



VGIScience Summer School – Interpretation, Visualisation and Social Computing of Volunteered Geographic Information (VGI)

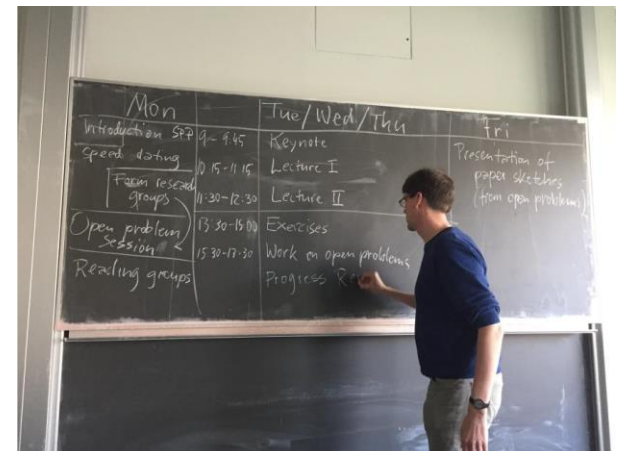
TU Dresden, 11.-15. September 2017

Welcome

- PhD students working on research topics related to Volunteered Geographic Information (VGI)
 - Austria, Germany, India, Japan, Switzerland
- invited speaker
 - Prof. Alan MacEachren
(Pennsylvania State University, Director of GeoVISTA Center)
- participants of the VGIscience priority programme
 - scientists from all 15 projects

VGI Science Priority Programme & VGI Science Summer School

- Nov 2013 – round table funded by German Research Foundation (DFG) „Added value through visual communication of Volunteered Geographic Information (visVGI)“
- Oct 2014 – Application for a Priority Programme “VGI Science” (by Prof. Burghardt, Prof. Nejdil, Prof. Schiewe, Prof. Sester)
- March 2015 – decision of the DFG to set up the priority programme initially for 3 years with a funding volume of 4.8 Mill €
- Oct 2015 – 35 project proposals were submitted of which 15 have been accepted by June 2016
- Nov 2016 – Kick of meeting for the Priority Programme VGI Science
- April 2017 – common workshop for the preparation of VGI Science Summer School

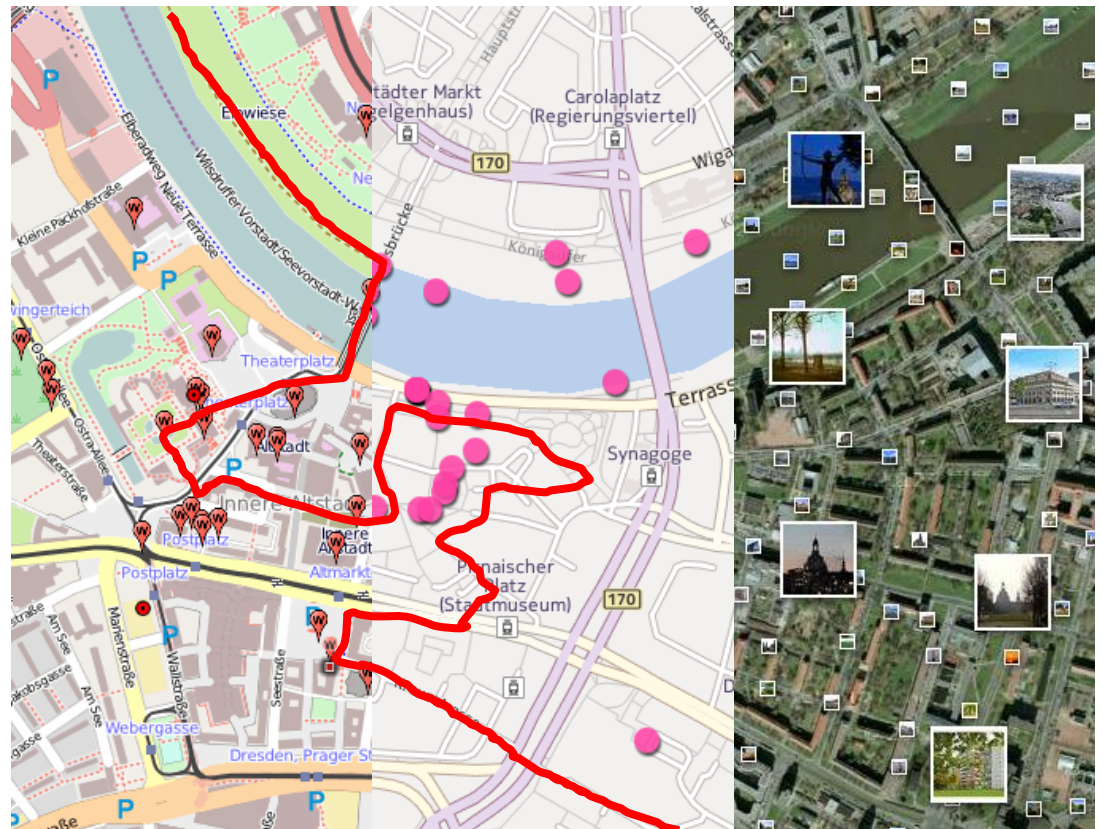


Introductory presentation

1. Volunteered Geographic Information
 - potential and challenges of VGI
 - related research (e.g. ENERIGIC, Mapping and the Citizen Sensor)
2. Priority programme VGIscience of German Research Foundation
 - objectives of the priority programme
 - projects within VGIscience
 - VGIscience repository
3. Summer School VGIscience
 - scope of the Summer School
 - relevance of the Summer School for the priority programme
 - planned activities

Availability and retrieval of Volunteered Geographic Information

- broad range of volunteered geographic information (OSM-data, GPS-tracks, sensor data, Wikipedia, georeferenced photographs, social networks, microblogging, ...)
- data sources are often very large, with high update rates (e.g. 500 Mill. Tweets per day)
- include not only factual but also subjective information
→ noise or signal
- spatial- /temporal reference is given either completely or partially



OSM-Daten

sensor data,
trajectories

images, video,
microblogging text

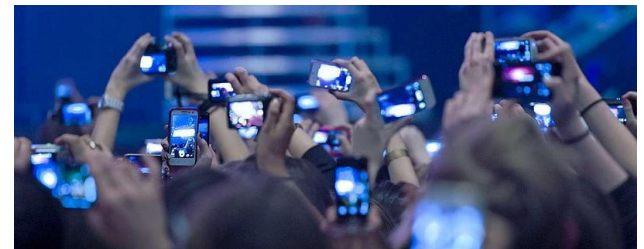
Term definition

- VGI -Volunteered Geographic Information (Goodchild, 2007)
 - introduced by Michael Goodchild (2007)
 - special case of user generated content (UGC) with direct or indirect spatial reference
 - additional value, e.g. free availability
- Citizen Science (dt. Bürgerforschung) and crowdsourcing
 - projects carried out through interested people
 - concept „Humans as Sensors“ – utilisation of low cost geosensors for various task
 - **active** participation



Location-based social media data

- social networks provide platforms for the exchange of opinions, experiences and information
 - trail of data that people leave behind, intentionally or not talks about our live
 - it gives insides to decision makers, architects and urban planners
 - creation of spatial data „as a side effect“ (**passive**)
- characteristics of the data
 - large, heterogeneous
 - continuous
 - user specific → privacy



Challenges of VGI and geospatial big data -

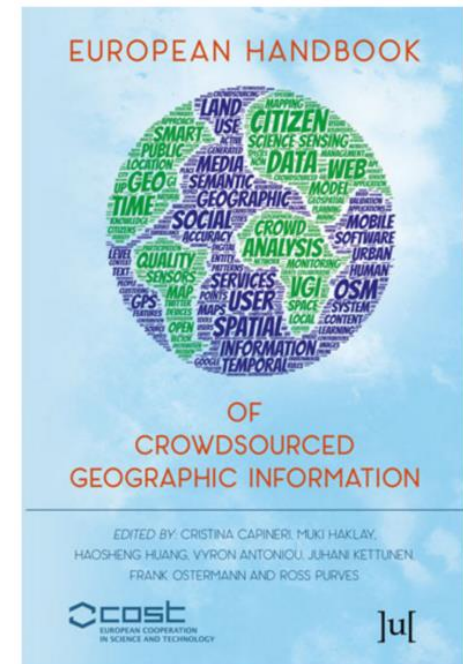
4 x V (Laney, 2001; Robinson et al. 2017)

- **volume**
 - refers to data size and varies considerably depending on the discipline (from million points in a movement data set to petabyte in imagery sources)
- **velocity**
 - is the speed at which VGI can be generated (fast, continuous data streams) and at which they should be analysed (e.g. real time)
- **variety**
 - refers to data heterogeneity such as formats, representations, degree of structure
- **veracity**
 - relates to quality, trustworthiness, subjectivity and uncertainty

ENERGIC

European Network Exploring Research into Geospatial Information Crowdsourcing: software and methodologies for harnessing geographic information from the crowd

- cost-action ENERGIC (2013-2016)
- build a European network of scientist, young researchers and industry representatives
- activities and output
 - Training Schools
<http://vgibox.eu/activities/training-school/>
 - VGI Knowledge Portal (Repository)
http://vgibox.eu/repository/index.php/Main_Page
 - “European Handbook of crowdsourced geographic information”

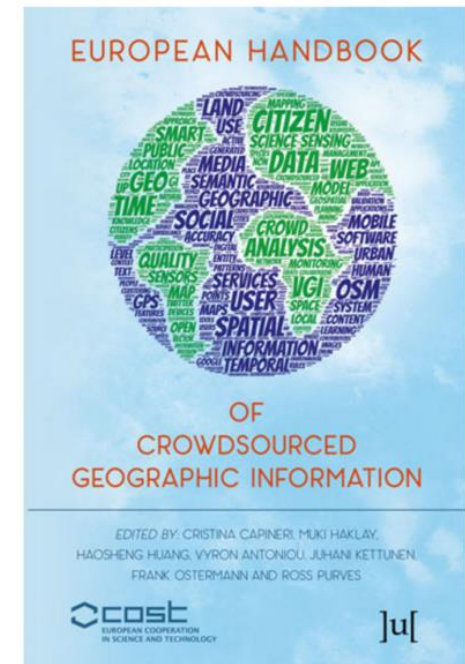


<http://www.ubiquitypress.com/site/books/10.5334/bax/>

ENERGIC

European Network Exploring Research into Geospatial Information Crowdsourcing: software and methodologies for harnessing geographic information from the crowd

- What motivates citizens to provide such information in the public domain, and what factors govern/predict its validity?
- What methods might be used to validate such information?
- Can VGI be framed within the larger domain of sensor networks, in which inert and static sensors are replaced by, or combined with, intelligent and mobile humans?
- What limitations are imposed on VGI by differential access to broadband Internet, mobile phones and other communication technologies, and by concerns over privacy?
- How do VGI and crowdsourcing enable innovation applications to benefit human society?



<http://www.ubiquitypress.com/site/books/10.5334/bax/>

Mapping and the Citizen Sensor

- cost-action TD1202 from 2012-2016
- help coordinate the activities of citizen sensors with particular regard to VGI data collection and dissemination
- review the current status of mapping
- define protocols to help guide and users of VGI data

VGIScience Summer School, 11.-15. September



Transactions in GIS 

[Explore this journal >](#)

Research Article

The Scale of VGI in Map Production: A Perspective on European National Mapping Agencies

Ana-Maria Olteanu-Raimond , Glen Hart, Giles M. Foody, Guillaume Touya, Tobias Kellenberger, Demetris Demetriou

First published: 25 January 2016 [Full publication history](#)

DOI: 10.1111/tgis.12189 [View/save citation](#)

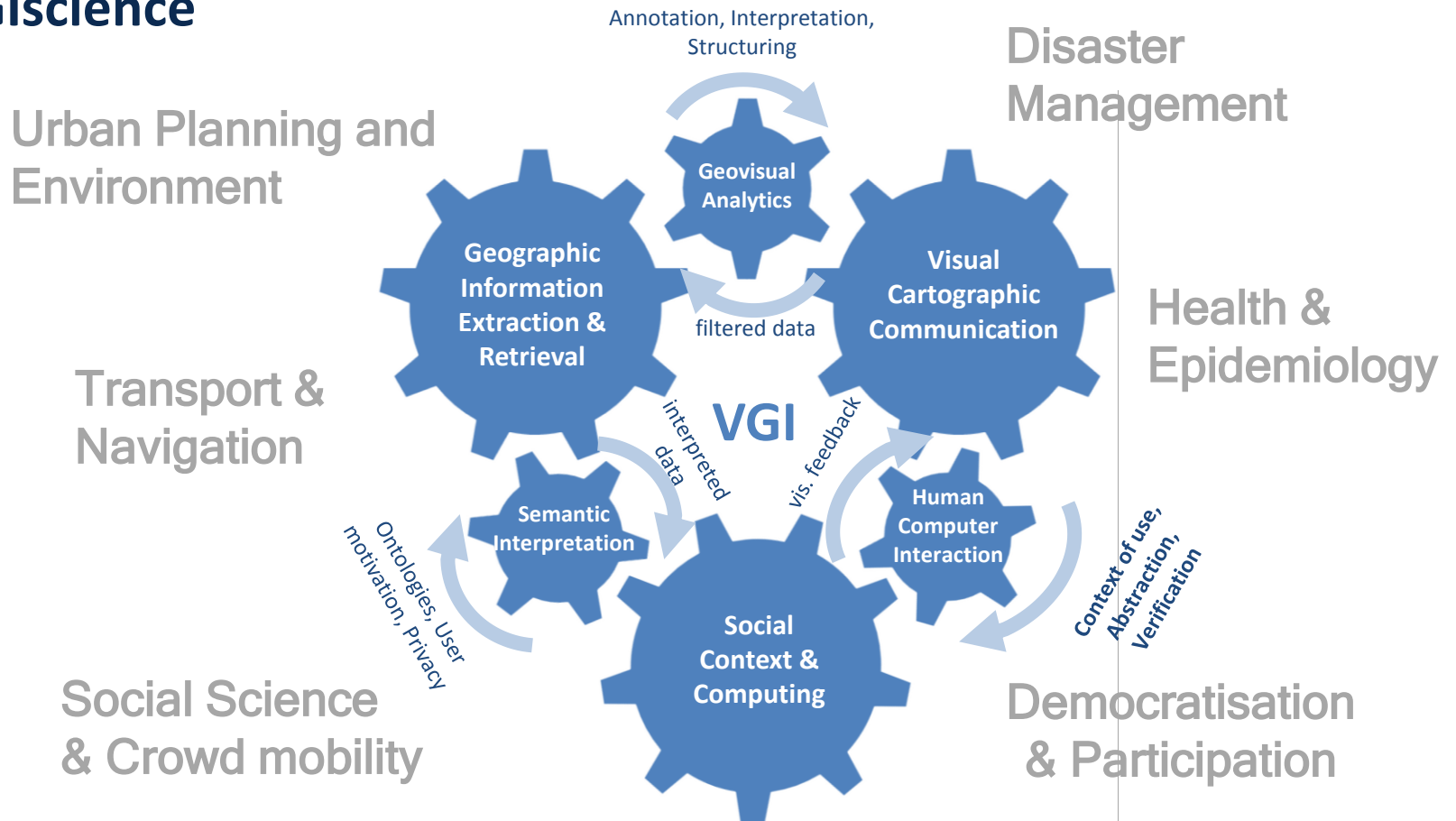


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Priority Programme VGIscience



I) Research on geographic information extraction

- Extraction of the spatial, temporal and thematic reference
- Fusion of data from various sources and resolution
- Identification of correlations and pattern within large amount of data and data streams
- Search and exploration of VGI

II) Research on geo-visualisation and cartography

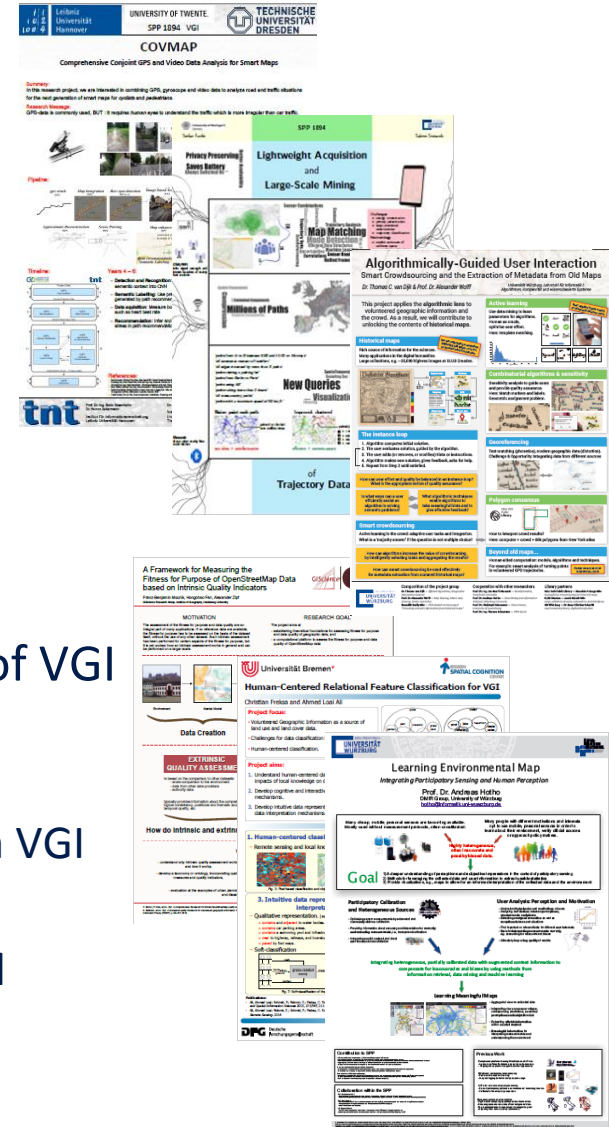
- Development of innovative, adaptive visualisation metaphors
- Visualisation methods suitable for VGI (multi-variate, metadata, quality)
- Real-time visualisation, abstraction
- User feedback, collaboration and interaction
- Empirical verification and theoretical foundations

III) Research questions on social context and computing

- Quality and generalisability of information: subjective classification vs. general ontologies
- Context dependency of data acquisition, abstraction and interaction
- Reliability and trustworthiness, information quality
- Motivation, intention for participation and privacy

Projects within VGIScience

- active participation and capturing of geodata (COVMAP, LearnEnviMaps, topikos, TrajectoryVGI, OldMapsVGI)
 - conjoint GPS and Video collection for traffic management
 - participatory sensing and collection of environmental data
 - extraction of metadata from Old Maps
- quality issues / assurance and improvement of VGI (QualityOSM, HC-VGI, LearnEnviMaps)
 - fitness for purpose of OpenStreetMap data
 - data quality issues of collaborative mapping in VGI from an AI / cognitive systems perspective
 - optimizing sensor measurements by advanced calibration mechanisms

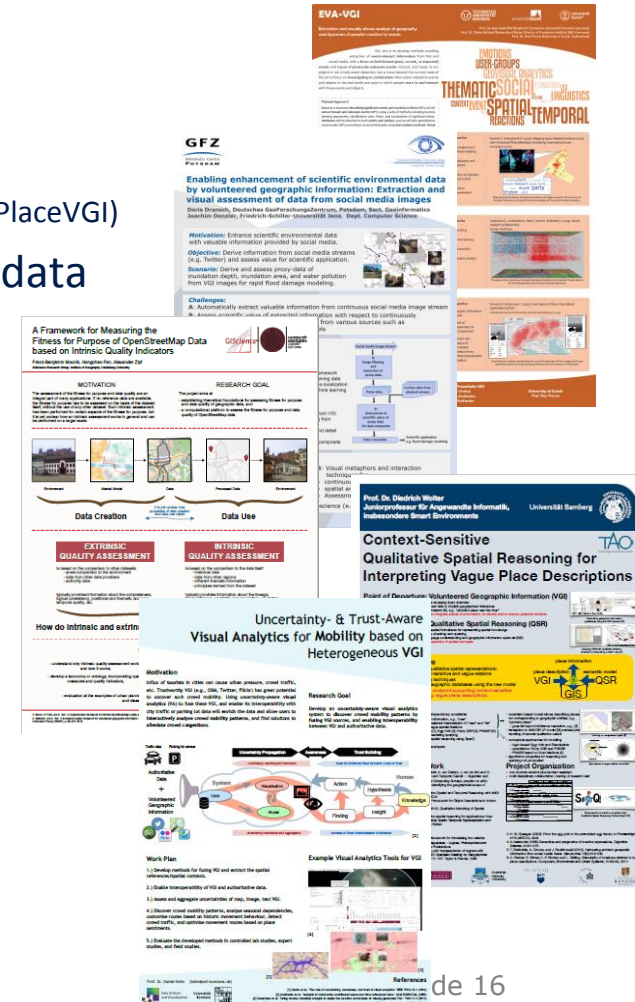


The image displays a collection of research posters presented at the Summer School. Key projects visible include:

- COVMAP**: Comprehensive Conjoint GPS and Video Data Analysis for Smart Maps, presented by Letizia University Hannover and Technische Universität Dresden.
- Lightweight Acquisition and Large-Scale Mining**: A project focusing on efficient data collection and processing.
- Algorithmically-Guided User Interaction**: Smart Crowdsourcing and the Extraction of Metadata from Old Maps, led by Dr. Thomas C. van Dijk and Prof. Dr. Alexander Raub.
- New Queries Visualization**: A project exploring new ways to interact with and visualize geographic data.
- Human-Centered Relational Feature Classification for VGI**: A project from Universität Bremen led by Christian Fröhlich and Ahmed Lotfi Ali, focusing on data quality and classification.
- Learning Environmental Map**: Integrating Participatory Sensing and Human Perception, led by Prof. Dr. Andreas Wiering.

Projects within VGIscience

- data analytics and visualisation
(VA4VGI, EVA-VGI, ENAP, SpatialCorrelationVGI, UncertaintyTrustVA, VaguePlaceVGI)
 - real-time event assessment from social media data
 - analysis of people´s reactions
 - spatial correlations in social media data
 - interpreting vague place descriptions
- social aspects and human perception
(MotivationHumanVGI, UncertaintyTrustVA, LandmarksVGI, EVA-VGI)
 - motivation and participation in Humanitarian Assistance
 - perception of landmarks in VGI-based maps
 - trustworthiness and privacy issues



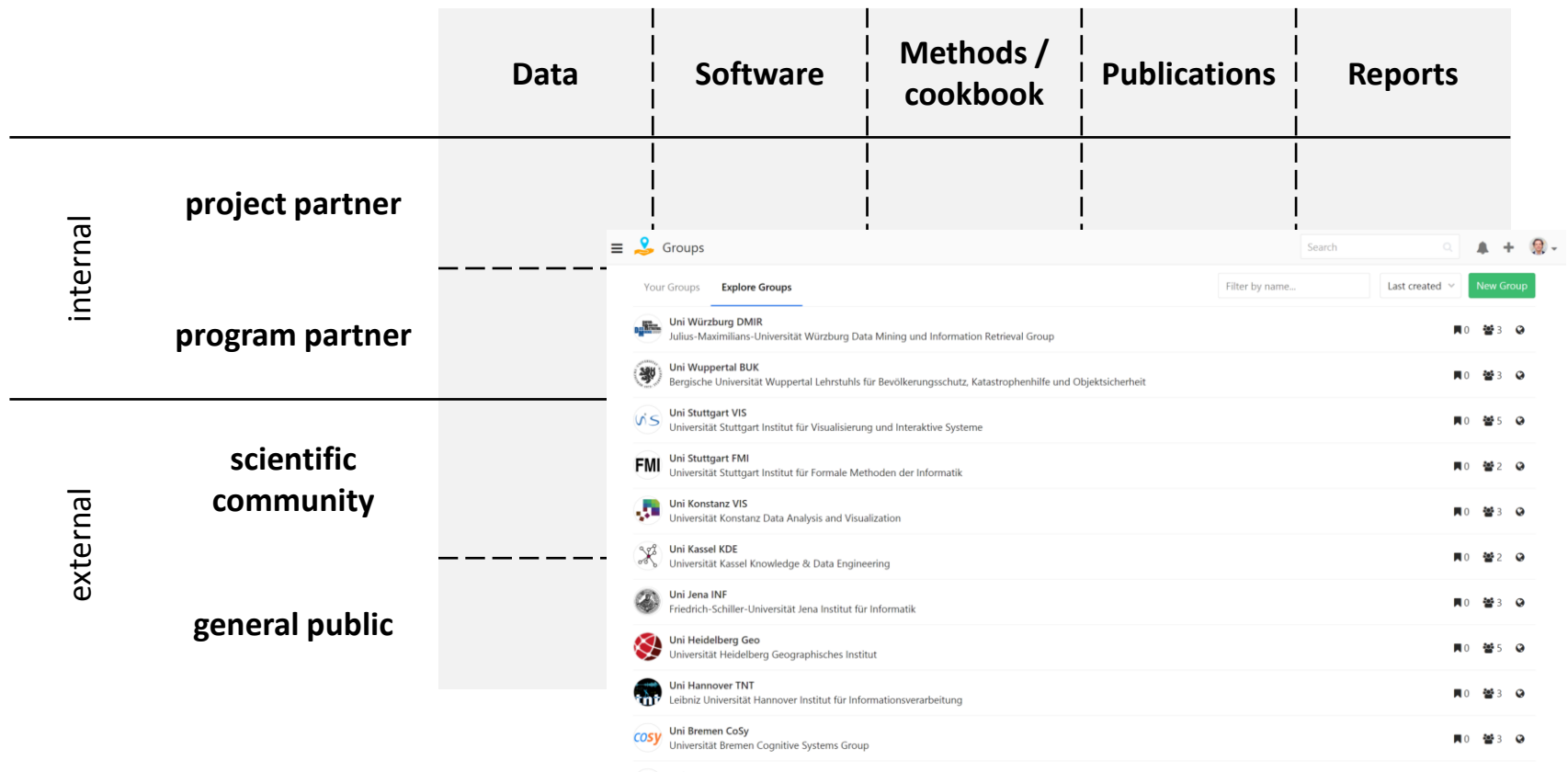
The collage features several project posters and presentations:

- EVA-VGI**: A poster about visual assessment of data from social media images, mentioning 'EMOTIONAL USER GROUPS', 'THEMATIC SOCIAL ANALYTICS', and 'SPATIAL REACTIONS'.
- GFZ**: A poster titled 'Enabling enhancement of scientific environmental data by volunteered geographic information: Extraction and visual assessment of data from social media images'. It lists motivation, objectives, datasets, and challenges.
- OpenStreetMap**: A poster titled 'A Framework for Measuring the Fitness for Purpose of OpenStreetMap Data based on Intrinsic Quality Indicators'. It includes a motivation section and a research goal.
- TAO**: A poster titled 'Context-Sensitive Qualitative Spatial Reasoning for Interpreting Vague Place Descriptions'. It mentions 'Qualitative Spatial Reasoning (QSR)' and 'VGI'.
- Uncertainty- & Trust-Aware Visual Analytics for Mobility based on Heterogeneous VGI**: A poster with a diagram showing a cycle of 'Data Creation' and 'Data Use'.
- Work Plan**: A poster with a numbered list of tasks for a project.
- Example Visual Analytics Tools for VGI**: A poster showing various maps and data visualizations.

Projects within VGIscience

- applications
 - disaster management, emergency response and flood damage models
(COVMAP, QualityOSM, UncertaintyTrustVA, MotivationHumanVGI, ENAP)
 - urban / city planning, environmental management and traffic management
(LearnEnviMaps, OldMapsVGI, QualityOSM, EVA-VGI)
 - analyse human activities and crowd mobility
(TrajectoryVGI, UncertaintyTrustVA, EVA-VGI, VA4VGI)
 - navigation and orientation, indoor navigation
(topikos, QualityOSM, LandmarksVGI)
 - VGI and land cover mapping
(HC-VGI)

VGIscience repository



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Scope of the Summer School

- to give PhD students who are at an early stage of their academic career insights in to current research topics related to VGI
- establish cooperation between researchers from different research groups
- active research and development work related to VGI – we aim on visible outputs
 - conceptual work (outline of a paper)
 - sharing code / tools → repository
 - ideas of common VGI-based applications



Relevance of the Summer School for the Priority Programme

- groups of VGIscience priority program
 - this week is our chance to work actively together
 - a priority programme is more than a single DFG research project
 - the success and continuation of the VGIscience priority programme depend on our common research
- intern / extern

Structure & Activities

	Monday	Tuesday (GeoInfExt, GIR)	Wednesday (GVA, GeoVis)	Thursday (Social Context)	Friday
9:00 - 9:45 Session I	Welcome and fast forward	Lecture I	(Geo-) Visual Analytics – Keynote	Lecture I / Practical	Presentation of group work I (15 + 15 min)
9:45 - 10:30 Session II	Introduction VGIScience-SPP	Invited talk	Lecture I	Lecture II / Practical	Presentation of group work II
10:30-11:00	Coffee				
11:00-12:30 Session III	Discussion of scientific research paper	Lecture II & III	Lecture II & III	Group work	Flash light evaluation / final session
12:30-13:30	Lunch				
13:30-15:00 Practical's	Task for the week	Parallel Exercises	Parallel Exercises	Hiking in the Saxon Switzerland	
15:00-15:30	Coffee				
15:30- ... (Open problems)	Group formation / conceptual work	Group work / concept and prototyping	Group work / prototyping	Hiking in the Saxon Switzerland	
Evening	Icebreaker		Dinner		

Let's do research together

