EuroSDR

Annual Report 2010

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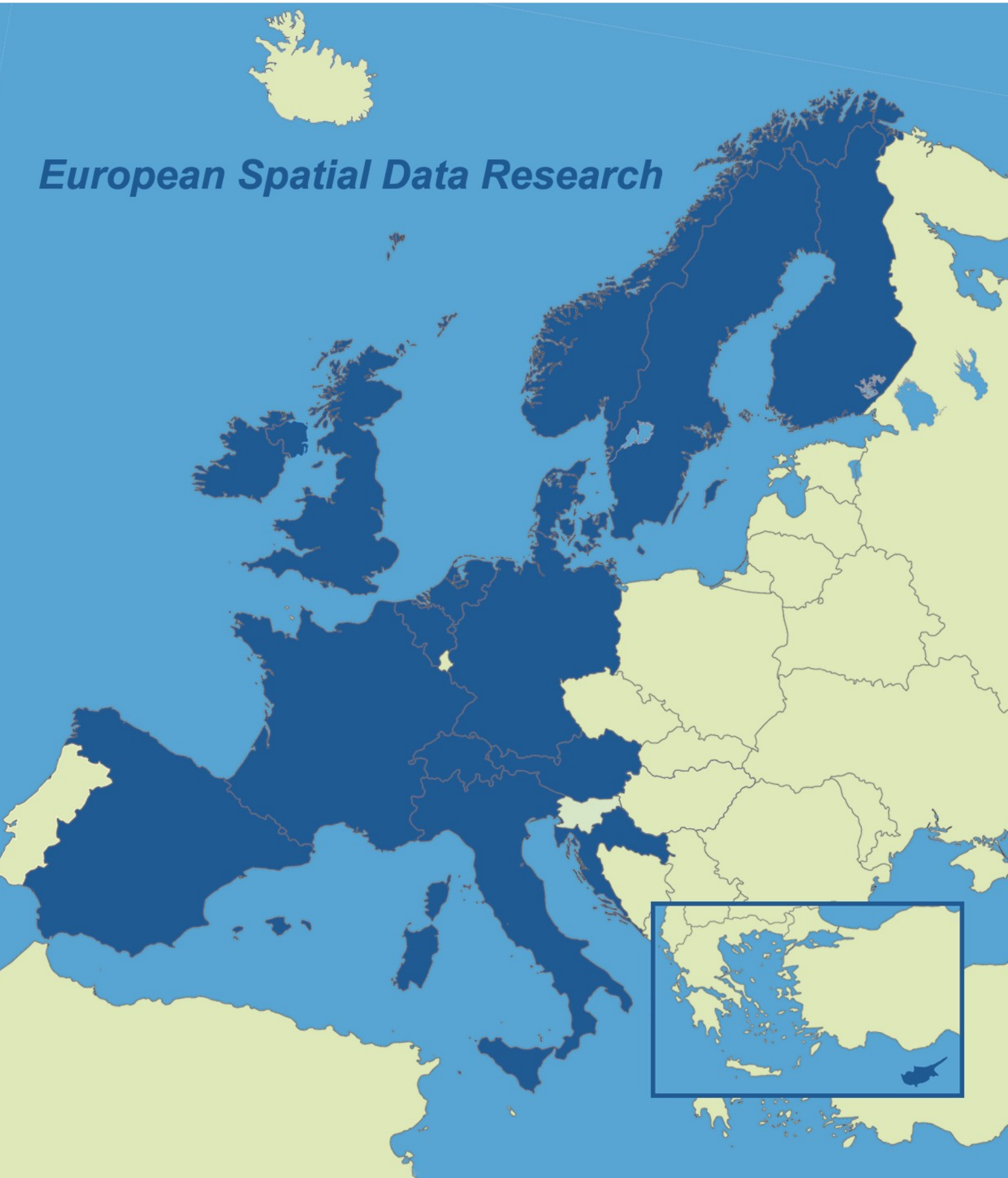

About EuroSDR

EuroSDR is a pan-European organisation established by International Treaty, as OEEPE, in 1953 in Paris in accordance with a recommendation passed by the Council of the Organisation for European Economic Co-operation. The spatial data research interests of European countries are represented through the membership in EuroSDR of national organisations from their production and research sectors.

The result is a network of delegates, from European Geographic Information organisations and research institutes, effectively and practically addressing Europe's spatial data research requirements.

Collaborative research projects address the acquisition, management and delivery of spatial data and services while international workshops and courses, in collaboration with related organisations, address key issues in a timely and focussed manner.

Our Member States and their Prime Delegates (2010)

Austria	Michael Franzen	Bundesamt für Eich- und Vermessungswesen (BEV)
Belgium	Ingrid Vanden Berghe	Nationaal Geografisch Instituut - Institut Géographique National
Croatia	Željko Hećimović	Hrvatski Geodetski Institut
Cyprus	Christos Zenonos	Department of Lands and Surveys
Denmark	Thorben Brigsted Hansen	Kort & Matrikelstryrelsen
Finland	Risto Kuittinen	Geodeettinen Laitos
France	Jean-Philippe Lagrange	Institut Géographique National
Germany	Dietmar Grünreich	Bundesamt für Kartographie und Geodäsie
Ireland	Colin Bray	Ordnance Survey Ireland
Italy	Fabio Crosilla	Insiel
Norway	Jon Arne Trollvik	Statens Kartverk
Spain	Antonio Arozarena	Instituto Geografico Nacional
Sweden	Anders Olsson	Lantmäteriet
Switzerland	Francois Golay	Ecole polytechnique fédérale de Lausanne (EPFL)
The Netherlands	Jantien Stoter	Technical University of Delft and NL Kadaster
United Kingdom	Malcolm Havercroft	Ordnance Survey of Great Britain

Our Vision is to be **the European research platform** for National Mapping and Cadastral Agencies, Academic Institutes, the Private Sector, Industry and User Groups on issues related to the implementation of technology developments with respect to optimising the provision (collection, processing, storage, maintenance, visualisation, dissemination and use) of reference information (data serving as a spatial framework for organisations involved in monitoring, management and development) in a Geoinformation Infrastructure (GI) context.

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Further information on all articles in this report can be requested from the EuroSDR Secretariat at admin@eurosdr.net

Message from the President

Jean-Philippe Lagrange

This foreword to the EuroSDR Annual Report for 2010 is intended to invite you to read accounts of the varied and wide ranging spatial data research activities undertaken throughout the year. These are reported in detail by the EuroSDR players most directly involved. In this message, I will draw attention to initiatives that, while not reported in detail elsewhere, are equally important for the organisation.

I would like to begin, however, by wishing the best to my predecessor in office, Mr. Antonio Arozarena of IGN Spain, who completed his Presidential term at our 116th meetings in Frankfurt in May. Antonio devoted a significant amount of his time to EuroSDR during his two-year term and developed closer ties with our related organisations, EuroGeographics, the International Cartographic Association and the International Society for Pattern Recognition and Remote Sensing.

Antonio's work in developing a practical way of effective working with EuroGeographics bore fruit in September when EuroSDR made a proposal to the EuroGeographics pre-GA briefing in Brussels. On behalf of EuroSDR, I proposed that EuroSDR would present annually to the EuroGeographics General Assembly a topic, arising from EuroSDR activities, that has short or medium-term implications for European national mapping agencies. There are a number of such topics that come to mind but the need for object-oriented 3D data model structures for national reference data is a good example. We hope that such focussed and directed presentations will allow both organisations to achieve the maximum benefit from our close cooperation.

One of the highlights of a busy 2010 was an initiative undertaken through the cooperation of our member, The State Geodetic Administration (SGA) of Croatia. At the 117th EuroSDR meetings in Zagreb in October, SGA invited representatives from the national mapping agencies from its neighbouring countries in the Balkan area. Bosnia and Herzegovina, Macedonia, Montenegro, Serbia, and Slovenia were present at the meetings and contributed to discussions focussed on how EuroSDR might co-operate more effectively with the Balkan countries in order that the spatial data research needs of this area can be addressed. From a EuroSDR point of view, this initiative is very significant. It is not realistic to expect every European country to become a member of a research and development organisation such as EuroSDR, particularly during a period of budgetary constraints such as pertained in 2010. Therefore, we are looking at innovative ways in which non-member countries can feed into the EuroSDR research agenda, and how EuroSDR can contribute technical insights and innovations into their activities. During discussions, a number of issues were highlighted and the need to explore the implications of the INSPIRE directive and the associated technical requirements was high on the list. There was a strong feeling that an appropriate EuroSDR-led event concentrating on this topic would be worth organising during 2011. It is our intention to pursue this initiative as far as possible.


Jean-Philippe Lagrange
President
EuroSDR

A significant catalyst for such initiatives is the practise, commenced some time ago, of inviting presentations at regular EuroSDR meetings from representatives of non-member countries or non-active member countries. During 2010, we had a very stimulating presentation from Slovenia (Prof. Mojca Fras) and, unfortunately, an invited presentation from our colleagues in Poland could not materialise. Such presentations inevitably engender an interest in the relevance of EuroSDR activities to both sides and we are keen to keep this practise going. Among others in 2011, we will invite speakers from the Baltic region and explore further collaborations.

As you will read in this issue, we were delighted to welcome two new members to EuroSDR in 2010 - The University of Udine represented by Professor Fabio Crosilla as full member for Italy and AGIV (Agentschap voor Geografische Informatie Vlaanderen), an agency for Geographical Information in Flanders represented by Dr. Jo Van Valckenborgh, as an Associate member for Belgium.

A particularly satisfying outcome of 2010 was the success of EduServ, our programme of e-learning courses, hosted this year by KU-Leuven. The onsite pre-course seminar, to be hosted by our colleagues in Leuven, had to be cancelled at the last minute due to the disruption caused to European travel by the erupting volcano in Iceland. Thanks to considerable extra effort on the part of the EuroSDR working group on Education Services and the Secretariat, the courses nevertheless proceeded very successfully with a record high number of participants.

I deliberately chose to finish with this topic in order to highlight the amount of voluntary activity that goes on behind the scenes to enable all our activities to proceed. I would like to record my appreciation for this effort on the part of many people within EuroSDR, beginning with, but not limited to, our permanent Secretariat at DIT, Commission Chairs and project leaders and look forward to it continuing into the future.

Message from the Vice-President

Dieter Fritsch

When I took over the Vice Presidency during the EuroSDR Autumn 2009 meeting in Helsinki my motivation was to give new momentum to workshops, projects and our Annual Meetings. The year 2010 started with my participation in the 2nd EuroSDR Workshop held in Brussels "EuroSDR Project Atlas of INSPIRE Implementation Methods" (Jan. 14.-15., 2010). INSPIRE will definitely change the way we collect, manage, harmonize and disseminate geospatial datasets in Europe and therefore must be one of the ongoing EuroSDR core projects. This workshop offered a stimulating and open atmosphere for the 30 participants, where everybody could contribute their own visions at the end of the event. Thanks to Ingrid Vanden Berghe (National Geographic Institute, Belgium), Joep Crompvoets (Katholieke Universiteit Leuven, Belgium), Jantien Stoter (TU Delft and Kadaster, The Netherlands) and Walter de Vries (ITC, The Netherlands) for organizing the two workshops.

In February the EuroSDR Executive Team held its meeting in Madrid, invited by the EuroSDR President, Antonio Arozarena Villar. Thanks to Antonio we had a very good meeting discussing the frame of the Rolling Research Plan 2011-14 and the new structure of the bi-annual meetings. Here we decided to always invite two speakers of high calibre on the future agendas of the Scientific sessions of the meetings, to offer ample time for discussions (keynotes and special break -out topics) and to properly integrate decision items to be approved by the delegates. This structure was successfully implemented in the Spring Meeting in Frankfurt/Main, Germany, and the Autumn Meeting in Zagreb, Croatia and will guide us also in 2011.

In March it was a pleasure to participate in the EuroSDR Workshop "3D Digital Landscape Models – From 2D Cartographic to 3D Topographic Data", organized by the Chairman of Commission IV, André Streilein, the EuroSDR Secretariat (Kevin Mooney and Oonagh Birchall) and Andy McGill (Ordnance Survey Ireland). About 35 participants enjoyed a stimulating workshop with great presentations and effective break-out sessions – Dublin Castle as venue contributed with its own atmosphere to the success of this workshop. This first workshop provided a comprehensive state-of-the-art amongst the EuroSDR members (Academia, NMCAs) and it was decided to hold a second workshop in Munich, November 2010. Thanks to the organizers for bringing this topic to the EuroSDR agenda – it was a great workshop. Also the Munich Workshop, hosted by the Bavarian State Office of Geodesy and Geoinformation, was a great workshop; special thanks go to Klement Aringer and Wolfgang Stoessel.

The German EuroSDR member, the Federal Office for Cartography and Geodesy (BKG, Frankfurt/Main, Germany) invited EuroSDR to hold its Spring Meeting in Frankfurt. Before we opened this meeting the EuroSDR Executive Team met for a one-day discussion round on the draft of the Rolling Research Plan 2011-14. The results were finally presented for the first time to the EuroSDR delegates during the Frankfurt meetings. Two keynote speakers (Juergen Dold, CEO Leica Geosystems, Heerbrugg, Switzerland) and Alexander Zipf (Geoinformatic Science, University of Heidelberg) gave their visions on new developments in geospatial hardware and software and web-based geodata processing. The Ice Breaker party in the Villa Mumm (special invitation of Dietmar Grünreich) belongs to the lovely memories when rethinking EuroSDR activities. Summarizing the Frankfurt Meeting we should not forget to pay special acknowledgments to Dietmar Grünreich and Andreas Busch for making the Spring Meeting a very pleasant one.

In June EuroSDR was invited to participate in the 1st European Address Conference, Brussels. Here, I gave an overview about EuroSDR as such and offered our partnership to the European Address Forum, a new organization to put forward georeferenced addresses for every European citizen. This workshop made the problems of addressing people with the right geolocation clear, especially when people move around without being registered properly at the right municipality.

Our partner organization ISPRS (International Society for Photogrammetry and Remote Sensing) celebrated its Centennial in Vienna (beginning of July), to remember its founder Eduard Dolezal. This great event was held in conjunction with a Joint Meeting of the three German-speaking Photogrammetric Societies Austria, Germany and Switzerland and the ISPRS Technical Commission VII Symposium. On behalf of EuroSDR the Secretary General, Kevin Mooney and I were invited for discussions with the ISPRS Council to strengthen the collaboration between ISPRS and EuroSDR in the future. The results were promising and I accepted an invitation to deepen the first ideas at the next ISPRS Council and Technical Commission Presidents meeting in Orlando, Florida (November 2010). As an outcome of the Vienna meeting we invited ISPRS President, Orhan Altan, as a keynote speaker to the EuroSDR 2010 Autumn Meeting in Zagreb.

The Autumn Meeting in Zagreb (end of October) was perfectly organized. Thanks to Zeljko Hecimovic and his team from the Geodetic Institute of Zagreb University who altogether provided excellent services (Airport Pick-up, City Tours, Social Events) to make this stay in Zagreb unforgettable. Besides Orhan Altan we invited Michael Gruber as second Key-

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Dieter Fritsch
Vice-President
EuroSDR

Sensors, Primary Data Acquisition and Georeferencing

Michael Cramer

Looking back, 2010 does not seem to be too spectacular in terms of the activities of EuroSDR Commission I. But this is only true at first glance; if you look in more detail quite interesting things did happen in 2010 in the field related to this commission:

Refinement of digital airborne camera systems is still one of the major topics. Especially because now the systems are introduced in practice and continuously have to provide consistent and reliable results in operational conditions. This not only applies to the sensor hardware itself, it also applies to the improvements in the processing chain, containing both geometry and radiometry aspects.

It was also one of the topics discussed at the **European Calibration and Orientation Workshop EuroCOW 2010**. This well established, high quality biennial workshop always brings together experts from science, system providers and users. It was held at the Institute of Geomatics (IdeG) in Casteldefells, Spain, again, jointly organized through IdeG, EuroSDR and ISPRS Working Group Commission I.5. In addition to technical presentations and scientific discussions on the most recent technical developments, more general topics were also addressed to point to future development and trends. From that the following four phases or paradigms in mapping systems were defined:

1. Airborne mapping (*after second world war*)
2. Satellite mapping through the *cold war*
3. Terrestrial mapping (*now*)
4. UAV/UAS applications *in future* (?)

Today it is clearly not only people from photogrammetry or the mapping community using mapping technologies, but a broad spatial community that moves towards automation, asking for more reliable and more robust processes, with finally merging worlds and bridging the gap to computer vision. New applications request image data, which are more important than former vector maps. Future focus will be more on up-to-dateness, completeness, automation. The need for a complete image mosaic seems to be higher than the final accuracy, at least as long as there is "some sort" of georeferencing available. Robust unconventional mapping will also be a topic of importance. Such future application will definitely have an impact on the current still rigorous UAS/UAV flight restrictions.

Michael Cramer
Chairman
Commission 1

It should be highlighted that all major digital airborne camera providers have again attended the EuroCOW meeting, not only listening to the scientific presentations but also using this event to present their newest developments. This time **the first single frame, thus monolithic, very large format digital airborne camera**, the now called DMC II product, was introduced by Intergraph/ZI. This product is available as a series with 140, 230 or 250 Mpix resolution. In terms of the number of pixels per image the DMC II by far exceeds the number of pixels of the former DMC I product, which was less than 110 MPix. But this was obtained for the virtual image only, which was stitched from the 4 individual (about) 28 MPix camera heads arranged in a tilted configuration to derive a "butterfly" pattern on the ground. A 230 MPix image now – in terms of number of pixels – is equivalent to an image from traditional airborne mapping cameras scanned with a pixel size of 0.014 mm. Figure 1 illustrates the different sensor sizes in comparison to analogue scanned film, the former DMC I product and the Vexcel Imaging Ultracam camera series, which is based on the syntopic imaging from multi-head configuration and stitching. The future will show, if this monolithic imaging is superior to current large format imaging using multi-head layouts, or if both technologies will be used in parallel – besides line scanning approaches and other different camera concepts, like stepping frame camera systems.

This continuous evolution of sensors and change in concepts always requires new empirical accuracy testing, not only focusing on the geometry but also on the radiometric sensor performance. A quite extensive test of digital airborne camera systems and the quality of derived products like digital surface models was finished in summer 2010 – even though this project was

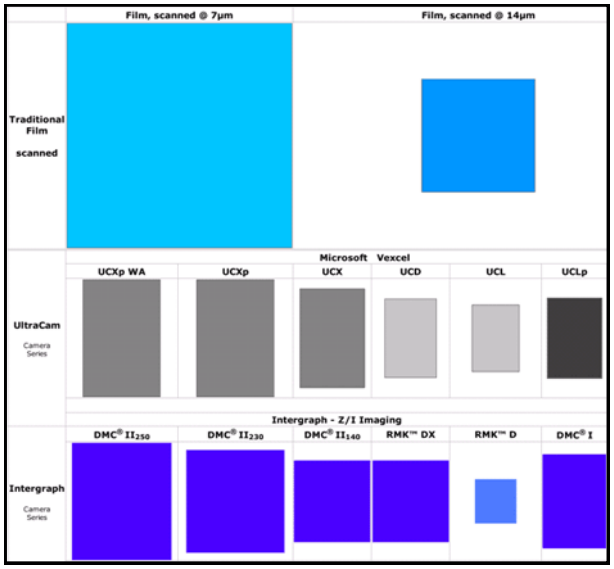

Figure 1: Comparison of camera frame sensor sizes for digital airborne mapping sensors (© www.aerial-survey-base.com)

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not directly linked to EuroSDR as an official project, it should be mentioned here because it was one of the most comprehensive tests in digital airborne systems done so far and its results are closely linked to the Commission I activities. This **DGPF test on Digital Airborne Photogrammetric Cameras** was initiated by the German Society of Photogrammetry, Remote Sensing and Geoinformation (DGPF) and coordinated by the chairman of EuroSDR Commission I. Results are published in the 02/2010 special issue of the German society's PFG journal.

The evaluation of the **radiometric aspects of digital photogrammetric images** is also one of the ongoing empirical projects in EuroSDR, which reached its mid-term in 2010. Major challenges in the project have been that the optimal radiometric processing of photogrammetric image blocks requires new kinds of approaches. The commercially available radiometric adjustment software, which is currently mostly used by NMAs, is not feasible for the new data, and has not been taken as part of the project. All known operational approaches suitable for accurate correction of photogrammetric images are tested in the project and in addition novel methods are now being developed. Results with the Leica XPro are the first quantitative results of reflectance calibrated photogrammetric images ever published, and show the high potential of new approaches, but also indicate several important research issues. Results from experiments of tree species classification in boreal forests have indicated that the optimal utilization of the multi-angular views of a photogrammetric block could be advantageous and pointed out research questions. These results point to new directions for the processing and analyzing of photogrammetric images.

All new types of sensors, data and products demand a commonly accepted certification processes. This topic is part of the EuroSDR **European Digital Airborne Camera Certification EuroDAC²** initiative, which has been running for quite a while. In 2010 parts of our initiative were accepted and integrated in one of the new projects from the European Metrology Research Program EMRP. This now establishes the link to the official European National Metrology Institutes and may answer one of the most important questions: Who will be able to certify mapping systems for the whole of Europe?

For sure, certification always relies on processes defined with national or international standards. This is why the EuroDAC² group also contributes to the development of the new standard **ISO/TS 19159 "Calibration and validation of remote sensing imagery sensors and data"**, which is mentioned in the report on standards related activities later in this issue.

With all these recent developments and activities, one should not forget the roots where things began! As we know, almost all today's digital airborne sensors use integrated GNSS/inertial systems to directly determine the full exterior orientation of the airborne sensor. This data might then be used for direct georeferencing or integrated sensor orientation – an issue which is also part of Commission I activities. Inertial sensors using accelerometers and gyroscopes are an inherent part of such integrated systems. It is interesting to note that, in 2010, the invention of the later called gyroscope celebrated its 200th birthday! It was Johann Gottlieb Friedrich Bohnenberger (1756-1831), professor for Physics, Mathematics and Astronomy at University of Tuebingen, Germany, who developed his so-called "**Bohnenberger Machine**". This less than 0.2m sized instrument was firstly only used to illustrate basics of gyro technology and precession of the Earth's rotation axis to students during Bohnenberger's lectures. As can be seen from the sketch in Figure 2, which was published seven years after his invention was first mentioned, and one of the original instruments, this machine contains all elements of a mechanical gyroscope: The rotating element and the gimbal to maintain freedom in all three axes. This machine was later re-named gyroscope by J. B. Léon Foucault (1819-1868). Its concept became essential for all gyro instruments in navigation, survey and platform stabilization – even nowadays. Bohnenberger was also the person responsible for the first mapping of the former state of Wuerttemberg in the south of Germany.

This reference to Bohnenberger and his invention may help to illustrate how progress happened in the field of mapping devices in its broader sense. It would be interesting to see which of our current developments might still be of relevance 200 years from now? Still, we hope that current and future work of EuroSDR Commission I will always serve the EuroSDR mission, to maintain the link between users and science for the purpose of applied research in data provision and delivery. If anyone is interested in actively participating – you are always cordially invited!

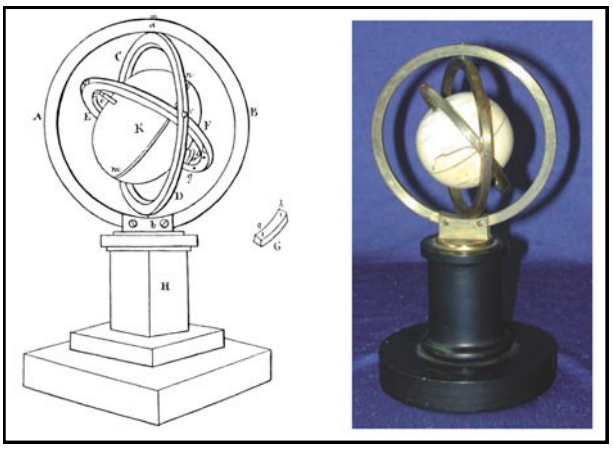

Figure 2: The "Bohnenberger Machine" – sketch published in 1817 by Bohnenberger (left) and instrument rediscovered in Tuebingen in 2004 (right) (figure taken from Exhibition Catalogue "Orientierung im Raum", Universitaet Stuttgart, 2010).

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Image Analysis and Information Extraction

Juha Hyyppä

Commission 2 deals with the automatic extraction and updating of geo-spatial information from aerial and space imagery. Below, two projects are depicted in detail to give an understanding of the work done in the Commission in 2010.

Registration quality – Laser scanning and photogrammetry are powerful 3D data acquisition methods providing both overlapping and complementary information. Currently, integration of laser data and images provides the most complete information for various surveying and 3D modeling tasks. However, this integration requires that both data sets be accurately in the same coordinate system. In 2008, EuroSDR launched the project "Registration Quality – Towards Integration of Laser Scanning and Photogrammetry", led by Petri Rönnholm, Aalto University (Espoo, Finland), in order to collect knowledge about current registration methods and their performance.

The test included thirteen variations of orientation methods developed by participants and applied with the common data set. Fortunately, the applied registration methods covered all major types of tie features and many strategies used to find them. Major strategy types included the extraction of corresponding 3D features from both data sources, the extraction of 3D features from ALS data and corresponding 2D features from images or the creation of synthetic images from laser data and extraction of corresponding 2D features from both synthetic laser-derived images and aerial images. The types of tie features were points, lines, surfaces, unfiltered laser point clouds and a combination of lines and surfaces.

Examples of reasonably good relative orientations were achieved using manual, semi-automatic and near automatic methods. Therefore, the level of automation was not the most significant factor for registration accuracies. Accuracy of registrations was more dependent on the implementation of the methods and the types of tie features. According to the results, it is difficult to select one method as superior to others. More than one method resulted in good registration accuracies. However, automatic methods that used image- and ALS-derived DSMs as tie features were very promising. Their performance was very robust, because the DSMs covered the complete test area allowing a large amount of information for the registration process. In addition, the complete coverage of surface-like tie features enables checking of the internal geometric quality of ALS data. These methods rely on automatic image matching, which is needed in order to create image-based DSMs. Therefore, the quality of image-derived DSMs and the conditions that affect DSM creation should be further examined.

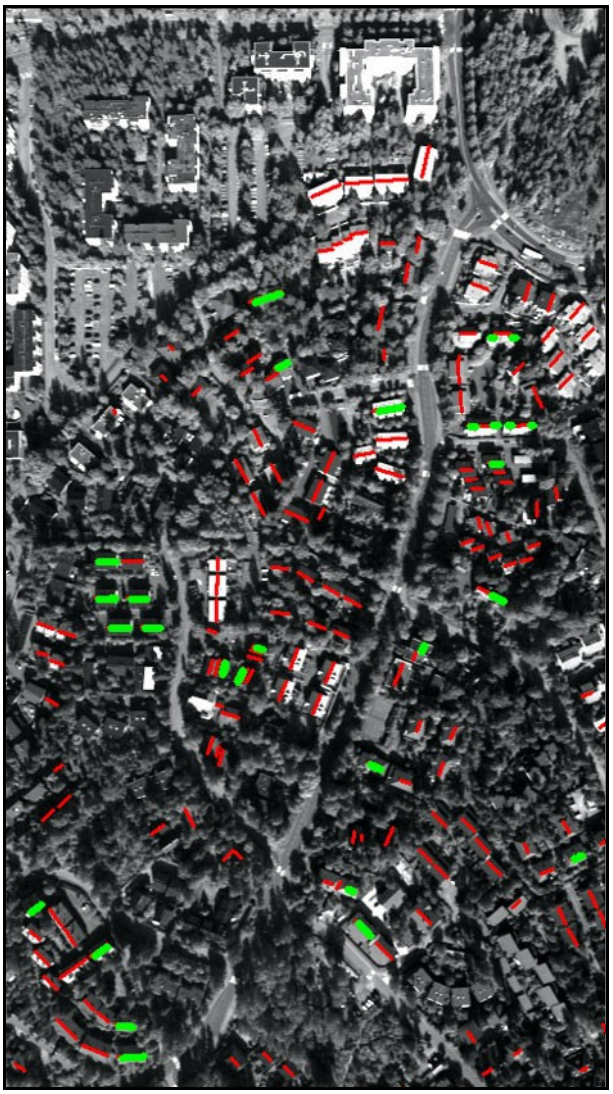

Figure 1. Example of one method tested in the Registration quality project. Ridges were extracted from ALS data by fitting planes to roofs and intersecting these planes. Corresponding ridges were extracted from images using image processing and relative orientations were solved using co-planarity equations by the means of least squares adjustment. Courtesy to Mika Karjalainen (FGI), Petri Rönnholm (Aalto Univ.) and Arttu Soininen (Terrasolid Oy).

This EuroSDR project represents one step towards future integration of ALS data and aerial images by

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highlighting the importance, performance and possibilities of current data registration methods. It must be noted that many methods applied by the participants were still at the development stage. Therefore, the performance and execution time of most methods can be improved in the future.

Road Environment Mapping Using Vehicle-based Laser Scanning – The vehicle-based or mobile laser scanner is a multi-sensor system that integrates various navigation and data acquisition equipment on a car or van for collecting point clouds along the roadside. The navigation sensors typically include GPS receivers and an IMU (Inertial Measurement Unit), while the data acquisition sensors include, in addition to the terrestrial laser scanner, digital cameras. Thus, the instruments are similar to airborne laser scanning surveys. Originally, the EuroSDR project 'Road environment mapping using vehicle-based laser scanning' aimed at benchmarking extraction methods for road side objects such as buildings/building planes, trees, pole type objects, DTM, kerbstones, paintings, bushes, traffic islands and fences, which are important objects in many applications. The data distributed to all participants was collected with the FGI ROAMER system, covering 1700 m of road environment from the Espoonlahti area. The data has been available since June 2009 from the FGI ftp site. Since it is hard to get reasonable amount of inputs, which reflects the status of the MLS in general, the present objective of the project is to report on the general accuracy of various mobile laser scanning systems, and to do benchmarking on retrieval methods of selected objects, such as poles. Data has also been collected with two commercial MLS systems. The reference data of the area was collected using TLS, ground control points and VRS- and RTK-GPS-measurements. Planimetric accuracy after systematic errors have been removed was between 2 – 4.6 cm with the various mobile systems, which is promising since the reference accuracy is about 2 cm. The accuracy is clearly a function of the distance to the target. In the case of automatic pole extraction about 80% accuracy has been obtained.

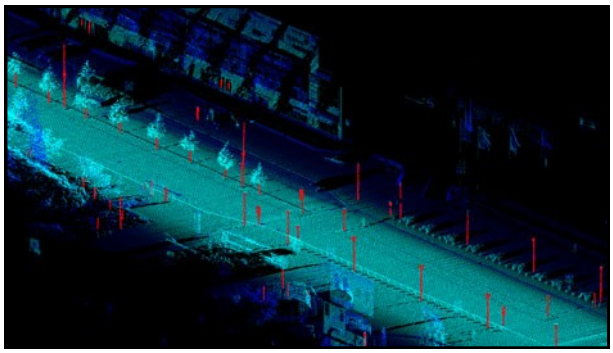

Figure 2. Example of automatically extracted poles from MLS data. Courtesy to Matti Lehtomäki, FGI, see also Lehtomäki M., Jaakkola, A.,Hyyppä, J., Kukko A., and Kaartinen, H., Detection of Vertical Pole-Like Objects in a Road Environment Using Vehicle-Based Laser Scanning Data, Remote Sens. 2010, 2(3), 641-664; http://www.mdpi.com/2072-4292/2/3/641/

Sensors, Primary Data Acquisition and Georeferencing

Michael Cramer

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Production Systems and Processes

André Streilein

In 2010 the activities of Commission 3 were focussed on raising awareness, on networking and capacity building in new fields of research such as virtual globes, change detection, 3D landscape models and archiving of digital reference data. A number of workshops and two new working groups document these activities.

The project on **Virtual Globes** (project leaders: Prof. Dr. Stephan Nebiker, Basel, Switzerland and Prof. Dr. Eberhard Gülch, Stuttgart, Germany) dealt with chances, challenges and opportunities of virtual globes and an evaluation of impacts on the geospatial industry. The final report has been published as EuroSDR official publication No. 57.

Four workshops on relevant research issues were organised during 2010.

The workshop "**Automated change detection for updating national databases**" (4th to 5th March, 2010, Southampton, UK) was intended to baseline research and to provide a stimulus for practical implementation of automated change detection methodologies.

More than sixty participants from mapping agencies,

"Change Detection": Automatic extraction of trees (yellow) compared with actual vector data of forest (white).

industries and research institutes attended the workshop. The conclusions from participants' discussions in break-out groups served to define the future steps, such as the initialization of a working group on "Common goals and requirements for NMCA's in change detection" and based on the outcome of the working group, preparation of a proposal for a NMCA testbed for change detection.

André Streilein
Chairman
Commission 3

The workshop "**3D Digital Landscape Models - From 2D cartographic to 3D topographic data**" (11th to 12th March, 2010, Dublin, Ireland) dealt with the opportunities and challenges of migrating 2D cartographic data to 3D topographic data, fusion of 2D and 3D data, positional accuracy improvement and the definition of 3D countrywide models. The workshop was attended by more than thirty participants from mapping agencies, industry and research institutes. It was suggested that the value-difference between models based on authoritative data and those based on local data should be emphasised by EuroSDR, who might also consider a 'championing role' in this regard.

A second follow-up workshop "3D **Digital Landscape Models - From 2D cartographic to 3D topographic data**" (29th to 30th November 2010, Munich, Germany) continued the momentum generated at the workshop in Dublin and was focussed along three lines: 3D Landscape Models; 3D City Models; 3D Data Structures/3D Databases/3D Standards. After intensive discussions during the two workshops the ideas generated will inform the upcoming EuroSDR Rolling Research Plan.

The "**Fifth International Workshop on 3D Geo Information**" (3rd to 4th November 2010, Berlin, Germany) was jointly organised by EuroSDR, ISPRS WG IV/8, DGPF, and Berlin University of Technology. More than 170 participants attended the workshop, which gave a comprehensive overview of international state-of-the-art research and facilitated dialogue on emerging topics in the field of 3D geo-information.

"3D-Reference-Data": Representation of the 3D Topographic Landscape Model of Switzerland at Nuerensdorf/Zurich

As a result of discussion during the different work-

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shops two new working groups were created.

The "**European Archiving Working Group**" deals with the challenges, which geo-spatial organisations across Europe are currently facing in archiving data for public access under recent Freedom of Information legislation. Utilising interdisciplinary experts from across Europe in discussion with geo-spatial stakeholders, consensus on best practices and combined learning is achieved in order to inform beneficial adoption and practical implementation of legislative obligations.

The working group is led by Paul Mason (OSGB) and currently has twelve members from eight countries. Membership includes both data and archive specialists. An inaugural meeting took place from 17th to 18th November 2010 in Southampton. The output of the working group will be a policy paper on archiving of geo-spatial datasets in 2011. The outcomes will also be more likely to influence national and European regulatory authorities.

The Working group on "**Common goals and requirements for NMCA's in change detection**" is a follow-up action from the first EuroSDR Workshop "Automated change detection for updating national databases". Based on the outcome it was decided to create a working group with individual members of EuroSDR in order to define the common goals and requirements for NMA's in change detection. The elaborated white paper will then act as the basis for a NMA testbed for change detection, where researchers and industry can show their degree of success and get clear directions for expected improvements.

The working group is led by Isabelle Sargent (OSGB) and currently has eight members from eight countries. The kick-off meeting took place on November 18th and 19th in Southampton.

Message from the Vice-President
Dieter Fritsch

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note Speaker who presented the future roadmap of Microsoft Vexcel Imaging. At Zagreb the EuroSDR wiki was presented for the first time to the delegates and I hope this will help in the near future to create extra momentum for EuroSDR activities.

It was a busy year for the Vice-President but a pleasure to serve EuroSDR, an excellently organized pan-European Network. Thanks to all EuroSDR Delegates, the EuroSDR Executive Team Members and the EuroSDR Secretariat who contributed much to make my job easy and efficient!

Data Specifications

Ulf Sandgren

Development of specifications for spatial data involves several challenges. For a long time we have been developing cartographic models, which have made it possible to describe the real and complex world well for a specific purpose. However, this means that the structure of data, scale and lay-out of a map normally only fits a limited number of use cases.

Nowadays, the demands for interoperability between different data themes, different organisations and different levels of detail make it even more demanding to work out data specifications supporting the use of spatial data for many different purposes.

INSPIRE
Several experts from EuroSDR member organisations are deeply involved in the development of INSPIRE Implementing Rules. Currently nineteen Thematic Working Groups are developing specifications for Annex II and III data themes. The first versions of these specifications were distributed for internal review in the beginning of November 2010. Further developed specifications will be sent for a broad review and for testing in June 2011. The guidelines for these testing activities will be based on contributions from EuroSDR.

Implementing Rules for data specifications being covered by Annex I of the directive were decided on 14th December 2009. These rules were published in the twenty-five official languages within the EU in July and they are expected to come into force by end of 2010.

Generalisation
The generalisation project, led by Jantien Stoter of ITC, has been finalised. The report from the project describes an investigation and comparison of applications and methods that support generalisation of geodata. It gives a clear picture of the current status concerning possibilities from the use of automatic methods for filtration and generalisation of spatial data.

Based on results from the project a tutorial with participation from EuroSDR will take place during the ICC Conference in Paris in July 2011.

Multiple representation
A new project proposal on Multiple Information Representation and Consistent Logical Environment (MIRACLE) was set up for FP7. The project was intended to meet the challenges of semantically integrating extremely large and growing volumes of heterogeneous multi/vario-scale GI by providing data models, architectures and software for both data providers and end-users. The goal of MIRACLE is to enable users to seamlessly integrate GI across scales and countries without being limited by technical constraints. Unfortunately, the project proposal was ranked too low on the priority list to allow it to be funded within the limits of the budgetary resources available.

Ulf Sandgren
Chairman
Commission 4

A number of EuroSDR members were involved in a new project proposal called “Aware Web Entities – Enabling the Internet of Places” (abbreviation: AWE). This proposal is partly based on the MIRACLE proposal and includes a number of research areas being described in MIRACLE. The proposal was delivered in the beginning of December 2010 within the ICT PPP call series 2.

Quality assurance of data supply
Based on a EuroSDR workshop on production partnership management an ISO standardisation initiative on quality assurance of data supply was initiated during 2008. Antti Jakobsson of EuroGeographics head office is the chairman of the working group and Ray Patrucco of Ordnance Survey GB the editor.

The work led to a Draft Technical Specification – ISO/DTS 19158 which was submitted in mid-August to an internal balloting system for permanent and liaison members to cast their vote and submit comments. Based on these comments the working group ran an editing committee meeting during the ISO TC211 meeting in Canberra from 6th to 10th December. The work is then expected to be close to being finalised by sending out a Draft Technical Standard for voting in the beginning of 2011.

Performance testing of GI services
A joint Commission 4 and 5 initiative on performance testing of GI services started during the year by setting up a network. The background for the initiative is the expanding interest for testing. One of the groups within the INSPIRE Forum was set up for testing GI services and testing activities are important parts of a number of projects, such as ESDIN and NatureSDIPlus. The EuroSDR initiative on Persistent Test Beds (PTB) has also moved to its second phase.

The network is led by Anders Östman. A wiki has been established for exchange of experiences and some seminars have been and will be arranged.

Land and marine integration
The EuroSDR initiative on creation of better interoperability between land and marine spatial information has been dormant due a to lack of sufficient support from the maritime organisations. There now seems to be sufficient interest to take up this issue again. There are a number of practical projects going on concerning data capture of land and marine areas from laser-

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Network Services

Mike Jackson

2011 will see the election of a new Commission 5 Chair and so this will be my final Annual Report. The main focus of work for Commission 5 has been the Persistent Test-Bed project or "PTB". The PTB has yet to achieve the more ambitious of its goals in terms of establishing a physical network of interoperating standards-based servers acting as an axis of academic research collaboration. This goal will require a more substantial and formally coordinated level of activity funded via a major programme such as the EC FP7 (or successor) Programme. But the PTB has been successful in undertaking practical development and carrying-out interoperability tests, in stimulating and evolving understanding on how to achieve interoperability in spatial data infrastructure (SDI) programmes such as INSPIRE and in increasing collaboration and coordination in interoperability research. Successful Workshops have been held annually over the last three years and will continue in 2011, multiple presentations have been given at Workshops and Conferences, and articles and papers published in magazines, journals and books.

The progress achieved and advancements made are very much due to the commitment and ability of those who have participated in the various projects and initiatives. I would particularly like to recognise the contributions of the two PTB Project Managers – Dr Gobe Hobona, at the time a post-doctoral researcher at the Centre for Geospatial Science, University of Nottingham and now working for Envitia and, over the last two years and continuing, Johannes Brauner from the Technical University of Dresden. Both volunteered a huge amount of their personal time and energy and have maintained the programmatic and technical momentum during those inevitable gaps in visible progress. Two other persons have made an especially critical contribution that must also be acknowledged. Technically, and from a community awareness and knowledge transfer perspective, both Chris Higgins from EDINA, University of Edinburgh (the OGC PTB representative) and Professor Lars Bernard, Technical University of Dresden (the AGILE PTB representative) have provided essential drive and innovation and activity into the project.

As was the case in 2009, the Persistent Test Bed Workshop at the AGILE Annual Conference (10th to 14th May 2010**,** Guimarães, Portugal**)** was a key event in the year. The Workshop presentations are downloadable from the PTB web site:
(http://sdi-testbed.eu/index.php?option=com_docman&task=cat_view&gid=9&Itemid=8)

The PTB web site has also been up-dated and improved during the year – see http://sdi-testbed.eu/. Following the Workshop the main activity in 2010 has been the progression of the proposal to develop a PTB authentication pilot linked to the EU eContentPlus Project "ESDIN" (see http://www.esdin.eu/) via the OGC Interoperability Experiment (IE) mechanism. This has been led by Chris Higgins of EDINA and builds on the PTB call for proposals issued earlier in 2010 which requested: "A willingness to participate in an ***access management federation of European universities project*** as part of an OGC Authentication Interoperability Experiment Shibboleth IE. The objective of this "plug fest" experiment was to demonstrate secure sharing of licensed data across the European academic sector using OGC Web Services. A summary of this Interoperability Experiment can be found at:
http://plone.itc.nl/gitestbed/phase-1-documents/PTB-AuthN-IE-briefing-v1.pdf/view.
A number of universities and commercial companies participated in the experiment. Cadcorp Ltd. and Snowflake Ltd. both agreed to make the necessary modifications to their Open Web Services (OWS) software needed for their participation in the experiment which also included ESDIN Open Source offerings.

A 'birds of a feather' informal discussion meeting about the Shibboleth IE took place during the week of the OGC Technical Committee meeting in Toulouse, France, from 20th to 23rd September. The virtual kickoff meeting took place on September 30th which was the deadline for the call and the outcome of the IE was a best practice report presented at the OGC Technical Committee meeting in Sydney, Australia, from 29th November to 3rd December 2010.

Looking forward into 2011 a key event will be the "*Workshop on Test-bed Research: Testing Geospatial Web Services /Persistent Testbed (PTB)*" on 18th April in Utrecht. This will be held, as in earlier years, as a pre-Conference Workshop at the AGILE Conference and is being organized by Stephan Schmid (AGIS Research Group Geoinformatics, University of the Bundeswehr, Munich) Johannes Brauner (Geoinformation Systems, Technische Universität Dresden) and Bastian Schäffer (52°North Initiative for Geospatial Open Source Software GmbH, Münster).

The workshop objectives are to keep the European GI Community informed about the ongoing different test-bed activities in terms of Geo Web Service testing procedures. It will discuss how the different Test-bed initiatives might beneficially collaborate and how to develop synergies and improve the sustainability of running demonstrators to ensure a flow of knowledge into operational programmes and to aid research. Future strategies for testing Geo Web Services will also be discussed.

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Mike Jackson
Chairman
Commission 5

Data Specifications
Ulf Sandgren

(Continued from page 12)

scanning. Also the INSPIRE TWG on height and depths seems to be an important new starting point.

Multiple maps
Preparations for a workshop on experiences concerning "multiple maps" have started. By "multiple maps" we mean maps adjusted for distribution on the Internet and presented on normal screens for PC's and with the same symbolisation independent of what scale an object is presented. The idea is also to look at the possibility of basing next generations of such maps on the INSPIRE data specifications.

Communication
Members of the Commission have been involved in a great number of conferences, seminars and workshops where issues within the work programme of the Commission have been presented and discussed.

Network Services
Mike Jackson

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Further activities and issues for 2011 include PTB access to medium and small scale pan-European data services, analysing the conclusions from the EC eContentPlus ESDIN project and the outcomes of the Shibboleth IE and evaluating the possibility of developing the PTB as a rolling OGC IE.

Workshops 2010

INSPIRE Atlas of implementation methods - second workshop
Brussels, 14th to 15th January 2010
http://www.spatialist.be/eng/act/201001_EuroSDR.htm

EuroCOW: European Calibration and Orientation Workshop
Castelldefels, 10th to 12th February 2010
http://www.eurosdr.net/km_pub/no57/html/euro_cow_2010/

Change Detection
Southampton, 4th to 5th March 2010
http://bono.hostireland.com/~eurosdr/start/index.php?option=com_content&task=view&id=57&Itemid=57

3D-Digital Landscape Models
Dublin, 11th to 12th March 2010
http://www.eurosdr.net/workshops/3d_2010/

INSPIRE Atlas of implementation methods - third workshop
Krakow, 22nd June 2010
http://inspire.jrc.ec.europa.eu/events/conferences/inspire_2010/conf_skd_workshop.cfm#

3D-Digital Landscape Models
Munich, 29th to 30th November 2010
http://www.eurosdr.net/workshops/3d_2010/

Fifth International Workshop on 3D Geo Information
Berlin, 3rd to 4th November 2010
http://www.3dgeoinfo.org/

116th Meetings in Frankfurt, Germany

The 116th EuroSDR meetings were hosted by our German colleagues, Bundesamt für Kartographie und Geodäsie (BKG), in Frankfurt from 26th to 28th May 2010.

From L to R: Antonio Arozarena, President of EuroSDR, Ministerialdirektorin Beate Lohmann and

The meetings were launched on Wednesday, 26th May 2010 by a seminar, hosted by BKG, entitled 'Activities in Geographical Information in Germany', where the following presentations were delivered:

Modern Administration with Innovation, Transparency, Cooperation *Ministerialdirektorin Beate Lohmann, Director-General Administrative Modernization, Administrative Organization*
http://www.eurosdr.net/meetings/116/presentations/h-0.pdf

SDI Organisation and Implementation in Germany *Martin Lenk, Bundesamt für Kartographie und Geodäsie (BKG)*
http://www.eurosdr.net/meetings/116/presentations/h-1.pdf

Activities of BKG with respect to National and International SDIs *Dietmar Grünreich, Bundesamt für Kartographie und Geodäsie (BKG)*
http://www.eurosdr.net/meetings/116/presentations/h-2.pdf

Joint Activities of AdV, umbrella organisation of the German Surveying and Cadastre Administrations *Klement Aringer, Land of Bavaria Office for Surveying and Geographic Information*
http://www.eurosdr.net/meetings/116/presentations/h-3.pdf

ATKIS Spatial Basic Data - Capabilities of Adding Values *Ernst Jäger, LGN, Hannover*
http://www.eurosdr.net/meetings/116/presentations/h-4.pdf

INSPIRE, GMES, and GEOSS: Challenges for a European Spatial Data Infrastructure *Eva Klien, Fraunhofer-Institut für Graphische Datenverarbeitung IGD*
http://www.eurosdr.net/meetings/116/presentations/h-5.pdf

DeCOVER - Contributions to SDI *Oliver Buck, EFTAS GmbH*
http://www.eurosdr.net/meetings/116/presentations/h-6.pdf

Disaster Management Activities of the Center for satellite based Crisis Information (ZKI) *Harald Mehl, German Remote Sensing Data Centre at German Aerospace Centre (DLR)*
http://www.eurosdr.net/meetings/116/presentations/h-7.pdf

Web-based Data and Processing Services at GFZ *Sören Haubrock, GFZ German Research Centre for Geosciences*
http://www.eurosdr.net/meetings/116/presentations/h-8.pdf

Three stimulating keynote presenters, Dr. Jürgen Dold (President & CEO Leica Geosystems AG), Prof. Dr. Alexander Zipf (Chair of Geoinformatics, University of Heidelberg) and Ms. Athina Trakas (Director European Services, Open Geospatial Consortium) delivered talks on:

'Image data collection and mapping - the new roadmap'
http://www.eurosdr.net/meetings/116/presentations/k-1.pdf

'Towards 3D spatial data infrastructures'
http://www.eurosdr.net/meetings/116/presentations/k-3.pdf
and **'OGC in Europe'**
http://www.eurosdr.net/meetings/116/presentations/k-2.pdf
respectively.
Each was followed by a focussed discussion on the topic in small breakout groups. Additional breakout discussion topics included 'Standards' and 'EuroSDR's next Rolling Research Plan'.

The social programme was equally enjoyable. First we were invited to visit the magnificent Villa Mumm, headquarters of BKG. The Villa dates from 1904. On the following evening, a fascinating treat was in store, when Joachim Schadendorf performed a dramatised account of the life and loves of Johann Wolfgang von Goethe. The first class performance was thoroughly enjoyed by all.

Inter-Commission Working Group on Standards

Wolfgang Kresse

The Inter-Commission Working Group on Standards maintains regular cooperation with the ISO, the Open Geospatial Consortium (OGC), and the Group on Earth Observation (GEO).

Within the ISO three Technical Committees are relevant for the work of EuroSDR: TC 211 “Geographic information / geomatics”, TC 172 “Optics and photonics”, and TC 42 “Photography”.

Within ISO/TC 211 the Working Group 6 “Imagery” concerns photogrammetry and remote sensing. Since 2008 the Reference model (ISO 19101-2), the Metadata (ISO 19115-2), and the first part of the Georeference (ISO 19130) have been completed. Two projects are ongoing: The second part of the Georeference (ISO 19130-2) covers sensors that were left out in the first: SAR/InSAR, LIDAR, and SONAR. The Calibration and Validation of remote sensing imagery sensors (ISO 19159) is based on preliminary work done by Commission 1 of EuroSDR.

TC 172 and TC 42 gain importance because some of the new projects such as Calibration and Validation require a stronger consideration of hardware aspects.

The OGC participated in EuroSDR’s spring meeting. It is intended to intensify the cooperation between both organisations, e.g. regarding common research projects.

GEO was established by the 2002 World Summit on Sustainable Development and by the G8 leading industrialized countries. GEO is constructing the Global Earth Observation System of Systems (GEOSS) on the basis of a ten year Implementation Plan. GEOSS has established the Standards and Interoperability Forum (SIF) in order to build a registry of relevant international standards. The EuroSDR Intercommission Working Group on Standards helps to build that registry.

Inter-Commission Working Group on Education Services

Anders Östman

The objective of the EuroSDR inter-commission working group on education services (EduServ) is to provide training services to EuroSDR members. These actions are closely related to other dissemination actions such as publication of reports, workshops and presentations at conferences. This means that EduServ has to serve two different aims, namely to provide training that is of interest to the EuroSDR members and through training actions disseminate the results of other EuroSDR projects.

The eighth EuroSDR Educational Service (EduServ8) took place from May to September, 2010, under the organisation of K.U Leuven, Belgium. In total 51 students attended the courses. Participants came from all over Europe, from Sweden in the north to Croatia in the southeast and to Spain in the southwest.

In EduServ 8, the following courses were given:

- Laserscanning for tree extraction (Instructors: Juha Hyyppä and Harri Kaartinen)
- Schema matching, mapping and transformation for INSPIRE (Instructors: Anders Östman and Imad Abugessaisa)
- Assessment of the quality of Digital Terrain Models (Instructors: Joachim Höhle and Marketa Potuckova)
- The INSPIRE Directive and its Implementing Rules. How to understand and apply them? (Instructors: Danny Vandenbroucke, Joep Crompvoets and Jos van Orshoven)

The ninth EduServ series will be hosted by the IGN / ENSG in Marne la Vallée (Paris), France. The introductory seminar will be given from 8th to 9th March 2011.

117th Meetings in Zagreb, Croatia

The 117th EuroSDR meetings were hosted by our newest member, the State Geodetic Administration of Republic of Croatia, in Zagreb, Croatia from 27th to 29th October 2010. They began with a seminar showcasing spatial data research and production activities in Croatia on Wednesday 27th October 2010, which included the following presentations:

NSDI Supporting Development of Modern Administration in Croatia *Davor Mrduljaš, State Secretary in MEPPPC & President of NSDI Council*
(http://www.eurosdr.net/meetings/117/presentations/h-1.pdf)
State Geodetic Administration of Croatia - spatial information service provider for society *Željko Bacic, Director General, State Geodetic Administration of Croatia*
(http://www.eurosdr.net/meetings/117/presentations/h-2.pdf)
Developing Nature and Cultural Heritage Protection Information Systems Based on NSDI Principles *Kornelija Pintaric, Directorate for Nature Protection, Ministry of Culture of the Republic of Croatia*
(http://www.eurosdr.net/meetings/117/presentations/h-3.pdf)
Airborne Multisensor Surveillance of Oil Spills at sea *Milan Bajic and Tomislav Ciceli, Faculty of Geodesy, University of Zagreb*
(http://www.eurosdr.net/meetings/117/presentations/h-4.pdf)
New trends in Close Range Photogrammetry *Dubravko Gajski, Faculty of Geodesy, University in Zagreb*
(http://www.eurosdr.net/meetings/117/presentations/h-5.pdf)
Geoinformation and Innovation *Zvonko Biljecki, President of the Board, Geofoto Group*
(http://www.eurosdr.net/meetings/117/presentations/h-6.pdf)
Examples of Spatial Data Issues and Solutions *Ivica Skender, GISDATA d.o.o.*
(http://www.eurosdr.net/meetings/117/presentations/h-7.pdf)

In addition to the regular reports of EuroSDR research activities, keynote presentations were presented by Dr. Michael Gruber (Chief Scientist, Microsoft Vexcel) and Prof. Dr. Orhan Altan (President ISPRS) on the topics **'Vexcel Imaging / Microsoft Image Data Collection and Mapping – The New Roadmap of Microsoft'** and **'ISPRS meets EuroSDR - Strenghtening Co-operation between ISPRS and EuroSDR'** respectively. As is the established practise at EuroSDR meetings, each presentation was followed by a focussed discussion on the topic in small breakout groups.

EuroSDR delegates attending the 117th meetings in Zagreb, Croatia

We were also delighted to welcome Dr. Mojca Kosmatin Fras (Professor at the Faculty of Civil and Geodetic Engineering at University of Ljubljana, Slovenia) to the meetings, who gave a fascinating account of education, research and production activities in GI in Slovenia. This was followed by a focussed discussion on the engagement of EuroSDR with countries in this region. Contributing actively to the discussions were invited representatives from the mapping agencies of Bosnia and Herzegovina, Montenegro, Slovenia and Serbia. It is hoped that the experience of such discussions can lead to more effective collaboration between this region and EuroSDR in the future.

Particular mention should be made of the presentation of Prof. Dr. Orhan Altan, President ISPRS. This presentation was part of an ongoing initiative towards stronger and closer ties between ISPRS and EuroSDR, which may take the following shape:

- Annual meeting between ISPRS Council and EuroSDR Executive Team
- Input to drafting of ISPRS Technical Commission terms of reference by EuroSDR Commission chairpersons
- Common calls for participants for EuroSDR projects
- A EuroSDR column in ISPRS Highlights
- A joint article on EuroSDR-ISPRS collaboration for submission to GIM-International.
- Co-hosting of NMA fora at ISPRS congresses.

Organisational Matters

2010 saw a change in the Presidency of the organisation. Antonio Arozarena, of IGN Spain, completed his two-year term at the 116th meetings in May 2010 and was replaced by Dr Jean-Philippe Lagrange, Deputy Technical Director, Institut Géographique National, France, who takes up the reins of office until Spring 2012.

Mr. Arozarena's presidency was a very active one and saw significant developments of the links between EuroSDR and EuroGeographics and ICA, the International Cartographic Association.

Prof. Juha Hyyppä completed his third and final term as Chairman of EuroSDR Commission 2, Image Analysis and Information Extraction, at the 117th meetings in Zagreb from 27th to 29th October 2010. He will be replaced by Prof. Dr. Norbert Pfeifer, Professor of Photogrammetry at the Institute of Photogrammetry and Remote Sensing of TU Vienna.

Prof. Hyyppä will continue his valued work with EuroSDR as leader of the ongoing projects, Mobile Laser Scanning and ALS Radiometric Calibration.

The University of Udine, Italy, became the latest member of EuroSDR on 26th May 2010. Professor Fabio Crosilla, Director of Udine University Interdepartmental Centre, Cartesio, was appointed as the new EuroSDR Prime Delegate for Italy.

AGIV, Belgium, became the latest Associate Member of EuroSDR on 29th October 2010. AGIV (Agentschap voor Geografische Informatie Vlaanderen) is an agency for Geographical Information in Flanders, Belgium. It will be represented in EuroSDR by Dr. Jo Van Valckenborgh from the Research and Development department of this progressive Belgian company.

Francisco Papí Montanel, Subdirección General de Cartografía at IGN Spain, stepped down as second delegate for Spain during 2010 and has been replaced by his colleague at IGN, Emilio Domenech.

On behalf of EuroSDR, I would like to thank all those mentioned for their commitment to EuroSDR and the very valuable contribution they undoubtedly made to its development.

Financial Overview 2010

Income	
Membership EuroSDR	84,000
Education Service	5,336
Sponsorship	1,500
Total	**€90,836**
Expenditure	
Research Seed	6,726
Executive Team	6,065
Secretariat	61,740
Info. & Marketing	198
Fees & Charges	4,175
Total	**€78,904**
Income Surplus	**€11,932**

3D Digital Landscape Models - Dublin, March 2010

47 Years of EuroSDR Publications

1. *Trombetti, C.*: "Activité de la Commission A de l'OEEPE de 1960 à 1964" - *Cunietti, M.*: "Activité de la Commission B de l'OEEPE pendant la période septembre 1960 - janvier 1964" - *Förstner, R.*: "Rapport sur les travaux et les résultats de la Commission C de l'OEEPE (1960-1964)" - *Neumaier, K.*: "Rapport de la Commission E pour Lisbonne" - *Weele, A.J. v.d.*: "Report of Commission F." - Frankfurt a.M. 1964.

2. *Neumaier, K.*: "Essais d'interprétation de >>Bedford<< et de >>Waterbury<<. Rapport communétabli par les Centres de la Commission E de l'OEEPE ayant participé aux tests" - "The Interpretation Tests of >>Bedford<< and >>Waterbury<<. Common Report Established by all Participating Centres of Commission E of OEEPE" - "Essais de restitution >>Bloc Suisse<<. Rapport commun établi par les Centres de la Commission E de l'OEEPE ayant participé aux tests" - "Test >>Schweizer Block<<. Joint Report of all Centres of Commission E of OEEPE" - Frankfurt a.M. 1966.

3. *Cunietti, M.*: "Emploi des blocs de bandes pour la cartographie à grande échelle - Résultats des recherches expérimentales organisées par la Commission B de l'OEEPE au cours de la période 1959-1966" - "Use of Strips Connected to Blocks for Large Scale Mapping - Results of Experimental Research Organized by Commission B of the OEEPE from 1959 through 1966" - Frankfurt a.M. 1968.

4. *Förstner, R.*: "Sur la précision de mesures photogrammétriques de coordonnées en terrain montagneux. Rapport sur les résultats de l'essai de Reichenbach de la Commission C de l'OEEPE" - "The Accuracy of Photogrammetric Co-ordinate Measurements in Mountainous Terrain. Report on the Results of the Reichenbach Test Commission C of the OEEPE". - Frankfurt a.M. 1968.

5. *Trombetti, C.*: "Les recherches expérimentales exécutées sur de longues bandes par la Commission A de l'OEEPE". - Frankfurt a.M. 1972.

6. *Neumaier, K.*: "Essai d'interprétation. Rapports des Centres de la Commission E de l'OEEPE". - Frankfurt a.M. 1972.

7. *Wiser, P.*: "Etude expérimentale de l'aérotiangulation semi-analytique. Rapport sur l'essai >>Gramastetten<<". - Frankfurt a.M. 1972.

8. "Proceedings of the OEEPE Symposium on Experimental Research on Accuracy of Aerial Triangulation (Results of Oberschwaben Tests)" *Ackermann, F.*: "On Statistical investigation into the Accuracy of Aerial Triangulation. The Test Project Oberschwaben" - "Recherches statistiques sur la précision de l'aérotriangulation. Le champ d'essai Oberschwaben" - *Belzner, H.*: "The Planning. Establishing and Flying of the Test Field Oberschwaben" - *Stark, E.*: "Testblock Oberschwaben, Programme I. Results of Block Adjustment by Independent Models" - *Ebner, H.*: "Comparison of Different Methods of Block Adjustment" - *Wiser, P.* : "Propositions pour le traitement des erreurs non-accidentelles" - *Camps, F.*: "Résultats obtenus dans le cadre du projet Oberschwaben 2A" - *Cunietti, M.; Vanossi, A.*: "Etude statistique expérimentale des erreurs d'enchaînement des photogrammes" - *Kupfer, G.*: "Image Geometry as Obtained from Rheidt Test Area Photography" - *Förstner, R.*: "The Signal-Field of Baustetten. A Short Report" - *Visser, J.; Leberl, F.; Kure, J.*: "OEEPE Oberschwaben Reseau Investigations" - *Bauer, H.*: "Compensation of Systematic Errors by Analytical Block Adjustment with Common Image Deformation Parameters". - Frankfurt a.M. 1973.

9. *Beck, W.*: "The Production of Topographic Maps at 1:10,000 by Photogrammetric Methods. - With statistical evaluations, reproductions, style sheet and sample fragments by Landesvermessungsamt Baden-Württemberg Stuttgart". - Frankfurt a.M. 1976.

10. "Résultats complémentaires de l'essai d'<<Oberriet>> of the Commission C de l'OEEPE - Further Results of the Photogrammetric Tests of <<Oberriet>> of the Commission C of the OEEPE".

Hárry, H.: "Mesure de points de terrain non signalisés dans le champ d'essai d'<<Oberriet>> - Measurements of Non-Signalized Points in the Test Field <<Oberriet>> (Abstract)" - *Stickler, A.; Waldhäusl, P.*: "Restitution graphique des points et des lignes non signalisés et leur comparaison avec des résultats de mesures sur le terrain dans le champ d'essai d'<<Oberriet>> - Graphical Plotting of Non-Signalized Points and Lines, and Comparison with Terrestrial Surveys in the Test Field <<Oberriet>>" - *Förstner, R.*: "Résultats complémentaires des transformations de coordonnées de l'essai d'<<Oberriet>> de la Commission C de l'OEEPE - Further Results from Co-ordinate Transformations of the Test <<Oberriet>> of Commission C of the OEEPE" - *Schürer, K.*: "Comparaison des distances d'<<Oberriet>> - Comparison of Distances of <<Oberriet>> (Abstract)". - Frankfurt a.M. 1975.

11. "25 années de l'OEEPE".

Verlaine, R.: "25 années d'activité de l'OEEPE" - "25 Years of OEEPE (Summary)" - *Baarda, W.*: "Mathematical Models". - Frankfurt a.M. 1979.

12. *Spiess, E.*: "Revision of 1:25,000 Topographic Maps by Photogrammetric Methods:. - Frankfurt a.M. 1985.

13. *Timmerman, J.; Roos, P.A.; Schürer, K.; Förstner, R.*: On the Accuracy of Photogrammetric Measurements of Buildings - Report on the Results of the Test "Dordrecht", Carried out by Commission C of the OEEPE. - Frankfurt a.M. 1982.

14. *Thompson, C.N.*: Test of Digitising Methods. - Frankfurt a.M. 1984.

15. *Jaakkola, M.; Brindöpke, W.; Kölbl, O.; Noukka, P.*: Optimal Emulsions for Large-Scale Mapping - Test of "Steinwedel" - Commission C of the OEEPE 1981-84. - Frankfurt a.M. 1985.

16. *Waldhäusl, P.*: Results of the Vienna Test of OEEPE Commission C. - *Kölbl, O.*: Photogrammetric Versus Terrestrial Town Survey. - Frankfurt a.M. 1986.

17. *Commission E of the OEEPE*: Influences of Reproduction Techniques on the Identification of Topographic Details on Orthophotomaps. - Frankfurt a.M. 1986.

18. *Förstner, W.*: Final Report on the Joint Test on Gross Error Detection of OEEPE and ISP WGIII/1. - Frankfurt a.M. 1986.

19. *Dowman, I.J.*: Spacelab Metric Camera Experiment - Test of Image Accuracy - Frankfurt a.M. 1987.

20. *Eichhorn, G.*: Summary of Replies to Questionnaire on Land Information Systems - Commission V - Land Information Systems - Frankfurt a.M. 1988.

21. *Kölbl, O.*: Proceedings of the Workshop on Cadastral Renovation - Frankfurt a.M. 1988.

22. *Rollin, J; Dowman, I.J.*: Map Compilation and Revision in Developing Areas - Test of Large Format Camera Imagery - Frankfurt a.M. 1988.

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