

Achieving Geometric Interoperability of Spatial Data

Workshop report

Following on from a workshop on Positional Accuracy Improvement (PAI) in Dublin, Ireland in 2004, European Spatial Data Research (EuroSDR) in conjunction with the State Surveying Agency of Bavaria (BLVA), Germany hosted an international workshop titled "Achieving Geometric Interoperability of Spatial Data". The goal was to discuss shifting maps for better quality in order to solve PAI issues. About 40 participants from Austria, Belgium, the Czech Republic, Denmark, Germany, Great Britain, Ireland and the United States of America attended the workshop that was held on 8-9 June 2005 in Munich, Germany. The event was supported by the Dublin Institute of Technology (DIT), Ordnance Survey (Great Britain) and the International Federation of Surveyors (FIG).



Participants of the PAI workshop in Munich

Breakout sessions

The benefits and efforts of projects that aim at geometrically improving geodata were intensively discussed by the present experts in two breakout sessions. The objective of a PAI project will always be achieving geometric interoperability between existing geodata sets. The previous workshop in Dublin (reported in EuroSDR publication No. 48) identified a number of different PAI scenarios that are closely attached to the specific historic situation in every country. It became clear that despite those differences both the core technical issue as well as the overall objective of the PAI in these countries was identical. The hosting group of the workshop chose the term geometric interoperability to highlight the common objective behind every Positional Accuracy Improvement project. Geodata that are geometrically interoperable enable its utilisation across borders, spatial analysis and maintenance and update schemes based on satellite based Global Positioning (GPS) technology.

Presentations

In addition to the discussions in breakout groups the workshop featured four paper sessions. After a warm welcome and a thematic introduction from Prof. Günter Nagel, president of the BLVA as well as the hosting group, Mrs. Daniela Florea (GeoStrategies, Great Britain) gave an engaging keynote address Seamless GI for Cross-Border Applications in which she challenged the requirements for data in a pan-European context.

The first block of papers focussed on Planning for PAI: Lokesh Shrivastav (Landmark Solutions, Great Britain) presented the relevant components that need to be looked at when planning a PAI project in his paper Setting up a large volume PAI production environment. Stefan Kampshoff (Technical University of Aachen, Germany) gave an overview about the technical challenges PAI presents as well as the methodical ways to tackle it focussing on software components that are necessary to perform Positional Accuracy Improvement of Large Datasets.

The paper Planning for PAI: the PAI toolbox by Carsten Rönsdorf (Ordnance Survey, Great Britain) examined the building blocks and a generic project plan for a PAI project, followed by Helmut Gläbli (BLVA, Germany) who talked about the migration of reference systems Changing from DHDN /GK 12° to ETRS89 / UTM in Bavaria- impacts on the cadastre and reference data.



Attendees listening intently

The paper block Technical solutions 1 - Issues for data providers and end users followed the first breakout session titled Best practise planning and contained four papers: Michael Ziegert (State Surveying Agency of Hamburg, Germany) presented the adjustment methods used by his agency while moving the spatial reference framework in his paper Getting homogeneous ETRS89 Coordinates-Adjustment and Proximity Fitting of Local Referenced Point Fields in Hamburg.

After Lubomir Soukup (Technical University of Prague, Czech Republic) introduced one particular way to shift data in Application of collocation to transformation of deformed maps the practical experience with different software packages utilising different algorithms in projects was presented Peter Selby (Intelliscan, Great Britain) in Workflow to Solve PAI for Microstation based GIS systems in the Utility Industry and Mike Beswick (MVM/Northgate, Great Britain) in PAI implementation for a water utility based on Strumap. Both papers highlighted the importance of PAI for the utility industry as key users of spatial information and the efforts associated with PAI implementation.

After a long evening shifting glasses full of beverages in the Münchener Hofbräuhaus the participants returned to the workshop venue the next morning where Terry Burns (Pixxures, USA) started-off the second day with the continuation of the Technical Solutions 2 - Issues for end users topic. He gave insights into PAI projects in the United States in this paper titled Synchronizing your GIS - a new approach.

This was followed by Frank Gielsdorf (Technical University of Berlin, Germany) who introduced The PAI Approach of the Surveying Administration Brandenburg which enabled the quality improvement of geodata with limited resources in a surveying agency.

Bob Chell (Laser-Scan, Great Britain) reported The benefits of data integration facilitating PAI in a Local Authority in Great Britain while Paul Starkey (Tenet IT Mapping, Great Britain) focussed on land ownership titles in The Application of MapRite Technology to PAI and Related Data Management Problems.

The final paper block looked at Business cases for implementing PAI: Giles de Souza (Infoterra, Great Britain), Bill Frogatt (Defra, Great Britain) and Tom Timms (Apic, Great Britain) jointly presented A common PAI strategy for several contributory organisations to an enterprise database in the context of the operations of a large central government agency in England. Carsten Rönsdorf informed the audience about The business justification for PAI covering both data providers and data users. Finally Andy Leatherland (Landmark Solutions, Great Britain) presented on PAI business Rules and Pilot exercise and outsourcing.

The full workshop programme with contact information of the authors can be found on the workshop website www.dit.ie/eurosdrr.

Results

The information given in the papers as well as the discussions over the two days presented a wide breath of best practise information which was discussed in the last breakout session Making the case for PAI (best practise) and what's next?

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Planning a PAI project is crucial.

The success of a PAI project is largely determined by a sound plan. The utilised technology was seen as important but does not seem to be the decisive factor for a successful project. In regards to the technology the amount of data that can be shifted automatically has a very high impact on the costs. It was highlighted that an audit about existing datasets, their quality as well as the processes the data is used in or should be used serves as a useful starting point.

PAI reveals existing quality issues.

The improvement of Positional Accuracy and the change of reference frameworks demands a high level of homogeneity of geodata in respect of structure, topology and consistency. Discrepancies from a defined level of homogeneity are not tolerable since they will attract a disproportional high amount of quality assurance and manual correction after the data has been shifted. Hence, these issues need to be fixed before data is shifted for PAI, delaying the shift and adding to the PAI effort.

Expertise on PAI and Geometric Interoperability is needed.

PAI and Geometric Interoperability requires specialized expertise that is not present in most organisations using geodata. Accessing expertise internally or externally is crucial for the success of a PAI project but has proved to be costly.

PAI needs a sound business case.

The benefits of PAI manifest themselves in the geometric interoperability which is achieved after the data has been shifted and quality assured. As an example, data shifted to the correct position within a Global Positioning framework, can immediately be maintained and added to by new GPS-based surveys. Unfortunately the financial benefit of these "soft" quality benefits will only become apparent in the mid term. Small but regular savings from increased efficiency in update, maintenance and utilisation will recoup the initially large investment into shifting data over, although this will only happen over a longer period of time. While the participants agreed that PAI is an important investment in protecting the future of existing datasets, and therefore the efforts that were put into creating these datasets in the first place, it became apparent that creating the business case for PAI hasn't been straight forward in any of the projects. A sound business case, requiring relevant expertise and a significant amount of time, is needed to reap the benefits of Geometric Interoperability.

Geo data are dynamic and require maintenance.

PAI highlights the fact that geographic datasets that describe the real world are dynamic and need to be maintained. They are a model of the real world that needs to be update a) when the real world changes and b) when other parameters of the model change. While the former is obvious, PAI falls in the latter category which is much more difficult to explain and justify, particular to managers without experience in (geographic) information.

Conclusions

The hosting group would like to thank Prof. Günter Nagel for the excellent organisation and support by the State Surveying Agency of Bavaria that made this workshop possible.

The results of this workshop have demonstrated that the improvement of the Positional Accuracy of geodata and the change of geodetic reference frameworks require significant efforts on technical, organisational and financial levels. The Positional Accuracy of geodata seems to be an important quality criteria which is often neglected. In this light the two workshops helped to demonstrate the benefit, accurate, interoperable data delivers to both experts and users.

Both PAI workshops in Dublin and Munich have achieved their respective goals: to examine the relevance of PAI throughout Europe and raise the awareness of the issue, to allow an exchange of experience and technical solutions on an international level and to document the variety of challenges and solutions to solve PAI in order to lower the barrier for providers and users of geodata to achieve Geometric Interoperability.

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