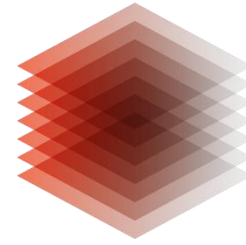


LEIBNIZ INFORMATION CENTRE
FOR SCIENCE AND TECHNOLOGY
UNIVERSITY LIBRARY



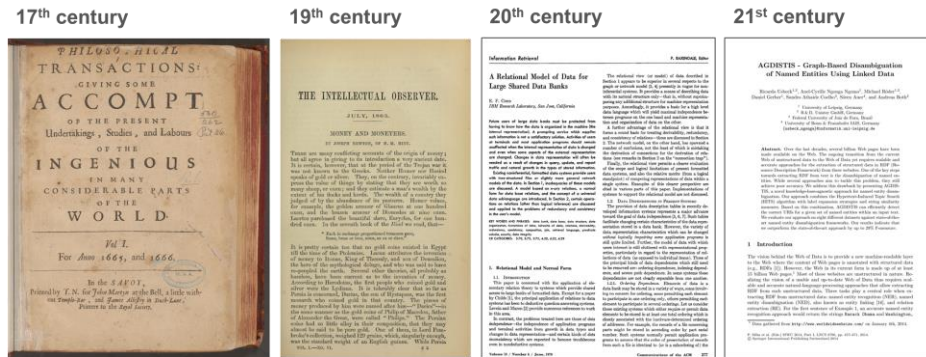
TIB

**Researcher or Crowd Member? Why not both!
The Open Research Knowledge Graph for Applying
and Communicating CrowdRE Research**

Oliver Karras, Eduard Groen, Javed Ali Khan & Sören Auer

Dr. rer. nat. Oliver Karras,
Notre Dame, South Bend, USA 13. September 2021
5th International Workshop on Crowd-Based Requirements Engineering

Open Research Knowledge Graph: Objective



Scholarly communication in academia

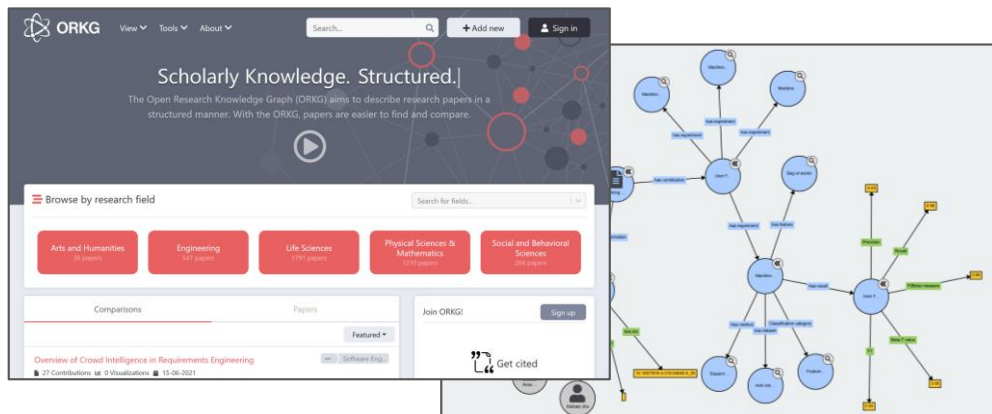
- Focus on **document-centric information flows**
- Scholarly knowledge is **hidden** in documents

ORKG aims to transform scholarly communication into knowledge-based information flows

- Open source platform for open research
- Focus on **content** (scholarly knowledge) not context
- Use **crowdsourcing** & automatic methods
- Acquire, curate, publish, and process scholarly knowledge that is **human- & machine-actionable**
- Knowledge graph as underlying data structure



<https://orkg.org>

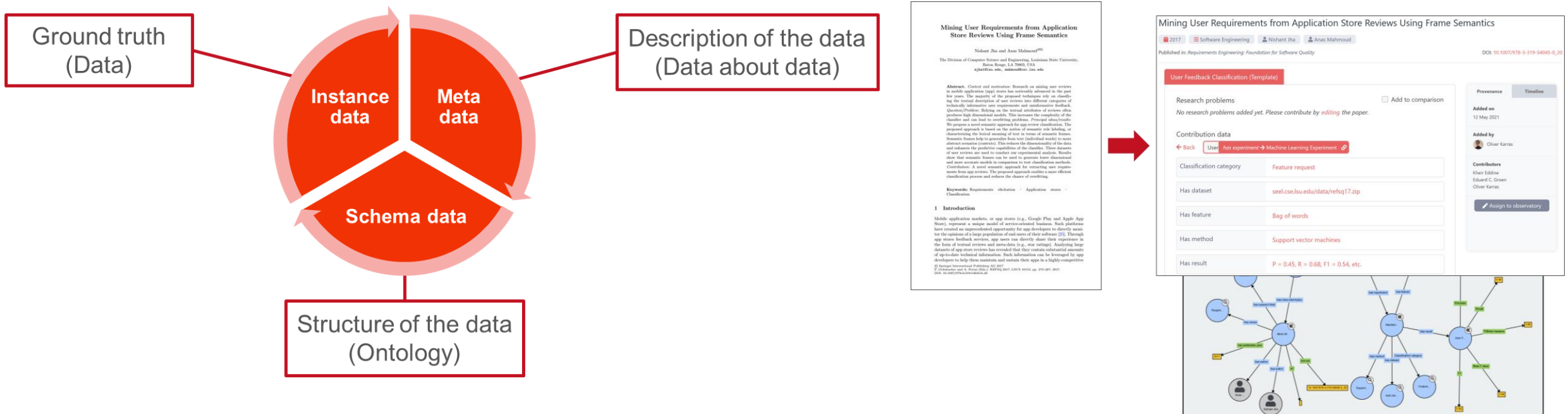


Excursion: What is a Knowledge Graph?

A knowledge graph (KG) consists of

- (1) the **schema data** (ontology) describing a conceptual model,
- (2) the corresponding **instance data** (ground truth), and
- (3) the **meta data** (description of the data) following the constraints imposed by the ontology.

The construction of a KG involves **ontology design** and **population** with instances.



Why is the ORKG of Interest to CrowdRE?



Researchers from any discipline form the **CROWD** of ORKG.

Long-term goals of the project^[1]

1. Integrate **more strategies for crowdsourcing** to enable crowd members to contribute to ORKG
2. Tailor the platform to the needs and requirements of the crowd by **involving the crowd in the development**

Proposal by Glinz^[2]

- CrowdRE needs to venture out into **open source** and **open research** settings
- Potential to apply CrowdRE in **real development settings**

[1] Jaradeh et al.: *Open Research knowledge Graph: Towards Machine Actionability in Scholarly Communication*, ARXIV, 2019.

[2] Glinz: *CrowdRE: Achievements, Opportunities and Pitfalls*, 3rd CrowdRE Workshop, 2019.

Research Questions & Analysis Procedure

Research question 1

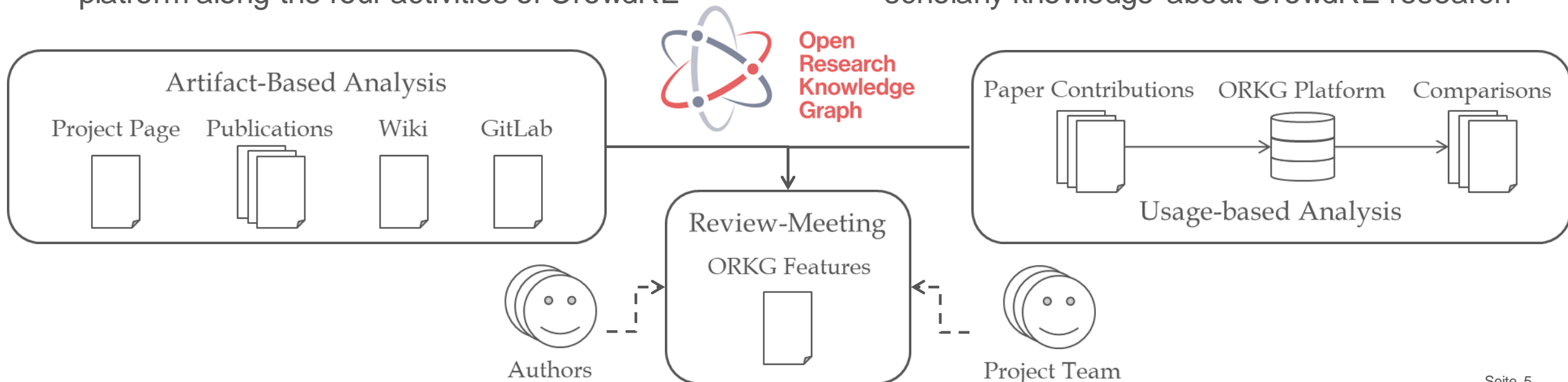
What **potential** does the ORKG have as a platform for **applying CrowdRE research** in a real development setting?

As **CrowdRE researcher**, we describe the current state and features of ORKG as a crowdsourcing platform along the four activities of CrowdRE

Research question 2

What **potential** does the ORKG have as a platform for **communicating** scholarly knowledge about **CrowdRE research**?

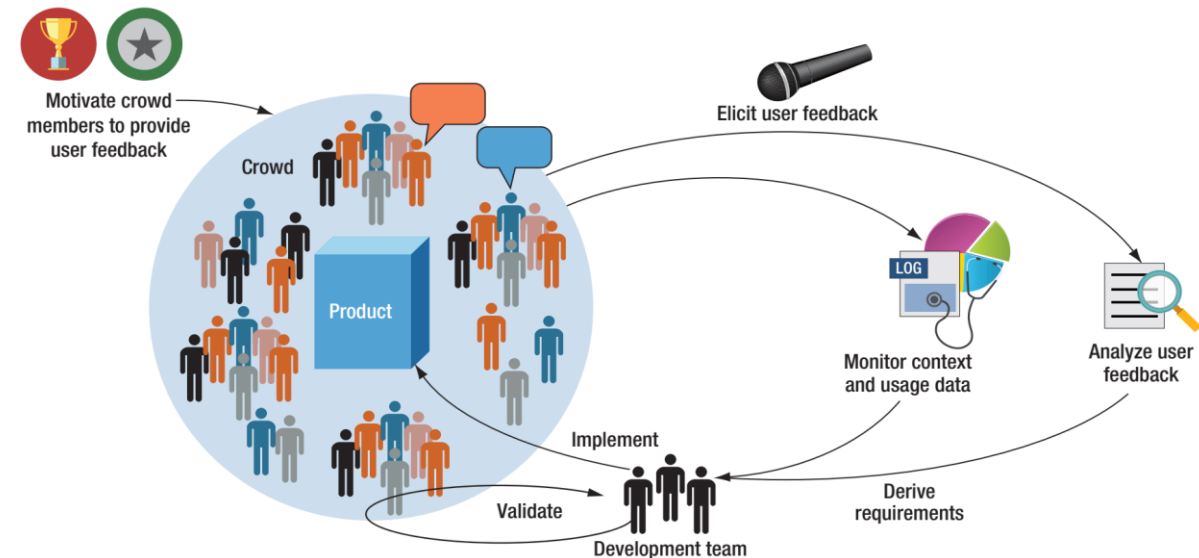
As **crowd members**, we report our experiences with ORKG to acquire, curate, and publish scholarly knowledge about CrowdRE research



Features of ORKG as a Crowdsourcing Platform

Excerpt of the Reference model of Crowdsourcing^[1]

Feature	Description
Pillar 1: The crowd	
5.4 Motivation	
5.4.1 Mental satisfaction	The crowd members support open data, open
5.4.2 Self-esteem	The crowd members know that they support th
5.4.3 Personal skill development	The crowd members can develop their research
5.4.4 Knowledge sharing	The crowd members share their research by ac
5.4.5 Love of community	The crowd members value each other's results
Pillar 2: The crowdsourcer	
1. Incentives provision	
1.1 Financial incentives	The project team launched the ORKG Curati regular contributions to the ORKG (initially li
1.2 Social incentives	The crowdsourcer uses public acknowledgments with prominently visible rankings and mentio
1.3 Entertainment incentives	This feature is not currently supported.
Pillar 3: The crowdsourced task	
7.1 Problem solving	The task of acquiring, curating, publishing, an problem that can be answered with an analysi
7.2 Innovation	The task of acquiring, curating, publishing, an
7.3 Co-creation	The task of acquiring, curating, publishing, and members to communicate and maintain schola
Pillar 4: The crowdsourcing platform	
1. Crowd-related interactions	
1.9 Provide feedback loops	The platform uses several options to provide



Description of the ORKG as a crowdsourcing platform:
<https://zenodo.org/record/5172132>

[1] Hosseini et al.: *The Four Pillars of Crowdsourcing: A Reference Model*, 8th International Conference on Research Challenges in Information Science, 2014.

[2] E. Groen et al.: *The Crowd in Requirements Engineering – The Landscape and Challenges*, IEEE Software, 2017

Features of ORKG along the Four Activities of CrowdRE

Motivating crowd members

1. Intrinsic motivation
 - Knowledge sharing
 - Love of the community
2. Extrinsic motivation
 - Social & financial incentives
 - Entertainment: None



Analyzing feedback

1. Manual analysis
 - Direct communication
 - Immediate analysis of feedback
2. (Semi-)automated analysis
 - None, due to small size of team & crowd



Eliciting Feedback

1. Feedback loops: Crowd → Project team



2. Feedback loops: Project team → Crowd



3. No targeted feedback to individual members

Monitoring context & usage data

1. Timeline
 - ORKG stores history of changes
2. Tools & Roles
 - Web analytics tool Matomo
 - Admins and Curators supervise activities



Experiences with Using ORKG as Crowd Members

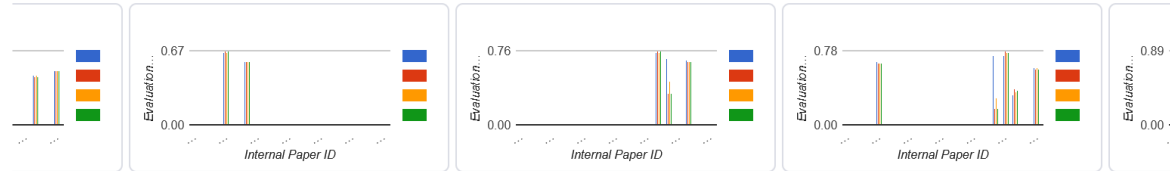
Overview of Approaches that Classify User Feedback as Feature Request

This overview shows the classification results of approaches that use the machine learning algorithms Naive Bayes or C4.5 in combination with the machine learning features Bag of Words or Term Frequency - Inverse Document request.

June 2021 Oliver Karras Eduard C. Groen

DOI: [10.48366/r112387](https://doi.org/10.48366/r112387)

Visualizations



Properties	Software Feature Request Detection in Issue Tracking Systems 2016 - User Feedback Classification	Mining User Requirements from Application Store Reviews Using Frame Semantics 2017 - User Feedback Classification
Has dataset	https://zenodo.org/record/56907#.YKT_NudCRPY	https://mast.informatik.uni-hamburg.de/wp-content/uploads/2014/03/REJ_data.zip
		https://sites.google.com

Curation of 2 Systematic Literature Reviews

1. Crowd Intelligence in Requirements Engineering
 - Focus on **qualitative** data: CrowdRE utilities
2. User Feedback Classification Approaches
 - Focus on **quantitative** data: ML performance

➤ Create **State-of-the-art Comparisons** in ORKG

Experiences

1. Curation both SLRs **achieved**
2. Better **overview** due to Interactions & Visualizations
3. Contributions & comparisons are **reusable** for all
 - Create new ones
 - Expand existing ones
4. Beta version with **limited** usability
5. Project team **always responded** to issues

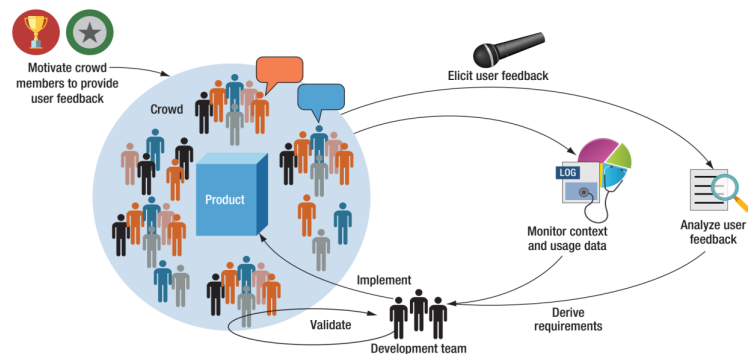
Interested in how ORKG can help you acquire, curate, and publish scholarly knowledge?
Join our interactive session: **"Crowdsourcing a Knowledge Graph on CrowdRE Research"**

Discussion & Conclusion

Research question 1

What **potential** does the ORKG have as a platform for **applying** CrowdRE research in a real development setting?

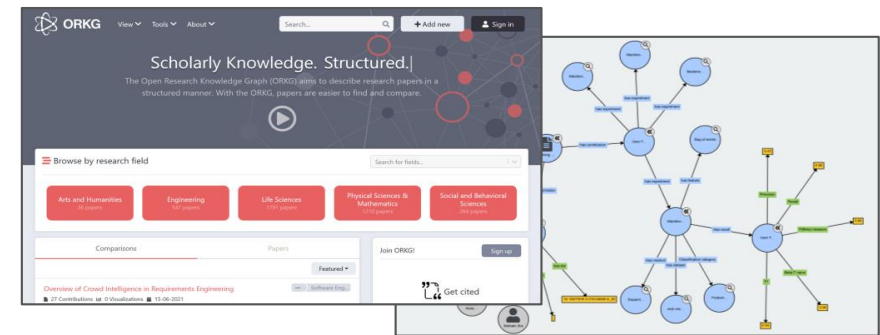
Crucial parts of CrowdRE cycle are addressed



Research question 2

What **potential** does the ORKG have as a platform for **communicating** scholarly knowledge about CrowdRE research?

Successful curation of scholarly knowledge

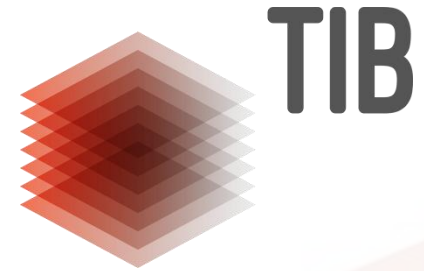


- Foundation for further curating CrowdRE research
 - Long-term accessible knowledge
 - Knowledge is now human- & machine-actionable

Solid basis for researcher **to apply & study CrowdRE** in a real development setting & in close collaboration with project team

Development of **new** search, retrieval, mining, and assistance **applications** for scholarly knowledge & **new perspective** for researchers as crowd members

LEIBNIZ INFORMATION CENTRE
FOR SCIENCE AND TECHNOLOGY
UNIVERSITY LIBRARY



<https://www.linkedin.com/in/oliver-karras/>



[@KarrasOliver](https://twitter.com/KarrasOliver)



[Google Scholar – Oliver Karras](https://scholar.google.com/citations?user=Oliver-Karras)



<https://www.researchgate.net/profile/Oliver-Karras>

Contact

Dr. rer. nat. Oliver Karras
TIB – Leibniz Information Centre for Science and Technology
Data Science and Digital Libraries Research Group
oliver.karras@tib.eu