format (also in HD). Lesson learned: A computer manufacturer has become a world-wide leading institution for hardware, software and content!

Using the hype around iPod, iPhone and other mobile devices, learning content has to be offered in the same style and format as TV series, movies, YouTube videos, and others. Therefore, video podcasts (in short: *vodcasts* or *videocasts*) seem to be a *de facto* standard already. Many Higher Education (High Ed) institutions today offer vodcasts for their students (Fritsch, 2007). Starting in the USA (2006), the Apple iTunes U extension in swapped to Europe in 2008. This environment is Apple's answer to extend business and services to the 3L community. Unlike radio or streaming content via the Web, vodcasts are not real-time. Vodcast material is pre-recorded and the users can access the material on-line and off-line. Certain vodcasts can even be live and interactive – dozens of podcasts enthusiasts can be on at once, with the host able to control the audience in the same manner as a radio host.

The vision for the future is as follows: Vodcasts of all kind, especially for High Ed, are offered on the Web. The worldwide student (and 3L) community browses the Web and finds out the most brilliant vodcasts, according to their scientific content and pedagogical style. They rank these vodcasts to give an indication of the quality and usability. Thus, it may easily happen that preparations in GIS are made using database vodcasts of the Computer Science Dept. at MIT, visualization vodcasts of the University of Stuttgart, analysis vodcasts of Tongji University Shanghai, and data structure vodcasts of DIT. Student learning in High Ed becomes really international! Highly ranked vodcasts have the potential for future business models in Life Long Learning (3L), which will be developed parallel to the more and more increasing vodcast offer.

Besides vodcasts there are many other initiatives, which complement traditional learning practices. Webinars seem to be another efficient method to offer e-learning contents via the Web. Obviously this technology is used quite often by the geospatial industry to introduce new hardware, software and workflows to potential clients. Above all, it allows the end user to be far away from the original location of the seminar, and on the other hand the industry to present something good without renting rooms in hotels for presentations and accommodation, resulting in savings for both parties.

E-Learning platforms such as "Moodle" are also popular, especially for training purposes. The use of Moodle is simple and efficient - it allows for interactive teaching without any costs (Open Source) and already has a broad community. A comprehensive evaluation of several e-learning platforms based on Open Source developments is given by Drewitz (2009).

## 1.2. EuroSDR, a Pan European Body of Spatial R&D

EuroSDR is a European spatial data research organisation whose aim is to address the research needs of spatial data provision in Europe. With a current membership coming from seventeen European countries and a strong

working relationship with related European organisations, EuroSDR has amassed considerable experience in addressing the extent and nature of such needs.

Member organisations are diverse in nature with several only now tackling the provision of their national spatial data infrastructure (SDI), while others are at an advanced stage of implementation. EuroSDR is therefore anxious to facilitate the transfer of key knowledge and experience from those countries that have dealt successfully with the issues to those that are at a much earlier stage. This is one of the principal aims of the EduServ series of distance e-learning courses, which has recently included topics related to SDI implementation such as 'Schema matching, mapping and transformation for INSPIRE', 'The INSPIRE Directive and its Implementing Rules' and 'Open Standards & Open Source WebMapping'. Other courses have covered the complete spatial data provision cycle from data acquisition to maintenance and delivery of services. They are based on the results of collaborative applied research across Europe and represent the outcomes of shared activities, data, methods and experience. EuroSDR published its sixtieth official publication in 2012.

### **1.3. E-Learning within EuroSDR - EduServ**

In order to facilitate the transfer of outcomes of EuroSDR research activities to the user domain, e.g. to key personnel in geographic information (GI) production organisations and industry, EuroSDR launched an annual series of e-learning courses in 2002 and called it EduServ. The Internet courses are preceded by a seminar at which participants meet tutors and receive guidelines for following the courses from their own locations. Delivery of the two-week courses requires an acceptable level of Internet connectivity, which exists in most member countries. EuroSDR is aware, however, that, should such courses be shared internationally, other forms of communication will need to be addressed, such as satellite broadcasting. This would require effective collaboration with related organisations with experience with this means of communication.

## **2. EDUSERV@EUROSDR – A Brief History**

### **2.1. Why EduServ?**

Publication of research and workshop reports is, in itself, not sufficient to attain the necessary goal of transferring the outcomes of EuroSDR research activities from the research to the user domain, in other words to key personnel in the GI production organisations and the user community. The impact of EuroSDR research is lessened if the results and outcomes are not translated into the GI production process (Heipke & Mooney, 2009).

To address these concerns EuroSDR commenced its education service (EduServ) in October 2002, an annual series of short distance e-learning courses based on specific research projects or on the recommendations of workshops (Mooney & Stein, 2007).

The results of these research projects are learnt in depth with the goal that new technologies and methods are ultimately used by the national mapping agencies, private firms and universities of the member states. A EuroSDR task force organizes the educational service for each year. It selects the topics and the teachers of the courses. The teachers are recruited from the group of EuroSDR project leaders or from universities who have experience of the selected topic and e-learning.

EduServ-11, the most recent module consisted of four two-week courses that ran consecutively from March 18 to May 31, 2013. Hosted by the International Centre for Mechanical Sciences (CISM), Udine, Italy, the courses attracted about 40 participants from twenty-seven organisations in 20 countries.

Annual EduServ programmes consist of short (usually two-week) consecutive Internet-delivered e-learning courses, which are linked to the research activities of EuroSDR. They require approximately thirty hours of work (both online and offline) from the participants per course. Participants follow the courses remotely via the Internet either from their place of work or from home. On successful completion of all assignments and the submission of a detailed course evaluation feedback questionnaire, participants receive a signed 'Certificate of Completion' from EuroSDR.

Participants frequently have very different technical backgrounds. In most cases, they are professionals of European national mapping agencies, but some come from private firms as well as university students. E-Learning is unknown to many of the participants and cultural differences in the relationship between teacher and participant

may exist. Therefore, the courses are preceded by a two-day seminar at which the participants meet with the course teachers and receive all necessary instruction and guidance to allow them follow the courses from their own organisations. Table 1 demonstrates the move of EduServ courses across Europe.

**Table 1. EduServ Host Organisations**

Year	Host Organisation	Country
2002	Aalborg University, Aalborg	Denmark
2004	Budapest University for Technology and Economics, Budapest	Hungary
2005	Dublin Institute of Technology, Dublin	Ireland
2006	ITC, Enschede	The Netherlands
2007	Charles University, Prague	Czech Republic
2008	University of Applied Sciences, Stuttgart	Germany
2009	Norwegian University of Life Sciences, Ås	Norway
2010	KU-Leuven, Leuven	Belgium
2011	ENSG, Paris	France
2012	Dublin Institute of Technology, Dublin	Ireland
2013	CISM, Udine	Italy

Details of the designers and teachers of these courses, together with the years in which they were included in EduServ programmes and the number of participants, are given in Table 2.

**Table 2. EduServ Courses, Centres, Years Delivered and Student Numbers**

Course Title	Centre	Years	No
Integrated Sensor Orientation	University of Hannover	2002, 2004	14, 16
Automatic Orientation of Aerial Images on Databases	Aalborg University	2002, 2004	14, 18
Laserscanning & Airborne Interferometric SAR	ITC, Enschede	2002, 2004	14, 14
Digital Cameras/Sensors	Ohio State University	2004, 2005	16, 15
Co-ordinate Reference Systems and Transformations for Spatial Data Position	Dublin Institute of Technology (DIT)	2005, 2006	12, 11
Positional Accuracy Improvement in GI Databases	Ordnance Survey GB; TU-Berlin; DIT	2005, 2006	13, 12
Quality of Geospatial Data and Related Statistical Concepts	ITC, Enschede	2006, 2007	15, 13
Quality Control of DTMs	Aalborg University	2006, 2007	10, 21
Mapping with SAR	TU-Berlin	2007, 2008	14, 18
Laserscanning for 3D city models	Finnish Geodetic Institute	2007, 2008	18, 24
CityGML	TU-Berlin and University of Gävle	2008, 2009	20, 11
Geometric performance of digital airborne cameras	Institute for Photogrammetry (ifp), Stuttgart University	2008, 2009	25, 15

Schema matching, mapping and transformation for INSPIRE	University of Gävle	2009, 2010	9, 34
Laserscanning for Tree Extraction	Finnish Geodetic Institute	2009, 2010	9, 9
Assessment of the quality of Digital Terrain Models	Aalborg University and Charles University	2010, 2011	12, 10
The INSPIRE Directive and its Implementing Rules	K.U.Leuven	2010, 2011	22, 12
Geodetic Reference Systems	IGN France / LAREG	2011, 2012	6, 10
3D Urban Modelling	IGN France / MATIS	2011, 2012	10, 20
Radiometric performance of Digital Photogrammetric Cameras and Laser Scanners	Finnish Geodetic Institute and Vienna University of Technology	2012, 2013	9
Open Standards & Open Source WebMapping	ITC – University of Twente	2012, 2013	22
Dense Image Matching	lfp –University of Stuttgart	2013, 2014	32

An evaluation of the effectiveness of EduServ courses is possible due to the requirement that participants must submit completed quality-assurance (QA) questionnaires prior to receiving their certificates. In general terms, participants have felt that the courses are useful, and most respondents indicate that the goals of the courses are achieved. Course material is appreciated and additional hardcopy material is found to be useful. The combination of the introductory seminar and e-learning was regarded as positive by about 70% of respondents and a similar percentage indicated that they would participate in further courses. Some participants have difficulties in keeping the time schedule and felt the work load was somewhat too heavy (more than 40 hours) and a small number considered the courses as difficult.

### 3. Lessons Learned from EduServ

The experience of hosting 11 EduServ modules so far suggests that such educational resources are of particular interest to the smaller states, both within and beyond Europe. This may be due in some part to the existence of adequate CPD resources in the larger states, which are not generally available in smaller ones. On the other hand, key staff members of GI organisations in several countries do not have high levels of proficiency in the English language and feel that such courses are beyond them.

#### 3.1. EduServ and Capacity Building

This of course raises the issue of capacity building in general and in skills updating in particular in those European states where a comprehensive GI education resource does not exist but where the implications of European directives such as INSPIRE will require considerable training.

The EuroSDR EduServ model of distance e-learning for CPD is an example of the use of appropriate technologies to assist states to build capacity but it must address the challenges of language and better marketing. There is also a need to be flexible and adaptive to new ways of learning, utilising state-of-the-art solutions for communication and networking.

The pre-course seminar needs to be carefully designed and managed in order that participants benefit from attending in a way that justifies the considerable expense and disruption in taking time out of busy work situations and travelling to the seminar venue. It is all too easy to offer a series of stale presentations containing material that is, in fact, made available as part of the e-learning course. Future seminars should incorporate a significant degree of interactive discussion and identification of individual requirements.

### **3.2. EduServ and Teach-the-Teacher Issues**

Since several instructors are scientists, some of them are new to e-learning from a tutoring perspective. The EduServ templates for organising e-learning courses are found to be very efficient in getting these instructors acquainted with this new way of learning. The templates consists of standardised procedures for course design, methods of delivering lectures, design of self-assessment tools etc. There is however no requirement that the instructor must follow these templates in detail. The course material and the didactic approach has to be designed with respect to the course content.

### **3.3. EduServ and Moodle**

The use of Moodle as e-learning platform has helped considerably to make the EduServ courses a success. This platform is widely used in non-profit organizations as well as in the private sector to implement all kinds of 3L programmes. This impacts directly on the improvement and further development of Moodle, which is gratefully acknowledged. As confirmed by the EduServ tutors it offers many options to organize an e-learning course, which makes it even more attractive.

But this complexity can be a drawback for those tutors who just use Moodle in a limited time period (as EduServ courses only offered for two years). Here, EuroSDR should offer guidelines on "How to organize an EduServ course using Moodle". Such guidelines would also help to optimize the time commitments of the individual tutors.

A further drawback is the time-consuming administration of the system, ie, to regulate the permissions for tutors and students, in particular if data must be uploaded and to overcome some regulations in discussion forums. This can only be overcome if the Administrator rights are available.

## **4. Future Implementations in Eduserv**

### **4.1. Podcasts or Videocasts Production**

From experiences gained in having served for a six year term as Rector of the University of Stuttgart (UniS), in which e-learning and blended learning were key issues of the university development programmes, podcast production of photogrammetric modules was launched in October 2006, at the Institute for Photogrammetry (ifp). The lessons learned from the overall outcome of the management and implementation of the very successful UniS e-learning programs 100online, selfstudy online and campus online have been: Keep it simple and use standards! Therefore the key issues in recording and archiving lectures in photogrammetry and geoinformatics can be summarized as follows:

- (1) Improve the quality of the lectures and the lecture notes and keep the students interested
- (2) Keep the efforts reasonable and use standards
- (3) Replace blackboard writing (notes) by rendering the lecture notes with handwritten explanations (text and formula derivations)
- (4) Offer the rendered lecture notes directly after the lecture, as a pdf file on the web
- (5) Provide podcasts/videocasts at two different resolutions: 320x240 (Half SD) and 640x480 pixel (SD)

A pilot project was started to process the four winter lectures of the author in the fields of digital signal processing (German and English language), statistical inference I and geoinformatics I. First of all, an easy-to-use recording environment had to be selected with the capability of producing handwritten notes. For some years, notepad computers have been offered by several vendors, such as Fujitsu, Hewlett Packard, Lenovo, and Toshiba, to name just

a few. Those computers run under MS Windows and have become very powerful. Thus, a Fujitsu LIFEBOOK T Series was chosen for the lecture recordings. Camtasia Studio 5 (TechSmith) seemed to be an ideal screen recording and presentation software, having the features we were looking for. Thus, the recording hardware and software came off-the-shelf, was cheap and solved the tasks we had in mind. Most recently MS Surface Pro 2 hardware/software is used for the raw recordings of the lectures, to be in line with ICT developments in tablet computing.

Being equipped with the necessary tools for a “Poor Man Podcast Production Environment (PoMaPPEn)” the following workflow could be maintained all the time:

- (1) Select the portion of the lecture notes (txt, doc, ppt, pdf, etc.) to be presented and convert it to a journal file (jnt).
- (2) Start the Camtasia Studio 5 recording software according to the video podcast creation model (1) and set the sampling rate of the screen recording to not less than 7 fps.
- (3) Present the lecture in front of the students, who look at the screen and see all the spontaneous rendering of the lecture notes.
- (4) After the lecture is finished store the jnt file, print it in pdf format, and put it on the web. Store the raw video file for editing, post-processing and podcast production (see figure 1).

Note that these four steps are really simple and also help to improve the convenience of the instructor, who may sit in front of the students and render the lecture notes on the notepad computer.

The pilot project was extended in Summer 2007 to offer all lectures and exercises of the Institute for Photogrammetry, UniS, for several curricula in this manner, with great success. An evaluation every semester made by the students comes out with very positive results – most of them wished that all lectures and exercises in their curricula should be offered in this excellent way of teaching. Another important experience made is that the grades of examinations have been improved with the availability of podcasts/videocasts.

Within the EduServ 12 Course “Dense Image Matching” the tutor Prof. Dr. Norbert Haala recorded his presentation at the pre-course seminar according to the guidelines above, which enabled it to be offered on the EduServ Web pages. This not only maintains the original spirit of the tutor but also caters for those participants who could not participate in this opening lecture and interactive session. With the coming new web design for EuroSDR, space should be reserved for easy access to the original lecture notes, the rendered lecture notes (mark-outs) and the podcasts/videocasts, allowing them to be downloaded to all mobile devices, anywhere and anytime!

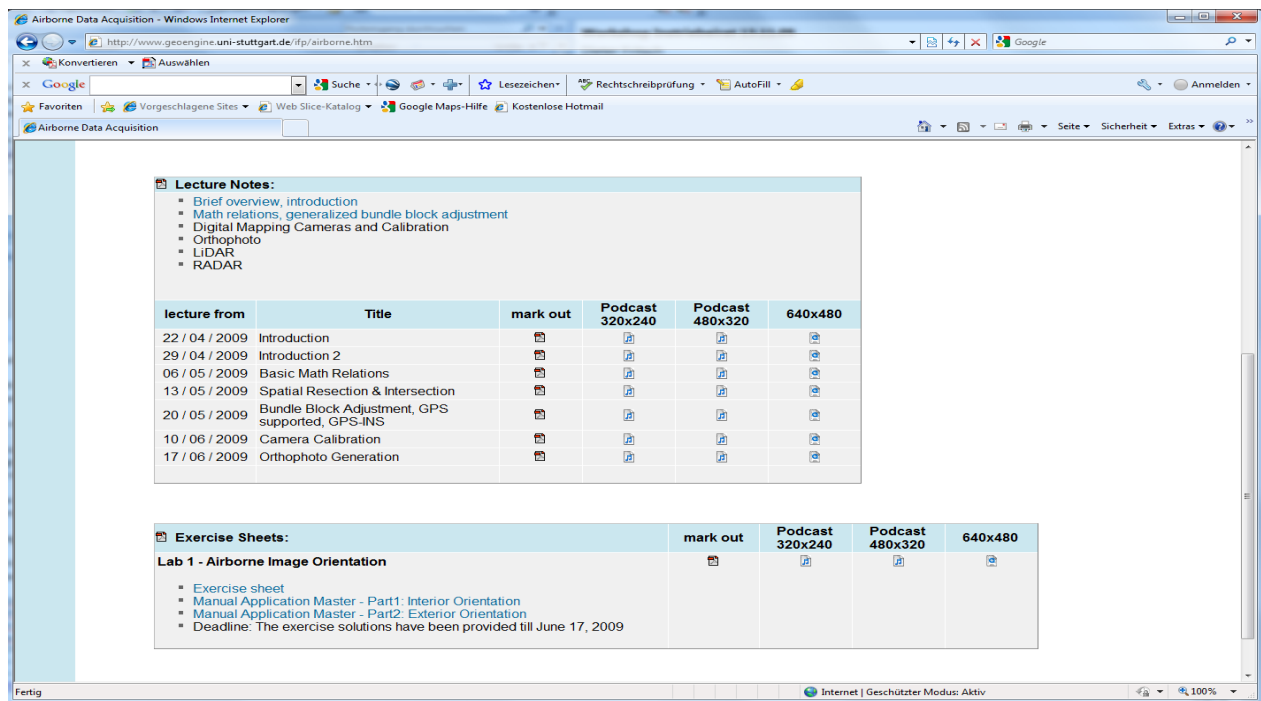


Fig. 1: Web access of Lecture Notes, Mark-outs and Podcasts/Videocasts at the Institute for Photogrammetry, Univ. of Stuttgart

## 4.2. EduServ Management Team of Three (1 Academia, 1 NMCA, 1 Private Sector)

Nowadays, requests for organizing EduServ courses are manifold. They come from academia, NMCAs, and the private sector. In the past, courses have directly evolved from EuroSDR projects and EuroSDR could not implement further requests. In order to be more flexible in future and to share voluntary workloads (making participation in EuroSDR even more attractive) it is proposed to have three principals in the management of EduServ from three different sectors: academia, NMCAs, and the private sector. With these shared responsibilities it should be easier to find willing and interested people with management skills and with visions and ideas for future courses.

## 4.3. EduServ Advisory Board

From the beginning a task force advised the EduServ Working Group Chairman about course planning work and gave him/her support in organizing the annual programme. This task force has not been active for some time and therefore must be re-vitalized. It is proposed to rename the task force "EduServ Advisory Board". Membership of this board should comprise two from academia, two from NMCAs, and two coming from the private sector. The three WG principals are automatically members of this board, together with the Secretary-General. The board should meet virtually once per month (e.g. by Skype calls) to maintain and continue efforts to offer attractive EduServ courses.

## 5. Conclusions

Experience of more than 10 years of EduServ suggests that e-learning courses are of particular interest to the smaller states within Europe. This may be due to the existence of adequate CPD (continuing professional development) resources in the larger states. However, key staff members of GI organisations in several countries may not have high levels of proficiency in the English language and, consequently, may feel that such courses are beyond them. Addressing the issue of capacity building and skills updating in those European states where a comprehensive GI education resource does not exist (but where considerable training in GI fields is still required) is seen by EuroSDR as a major challenge.



EuroSDR is also aware of the need to ‘future proof’ research capacity in all European states so that emerging GI research and education issues (in an increasingly ‘joined-up’ Europe) may be addressed effectively and economically. It is the firm intention of EuroSDR that its education service, EduServ, continues to address the issue of transferring the outcomes of its research activities to the GI production and user domain, and to respond to special requests coming from academia, NMCA and the private sector.

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