

International Cartographic Association Association Cartographique Internationale



Commission Report to the ICA Executive Committee

Commission: **ICA Commission on Map Production and Geoinformation Management**
Date of Report: **18 July 2023**
Period of Report: **08/2015 – 08/2023**
Name of reporter: **Peter Schmitz and Markus Jobst**

General Remarks:

Although the commission had some headwinds such as the Covid-19 pandemic during its two terms from August 2015 to August 2023, it managed to do some interesting activities which are listed below. The reason for including both terms is that the commission will close in August 2023. Some of the aspects of the commission's work will be absorbed into other commissions such as the proposed ICA Commission on Integrated Geospatial Information for Cartography.

Commission/Working Group highlights (e.g., conferences, publications, products & services, awards, etc. and outcomes for the EC to take note)

Commission on Map Production and Geoinformation Management

Terms of Reference

1. Enhance the study on map production- and process management, geoinformation logistics and geobusiness;
2. Research on the impact of modern communication methods on map production, business models, change management and design thinking;
3. Research the impact of Service Oriented Architectures and future technologies on Map-Production, Publishing and Archiving.
4. Research the methods of Service-Oriented Mapping maturity evaluation and SOMAP management.
5. Encourage international collaboration on the study of map production and geoinformation management with particular emphasis on bridging research, government and commercial sectors;
6. Participate and contribute to activities of other relevant ICA interest groups (e.g., relevant ICA Commissions, National Mapping Organisations, NGO's, Enterprises, URISA).
7. The applications thereof in Developing Countries.
8. Publications in and support of the International Journal of Cartography

Below will follow the activities of the commission between 2015 and 2023:

2015

Open meeting was held during the ICC 2015 in Rio de Janeiro, Brazil, 23 to 28 August 2019.

Started with the planning of the book, "Changing Paradigm in Map Production". The intention of the book "Changing Paradigm in Map Production" was to discuss state-of-the-art developments/paradigm in map production, exchange experience reports and evaluate the impact of new methods in map production, map distribution and map archiving. Several aspects are related to the development in map production, which may affect processing chains, change management, map requirements, distribution or archiving methodologies.

A workshop called "Hands-On Cultural Heritage Geospatial Infrastructures - a fundament for collaboration and exchange" will be held during the 20th International Conference on Cultural Heritage and New Technologies from November 2nd to 4th 2015 in the city hall of Vienna.

Papers

This subsection and the subsections in the subsequent years' present various papers, presentations and chapters generated by the commission chairs during each year.

Schmitz P, Cooper A, Kruger T, Speed K, Barkhuizen M, Lochner T and Linnen C 2015: Space Time Visualisation for Investigative and Forensic Purposes. 27th International Cartographic Conference, 23 to 28 August 2015, Rio de Janeiro, Brazil.

Schmitz, P, Eksteen, S and de Bruin, S. 2015, Towards a new way of measuring service delivery in Gauteng: Calculating a Fortunate Index. Poster presented at the 27th International Cartographic Conference, 23 to 28 August 2015, Rio de Janeiro, Brazil.

Schmitz, P., Cooper, A., de Jong, T. and Rossmo, D., 2015: Mapping Criminal Activity Space. *Journal of Intelligence Analysis*, 22(2).

A. Semmo, M. Trapp, M. Jobst, J. Döllner, Cartography-Oriented Design of 3D Geospatial Information Visualization - Overview and Techniques, *The Cartographic Journal*, 2015 [<http://hpi.de/doellner/publications/year/2015/102851/SD2015.html>]

2016

Workshop on Service-Oriented Mapping: from SDI to thematic webmaps (in German language) was held as a preconference hands-on workshop during the 64th German day of cartography on June 13th, 2016, in Potsdam.

The commission proposed a track for the Geomatics Indaba 2016 that was held from the 2nd to 4th of August 2016 in Ekuhurleni, near Johannesburg, South Africa. Although the track was approved by the conference organisers, too few papers were received to justify a track on its own and the papers were incorporated into other streams of the conference.

Created a poster for Sustainable Development Goal 12: Responsible Consumption and Production.



Papers

Paper by the commission chair in the South African Journal of Geomatics, Vol. 5. No. 2, September 2016. Title: The Use of Supply Chains and Supply Chain Management in the Production of Forensic Maps Using Data from a Fraud Case. (<http://dx.doi.org/10.4314/sajg.v5i2.5>)

M. Jobst, T. Fischer, The Role of Service-Oriented Mapping in Spatial and Regional Sciences, EuroCarto 2015 and book chapter in Series Lecture Notes in Geoinformation and Cartography, Springer; Berlin Heidelberg; 2016

2017

The hands-on workshop "Supporting sustainable development with geoinformation management and modern maps: things you hardly consider" was held as pre-conference event of the International Cartographic Conference 2017 in Washington D.C. on 1 July 2017 together with URISA.

The workshop looked at whenever one is concerned with geoinformation management and map production procedures, questions for appropriate technologies arise. Is an aimed IT struc-

ture good for production? Can the sources be used, combined and analysed? Does the resulting geovisualisation reach the communication aim? Therefore, the workshop focused on three parts: service-oriented mapping, supply chain for map production and maturity assessment evaluation. Although quite a few conference participants indicated that they would attend the workshop, only a small group of conference participants attended the workshop.

The content of the workshop held in Washington focused on:

- Service-Oriented Mapping is one possible paradigm to embed big data and distributed sources in modern map production, without owning the sources. This architecture requires specific tools and procedures in order to be stable and reliable. Beside the technological structures, the aspects of supply chain and GIS capability maturity provide powerful tools to make modern geoinformation management successful but are hardly considered.
- The map production path is followed from establishing the production plans and how it fits within the organisation (Plan); identifying the sources of data, the acquisition of the data (Source); the creation of the various maps or geospatial data (Make); and to the final product (Deliver). Faulty data and maps or the maintenance thereof are dealt with the return process (Return). The production path is based on supply chains and supply chain management using the Supply-Chain Operations Reference (SCOR) model as a guideline. The aim of this part of the workshop is to illustrate the use of supply chains and supply chain management to guide the production of maps or geospatial data.
- A program assessment evaluates a program's operations and helps managers redirect resources to improve performance. The URISA GMI GIS Capability Maturity Model (GISCMM) assessment tool and service enables organization to evaluate, visualize, and compare the capability maturity of their GIS programs and operations and understand which areas need improvement. In this workshop section we will discuss and demonstrate the use and results of the GISCMM tool and service.

A workshop called "Archaeological Geospatial Infrastructures" was held during the 22nd International Conference on Cultural Heritage and New Technologies from November 8th to 10th, 2017 in the city hall of Vienna with the following motivation: we are producing a variety of information in our daily work. Especially in archaeology the complexity of describing findings, their relation to time, culture, manufacturing, and location leads to specific models that help to structure this information. The CIDOC Conceptual Reference Model (CRM) is one example for standard cultural heritage ontology. But what if, we know how to structure our information, but cannot easily distribute it with our colleagues and other experts in the community?

We assume that location is a key indicator in cultural heritage and mapping is a central concept for documenting, structuring, and communicating information. In order to make our information and knowledge structures accessible, metadata are needed to promote them. We do not only need to create descriptions of our information, but also need to publish these metadata in accessible online catalogues. These catalogues enable exploration of existing findings, publications, in situ characteristics and so on. If location is part of this information, we could easily create maps to transmit our knowledge.

This hands-on workshop on Archaeological Geospatial Infrastructures led through the basic paradigm of these modern mapping technologies. Simple examples in a well-prepared software framework (totally based on open-source components) explained the basic methods of the Web, Service-Oriented Mapping and its services, metadata management, publishing of content and the creation of Spatial Data Infrastructures. The aim of this workshop was to provide an easy access to Spatial Data Infrastructures for Cultural Heritage topics and to understand their impact for management issues as well as world-wide initiatives for infrastructure harmonisation (like INSPIRE, UN-GGIM or NSDI).

We were able to represent ICA at the ICSU-CODATA Commission on Standards (<http://www.codata.org/>) Inter Union Meeting at the Royal Society in London in order to discuss "Science and the digital revolution: data, standards and integration". This workshop focused on the digital revolution with its profound implications for natural and social sciences by deepening the potential for new understanding of complex systems at all scales and in all areas of human concern.

The commission had an information session at the 28th International Cartographic Conference in Washington D.C. in July 2017 in order to introduce to its activities and to discuss on open topics.

During 2017 was the continuation of the book project as mentioned in 2015 section of this report. The provisional title of book is: "Changing paradigm in map production and geoinformation management". The editors were Jürgen Döllner, Markus Jobst and Peter Schmitz. During 2017 the provisional content of the book had been established and an invite to possible contributors were e-mailed. To the latter part of 2017 the chapters were received by the editors which then reviewed the chapters and provided feedback to the authors to revise their submissions. The revised chapters were received by the editors.

Papers

Schmitz, P. 2017, Displaying Voter Gains and Losses: Local Government Elections in South Africa for 2011 and 2016. Paper presented at the 28th International Cartographic Conference, 2 to 7 July 2017, Washington DC, USA.

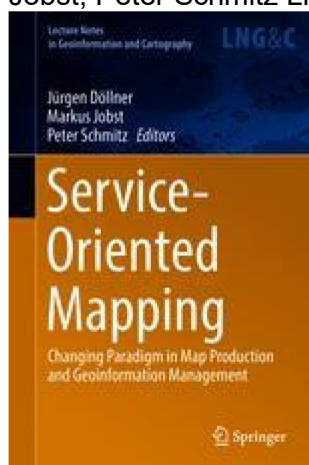
Schmitz, P., Goncalves, D. and Jacobs, M. 2017 Mapping Community Vulnerability to Poaching: A Whole-of-Society Approach. Paper presented at the 28th International Cartographic Conference, 2 to 7 July 2017, Washington DC, USA

Schmitz, P., Holloway, J., Dudeni-Thlone, N., Ntlangu, B. and Koen, R. 2017 Could the outcome of the 2016 US elections have been predicted from past voting patterns? Paper presented at the 28th International Cartographic Conference, 2 to 7 July 2017, Washington DC, USA.

Fischer, T., Himmelbauer, P. & Jobst, M. Raumforsch Raumordn Spat Res Plan (2017) 75: Über den Mehrwert organisierter Nachbarschaftshilfe – dargestellt am Beispiel des Zeit-Hilfs-Netzes Steiermark; 543. <https://doi.org/10.1007/s13147-017-0508-x>

2018

A Springer book in the series Lecture Notes in Geoinformation and Cartography has been published in 2018. The final title of the book was: "Service Oriented Mapping - Changing paradigm in map production and geoinformation management" Editors: Jürgen Döllner, Markus Jobst, Peter Schmitz Link: <https://www.springer.com/us/book/9783319724331>



The book addresses a range of aspects, including the implementation of the semantic web in geoinformatics, using big data for geospatial visualization, standardization initiatives, and the

European spatial data infrastructure. The book offers a comprehensive introduction to decentralized map production. Its primary focus is on the new paradigm of “sharing and reuse,” which is based on decentralized, service-oriented access to spatial data sources. The contributing authors have a diverse background, spanning from government and the UN to academics and spatially driven companies.

Pre-conference joint commission workshop on Collaborative custodianship through collaborative cloud mapping – Challenges and opportunities. ICA Commission on SDI and Standards; ICA Commission on Map Production and Geoinformation Management as well as the Committee for Spatial Information, Subcommittee on Education & Training (South Africa) during AfricaGeo 2018 conference. The workshop was held at the University of Pretoria before the said conference on 14 and 15 September 2018.

Papers

Schmitz, P., Pillay, L. and Moul, D. 2018 Fortunate Index and Food Security: City of Tshwane Case Study using GIS. Paper presented at the AfricaGEO 2018 Conference, 17 to 19 September 2018, Emperor’s Palace Convention Centre, Ekurhuleni, South Africa.

Schmitz, P. 2018 Geoprofiling of vulnerable communities and of criminals. Paper presented at the biannual Society of South African Geographers 2018 conference. 1 to 5 October 2018 at the Free State University in Bloemfontein and QwaQwa, South Africa.

Holloway, J.P., Ittmann, H.W., Dudeni-Tlhone, N. & Schmitz, P.M.U., 2018: From SA to the USA: Election forecasting. Orion 34 (2), pp. 83-106.

Cetl, V.; Tomas, R.; Kotsev, A.; de Lima, V.N.; Smith, R.S.; Jobst, M. (2019) Establishing Common Ground through INSPIRE: The Legally-Driven European Spatial Data Infra-Structure; in Service-Oriented Mapping 2018, Springer Lecture Notes in Geoinformation and Cartography; Springer Germany, 2018; DOI:10.1007/978-3-319-72434-8_3

2019

A national geopackage hackathon

At the invitation of the ICA Commission on Map Production and Geoinformation Management and the Austrian INSPIRE MIG delegates (INSPIRE Maintenance Implementing Group; <https://inspire.ec.europa.eu/inspire-maintenance-and-implementation/>), 52 Austrian geoinformation experts met on May 6th, 2019, in the Federal Office for Metrology and Surveying to conduct a hackathon on the technology geopackage. The intention of the Geopackage Hackathon was to put hands on a specific database technology with simple examples, in order to evaluate the applicability of geopackage and to build a common understanding of the geopackage encoding.

Geopackage is a file-based database technology (SQLite, <https://www.geopackage.org/>) that is widely used in mobile devices. With this technology, data is cached on the devices to provide the user with the data in situations without Internet connection. In the case of geo-information management, in addition to these crisis situations, the packaging of geodata, the embedding of visualization styles and metadata concerning the content are of high interest for map production. Thus, in addition to a geometry, thematic data can also be stored in several tables within a single file, thus incorporating the normalized data structures in accordance with e.g., the specifications of the spatial data infrastructure INSPIRE or even requirements of spatial archiving.

In the ten agenda items of the Geopackage Hackathon, the current OGC Geopackage Encoding Standard was introduced, the pragmatic advantages and disadvantages of a geopackage listed, the embedding of geopackage in QGIS, ArcGIS and FME checked, the integration of styles, (INSPIRE) metadata and rasters evaluated. Both, the use of a geopackage as data source for map servers, as well as geopackage as a source in Office applications or in automated processes for the protection of water sources were presented and set up in examples.

With the hackathon a common picture of the geopackage abilities has been built up. Both, possible perspectives, and currently existing disadvantages were pointed out. Geopackage standardization is still at an early stage of applicability with version 1.2 (<http://www.geopackage.org/spec/>). With purposeful requirements and participating workgroups useful extensions in terms of map production processes could be further introduced into the standard.

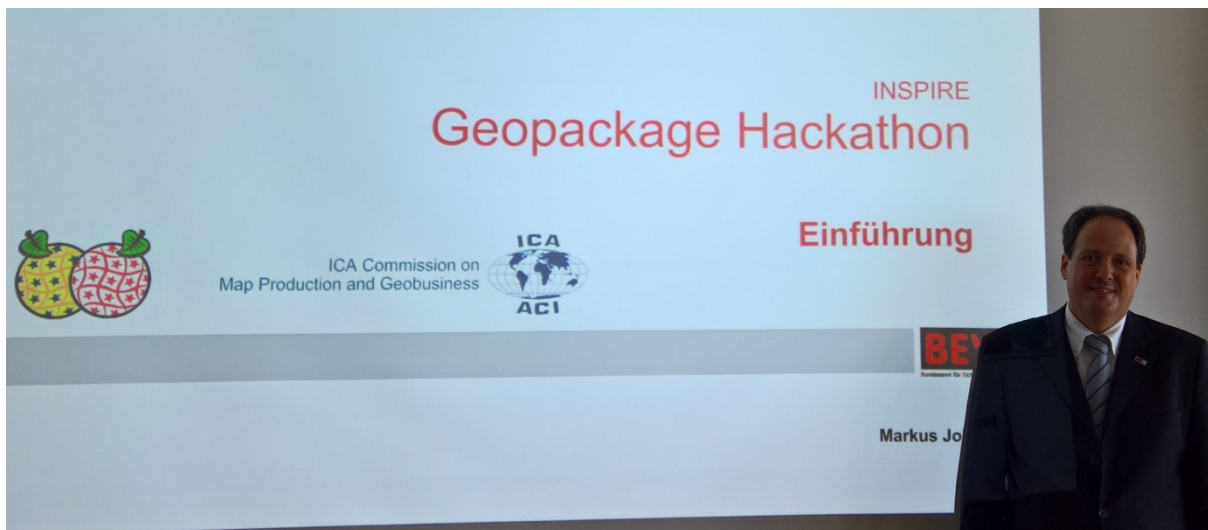


Image 1: Opening of the Geopackage Hackathon, photo by @SquatBird (Karin Wannemacher for ICA Com on Map Production)

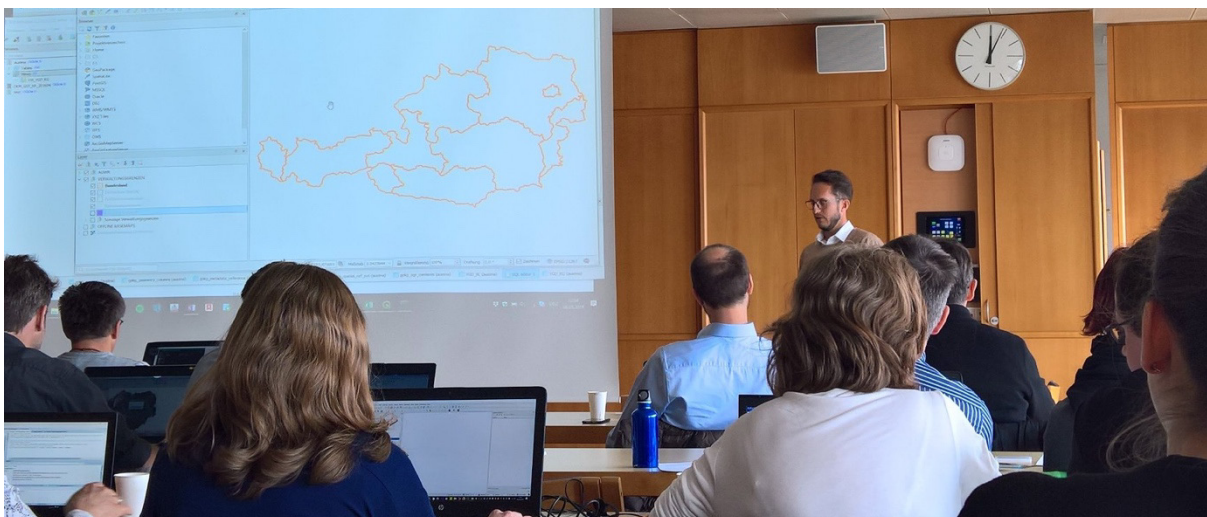


Image 2: Lukas Kuenzel from MS-GIS (<http://www.msgis.com>) introducing into a mapping procedure with Geopackage, photo by @SquatBird (Karin Wannemacher for ICA Com on Map Production)

Participated in the ICC 2019 in Tokyo, Japan. We had a small business meeting and the TOR for the next term 2019 to 2023.

Papers

Peter, X.K., Jiba, Z., Schmitz, P., Ramaloko, P. & Stipinovich, J., 2019: Effects of TNT contaminated soil on vegetation at an explosive range by probing UPLC-qTOF MS profiling method. *Ecotoxicology and Environmental Safety* 167 (2019) pp 324–330.

Chauke, M., Fourie, N., Schmitz, P., and Erwee, F. 2019. Collaborative Custodianship through Collaborative Cloud Mapping: Challenges and Opportunities, *Proc. Int. Cartogr. Assoc.*, 2, 19, <https://doi.org/10.5194/ica-proc-2-19-2019>, 2019. 29th International Cartographic Conference: Mapping Everything for Everyone, Tokyo, Japan.

Schmitz P, Heymans J, Claassens A, Carow S and Knight C. 2019. Humanitarian Demining and the Cloud: Demining in Afghanistan and the Western Sahara. In Döllner, Jürgen, Jobst, Markus, Schmitz, Peter (Eds.) *Service-Oriented Mapping Changing Paradigm in Map Production and Geoinformation Management*. Part of the Lecture Notes in Geoinformation and Cartography series of the International Cartographic Association published by Springer. ISBN 978-3-319-72434-8

Schmitz P. 2019. Supply Chains and Decentralized Map Productions. In Döllner, Jürgen, Jobst, Markus, Schmitz, Peter (Eds.) *Service-Oriented Mapping Changing Paradigm in Map Production and Geoinformation Management*. Part of the Lecture Notes in Geoinformation and Cartography series of the International Cartographic Association published by Springer. ISBN 978-3-319-72434-8.

Schmitz, P. and Gonçalves, D. 2019. Using GIS and cartography as part of the whole-of-society approach to determine coercion into marine wildlife poaching and piracy, *Advances in Cartography and GIScience of the International Cartographic Association*, 1, 18, <https://doi.org/10.5194/ica-adv-1-18-2019>, 2019.

Fischer, T.; Jobst, M. On the Suitability and Potential of Nursing Care Discussion Forums as a Health Promotion Measure for Long-Distance Caregiving Relatives: Evidence from Upper Austria. *Healthcare* 2019, 7, 139.

2020

Covid-19 stopped virtually everything here in South Africa. We had some Geoinformation Society of South Africa virtual meetings, but the commission was not actively involved. Plan to get more involved in future meetings.

Book by Markus Jobst: *SDG's in Action - a generations view* – was in production. It was designed as an atlas, the maps, statements, and biographies of contributors illustrate the range of perspectives on the SDGs and their motivations for establishing a sustainable world. The book "*SDGs in action - a generations view*" gives institutions, NGOs and educational institutions an idea of the views of different generations on the UN Sustainable Development Goals.

Commission chairs held a meeting on 15 May 2020 via WhatsApp.

In 2020 we tried to solicit input from companies and institutions to ascertain the impact of Covid-19 pandemic on their map production and geoinformation management activities. We developed MS Forms questionnaires in English, French, German, Portuguese, and Spanish. However, the response rate was so low, which unfortunately led to the project being terminated.

Papers

Kurwakumire, E., Coetzee, S. and Schmitz, P., 2020: Towards monitoring and managing the production of cadastral information in land information infrastructures using supply chain mapping and the Supply Chain Operations Reference (SCOR) model. South African Journal of Geomatics, Vol. 9. No. 2, September 2020. DOI: <http://dx.doi.org/10.4314/sajg.v9i2.12>

Fischer T., Jobst M., Capturing the spatial relatedness of long-distance caregiving: a mixed-methods approach, International Journal of Environmental Research and Public Health 17 (17), 6406, 2020

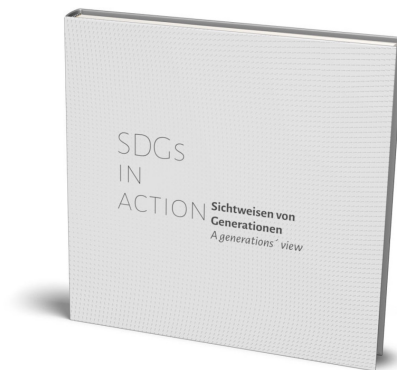
Fischer, T.; Jobst, M. An analytical framework for capturing the spatial-relatedness of long-distance caregiving: combining single-case study evidence with graph theory; International Journal of Environmental Research and Public Health 2020.

2021

We had a commission business meeting on 16 December 2021 just after the T14-2 session at the ICC 2021 conference. The meeting was initiated and chaired by Markus Jobst.

We published the book atlas “SDGs in action – a generations’ view” in December 2021 as printed as well as digital open access e-book (<https://sdggeneration.cartography.at/>). The open access e-book is available here: <https://doi.org/10.5281/zenodo.5602021>

SDGs in ACTION Sichtweisen von Generationen a generations’ view, Jobstmedia Präsentation Verlag; Wien; 2021; <https://sdggeneration.cartography.at/>; ISBN: 978-3-9502039-8-1



Papers

Schmitz, P., Inglis, K. and Holloway, P., 2021: Forensic mapping in a civil proceeding in South Africa.

Jobst M., Chawanji S., Gartner G.: Vector Tile Table Join Service (VTJS) - Cartographic Support for the Communication of AI Results, Proc. Int. Cartogr. Assoc., 2021.

Jobst, M. and Gartner, G.: A Generations View on SDG - Using the Central Role of Maps, Proc. Int. Cartogr. Assoc., 2021.

Fischer, T., Jobst, M. (2021): Die Geodateninfrastruktur und deren Potenzial zur Verbesserung der Intersubjektivität räumlicher Analysen: dargestellt am Beispiel der stationären Einrichtungen zur Langzeitpflege älterer Menschen in Österreich. REAL CORP 2021: CITIES 20.50 Creating Habitats for the 3rd Millennium, Universität für Bodenkultur Wien, 7.-10. September 2021

Jobst, M. and Gartner, G.: Map Production Supporting Activities of Digitalization and AI, Proc. Int. Cartogr. Assoc., 2, 53, <https://doi.org/10.5194/ica-proc-2-53-2019>, 2019.

Jobst M., Gartner G. Accessing spatial knowledge networks with maps, *International Journal of Cartography*, DOI: 10.1080/23729333.2021.1972910, 2021

2022

Papers

Markus Jobst, Tatjana Fischer. Approaching a Common Conscious Dataspace from a Data Provider Perspective – Requirements and Perspectives. In *Computational Science and Its Applications – ICCSA 2022: 22nd International Conference, Malaga, Spain, July 4–7, 2022, Proceedings, Part II*. Springer-Verlag, Berlin, Heidelberg, 333–343. 2022. https://doi.org/10.1007/978-3-031-10450-3_28

2023

Markus Jobst held a workshop “SDGGENERATION.CARTOGRAPHY.AT - KARTIERE DEINE WELT!” (<https://sdggeneration.cartography.at/KartiereDeineWelt/>) in Austria from July 5th to 6th 2023. The PDF of this workshop can be downloaded from <https://drive.google.com/file/d/1XkXjJ233xjWVXb6aH6ZHukcFXgoonaPZ/view>

The workshop was provided for interested pupils from the secondary school St. Paul Stift Gymnasium in Carinthia, Austria, who were also participating the Barbara Petchenik Contest in 2023 and did the first national price. The pupils put their hands on cartographic projections, geoinformation management, earth observation and sustainable development goals. Reports in the local press mentioned the ICA and the importance of cartography.



More impressions can be found here: <https://photos.app.goo.gl/Gm7hd1oiQdpPTmW6>

Closing-down meeting to be held at the ICC 2023 in Cape Town on Wednesday, August 16th, 2023, 12:40-14:30

Papers

Carow, S., Schmitz, P., & Pretorius, R., 2023: Spatial perspectives on student profiling to inform open distance e-learning (ODEL) in various geographical contexts: a case study from the Global South. *Discover Sustainability* (2023) 4:28; <https://doi.org/10.1007/s43621-023-00143-9> 27. Carow, S., Schmitz, P., & Pretorius, R., 2023: Spatial perspectives on student profiling

[to inform open distance e-learning \(ODeL\) in various geographical contexts: a case study from the Global South. Discover Sustainability \(2023\) 4:28; https://doi.org/10.1007/s43621-023-00143-9](https://doi.org/10.1007/s43621-023-00143-9)

Schmitz, P., Pretorius, R., du Plooy, N. & Cooper, A., 2023: Groth's algorithm to detect the possible presence of landmines using changes in the reflection of plants. Paper to be presented at the ICC 2023 conference.

Notable cross-disciplinary events (e.g. with other ICA Commissions/WGs, regional and international communities)

- All mentioned workshops were held in cooperation with other regional and international communities and reach out to the domains of health, mobility, UN-GGIM, education, etc.

Notable public events (e.g. invited public speech, Mapathon, TED talks, hackathon, etc.)

- Three presentations were given at the ICC2021
- Papers, which are listed above
- Listed workshops were done on different levels (regional, national, international)

Educational highlights (e.g. degree programs, MOOCs, lifelong learning courses)

- The ICA commission is continuously part of the lectures "Cartographic Interfaces" and "Programming Cartographic Tasks" in the International Master of Cartography at the Vienna University of Technology.
- The ICA commission is embedded in the lecture "Selected Topics GIScience and Technology", at the Institute of Geodesy, TU Graz
- Educational program on a national level on the basis of the Barbara Petchenik contest in terms of map production and geoinformation management.

Any other sharable experiences

- None