

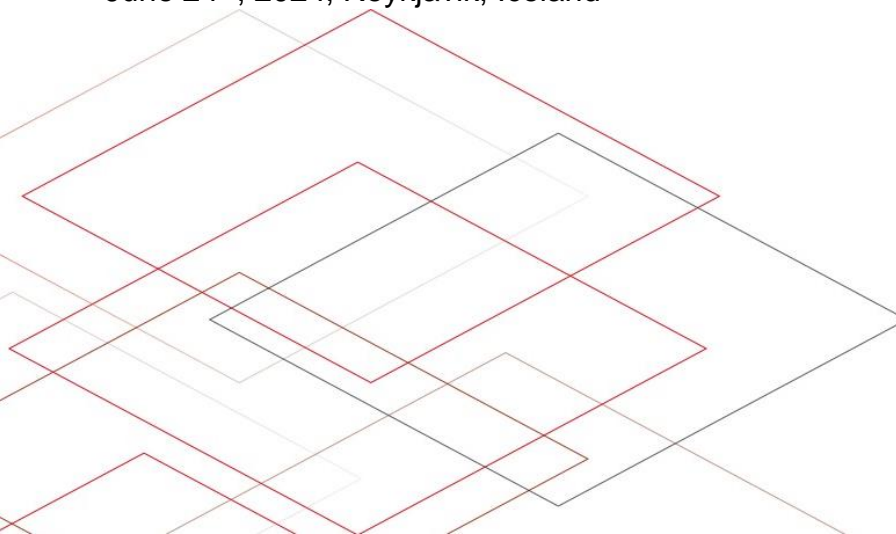
Summary, Reflection, and Closing

Oliver Karras, Alessio Ferrari, Davide Fucci, and Davide Dell'Anna

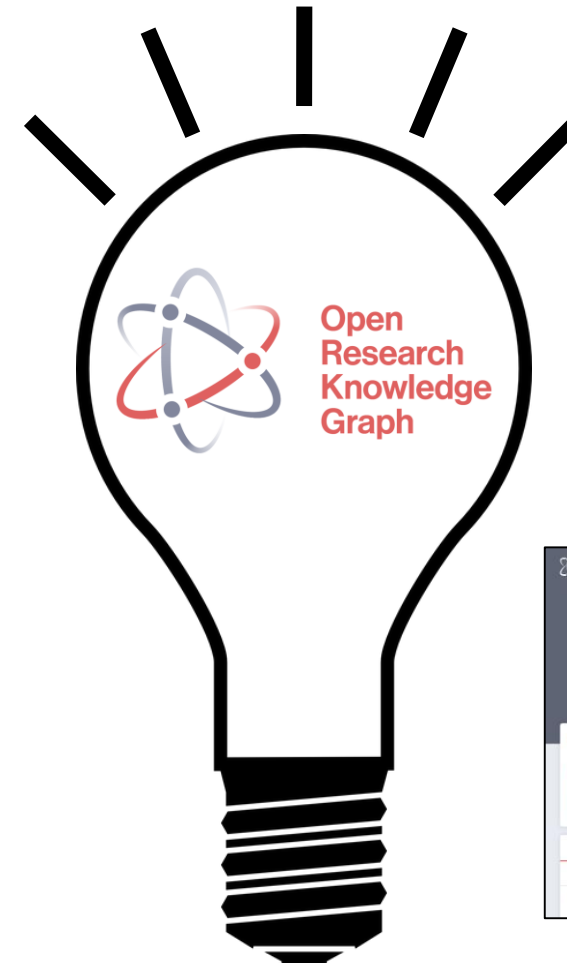
oliver.karras@tib.eu, alessio.ferrari@isti.cnr.it, davide.fucci@bth.se, d.dellanna@uu.nl

32nd IEEE International Requirements Engineering 2024 Conference – Exploring New Horizons: Expanding the Frontiers of Requirements Engineering

June 24th, 2024, Reykjavik, Iceland

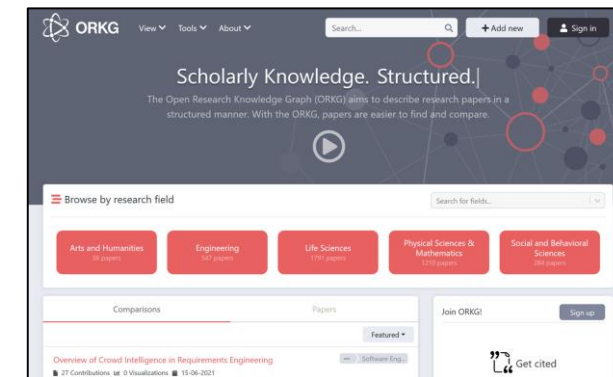


Summary



Open
Research
Knowledge
Graph

<https://orkg.org>



Let's bring scholarly communication and open science in Requirements Engineering to the 21st century!

Recap of the Tutorial

| Session | Time | Table of Content | Style | Speaker |
|-------------|---------------|---|--|---|
| Theoretical | 09:00 - 09:25 | 1. Welcome (5 min) 2. Introduction to open science in RE (10 min) 3. Introduction to the ORKG (10 min) | Presentation Presentation Presentation | All organizers Alessio Ferrari Oliver Karras |
| Practical | 09:25 - 10:15 | 4. Create a FAIR-annotated publication for the ORKG (50 min) 4.1 Set up an Overleaf project for an exemplary publication 4.2 Use the LaTeX package SciKGT _E X to annotate the publication 4.3 Generate PDF with embedded FAIR scientific information 4.4 Optional: Upload the FAIR-annotated publication to the ORKG | Exercise Sub-exercise Sub-exercise Sub-exercise Sub-exercise | Oliver Karras All organizers All organizers All organizers All organizers |
| Break | 10:15 - 10:45 | Coffee break | | |
| Practical | 10:45 - 11:45 | 5. Use the ORKG based on a RE use case (60 min) 5.1 Add an exemplary publication to the ORKG 5.2 Describe the scientific information of the publication in the ORKG 5.3 Create an ORKG comparison of the publications added by participants 5.4 Publish the created ORKG comparison as a citable digital artifact 5.5 Optional: Create visualizations for the created ORKG comparison 5.6 Optional: Retrieve the information with the SPARQL endpoint | Exercise Sub-exercise Sub-exercise Sub-exercise Sub-exercise Sub-exercise Sub-exercise | Oliver Karras All organizers All organizers All organizers All organizers All organizers All organizers |
| Feedback | 11:45 - 12:15 | 6. Reflection of the tutorial with the participants (25 min) 7. Farewell and closing (5 min) | Discussion Presentation | All organizers All organizers |

Reflection and Feedback

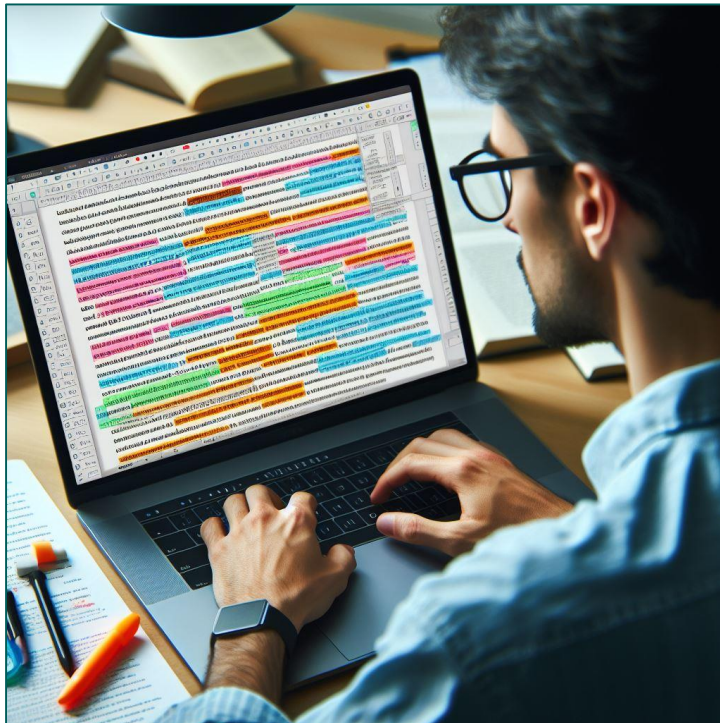
Your thoughts, please!

Teaser: REFSQ'25 Open Science Competition

Challenge 1:

Annotate your REFSQ'25 paper with SciKGTeX.

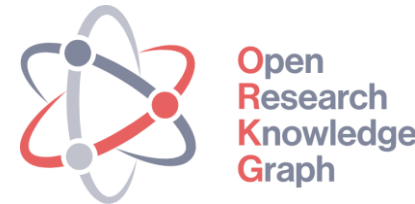
The accepted paper, best annotated with SciKGTeX, will be awarded the **Best ORKG Annotation Award** (prize: 100€).



Challenge 2:

Enrich your RESFQ'25 paper with an ORKG comparison.

The accepted paper, enriched with the best ORKG comparison, will be awarded the **Best ORKG Comparison Award** (prize: 200€).



Divide and Conquer the EmpiRE:
A Community-Maintainable Knowledge Graph of
Empirical Research in Requirements Engineering

Oliver Karras*, Felix Wernlein[†], Jil Klinder[†] and Sören Auer^{*†}
*TIB - Leibniz Information Centre for Science and Technology, Hannover, Germany
Email: {oliver.karras, soeren.auer}@tib.eu
[†]Leibniz University Hannover, Hannover, Germany
Email: felix.wernlein@stud.uni-hannover.de, jil.klinder@inf.uni-hannover.de, auer@t3s.de

Abstract—(Background.) Empirical research in requirements engineering (RE) is a constantly evolving topic, with a growing

(systematic) literature reviews, and even examine overlapping periods, venues, and themes (cf. Table 1) [16]. They have not collaborated to build on and update earlier works, which are known challenges of literature reviews [17]–[20]. Overcoming these challenges is critical to ensure the quality, reliability, and timeliness of research results from literature reviews [19], [21]. Recent research addresses these challenges by focusing on when and how to update (systematic) literature reviews in SE and its subfields [4], [21]–[23]. While these works mainly provide social and economic decision support and guidance for updating literature reviews [4], [20], the underlying problem is the unavailability of the extracted and analyzed data, corresponding to open science in SE [23], [24]. Unavailable data complicates collaboration among researchers and updating literature reviews, as the entire data collection, extraction, and analysis must be repeated and expanded for comprehensive results. Researchers need support in the form of technical infrastructures and services to conduct sustainable literature reviews so that all data is openly available in the long term [5], [17], [18], [29] according to the Findable, Accessible, Interoperable, and Reusable (FAIR) data principles [25], [26]. For this purpose, the data must be organized in a flexible, fine-grained, context-sensitive, and semantic representation to be understandable, processable, and usable by humans and machines [5], [13], [27]. Over the last decade, Knowledge Graphs (KGs) have become an emerging technology in industry and academia as they enable this versatile data representation [28]–[30]. Besides well-known KGs for encyclopedic and factual data, such as *Dispedia* [31] and *WikiData* [32], using so-called Research Knowledge Graphs (RKGs) for scientific data is a rather new approach [28], [29], [33]. RKGs include bibliographic metadata, e.g., titles, authors, and venues, as well as scientific data, e.g., research designs, methods, and results [34]–[39]. They are a promising technology to sustainably organize scientific data so that the data is openly available for long-term collaborations [27], [40]. We examine the use of RKGs as technical infrastructure by building, publishing, and evaluating an initial KG of Empirical research in RE (KG-EmpRE). Similar to Frattini et al. [41], our long-term goal is to continuously maintain,

A Comparison of Scientific Publications on the State of Empirical Research in Requirements Engineering and Software Engineering ★

November 2023 Oliver Karras Felix Wernlein Jil Ann-Christin Klinder Sören Auer

This comparison provides an overview of scientific publications that have investigated primary studies in requirements engineering and software engineering to give a snapshot of the “current” state of empirical research in requirements engineering and software engineering. In particular, the comparison shows for each publication (1) which research fields and topics were investigated, (2) whether and where the extracted and analyzed data is available, and (3) which method was used to determine the state, including further details about the respective method.

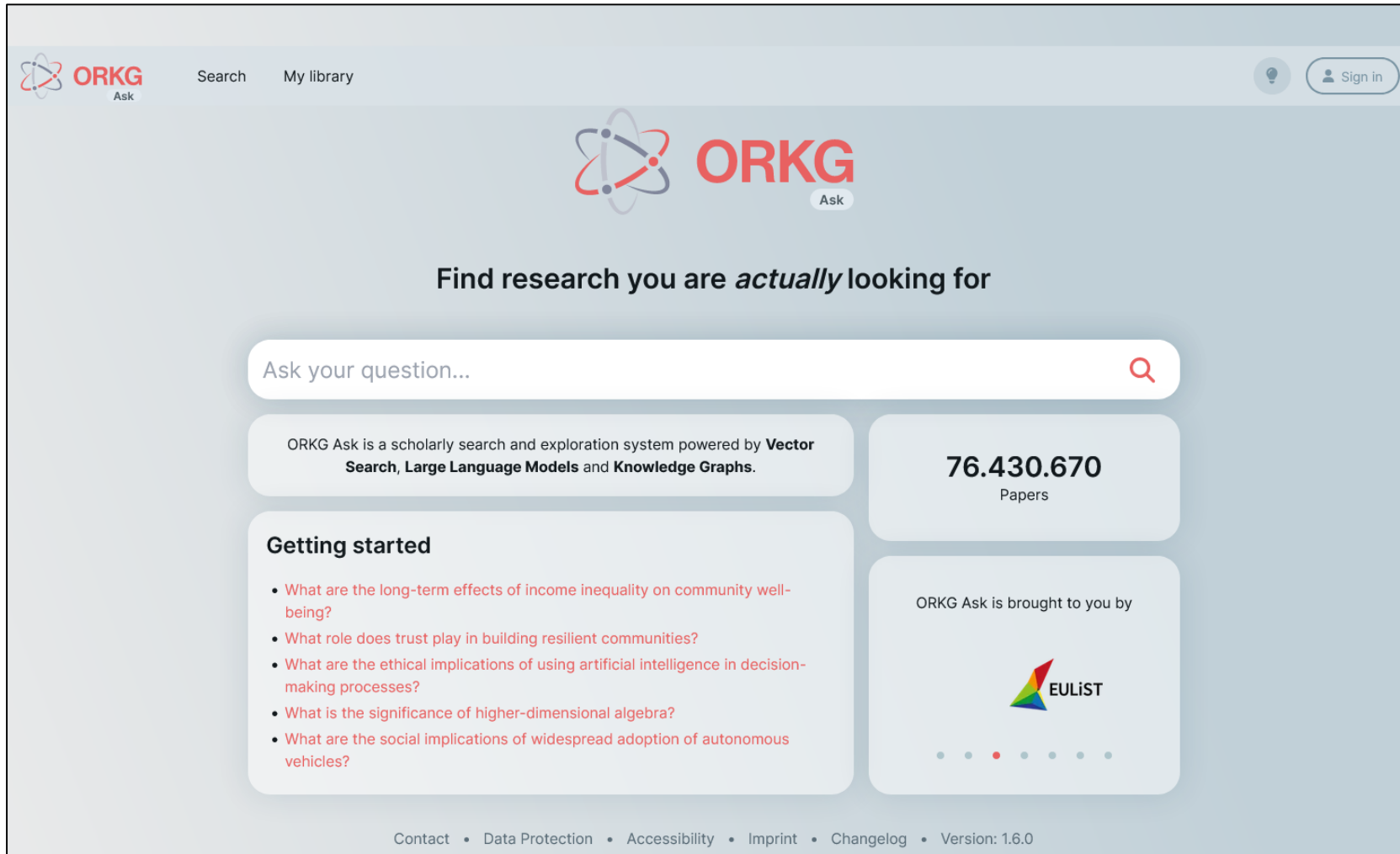
DOI: <https://doi.org/10.48366/RES0023>



| Properties | Empirical research in requirements engineering: trends and opportunities <i>Empirical research - 2016</i> | Empirical research methodologies and studies in Requirements Engineering: How far did we come? <i>Empirical research - 2014</i> | A Survey on Empirical Requirements Engineering Research Practices <i>Empirical research - 2012</i> | Evidence-Based Structuring and Evaluation of Empirical Research in Requirements Engineering: Fundamentals, Framework, Research Map <i>Empirical research - 2010</i> | An Anal. Requires Data <i>Empirical research - 2008</i> |
|-----------------------------|--|--|---|--|--|
| research problem | empirical research in requirements engineering | empirical research in requirements engineering | empirical research in requirements engineering | empirical research in requirements engineering | empirical research in requirements engineering |
| research field investigated | Requirements Engineering | Requirements Engineering | Requirements Engineering | Requirements Engineering | Requirements Engineering |
| topic investigated | bibliographic metadata context data collection | bibliographic metadata research topic theory | context data analysis data collection | context research method result | context research method result |

your personal use. Not for redistribution. The definitive version of record was published in the proceedings of 2023 ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM), <https://doi.org/10.1109/ESEM56168.2023.10304795>.

Looking to the Future: ORKG Ask



The ORKG Ask is a scientific **search and exploration system** that helps researchers **find** the **research articles** they are really looking for.

Ask a **question**.

Get an **answer** with **references**.

<https://ask.orkg.org/>
(Released: May16th, 2024)

Looking to the Future: ORKG Ask

The screenshot displays the ORKG Ask web application. At the top, there's a navigation bar with the ORKG logo, 'Search', 'My library', and a 'Sign in' button. Below this is a toolbar with 'Save', 'Share', 'Hidden', 'CSV', 'ORKG', and 'Edit columns' buttons. A search query box on the left contains the text 'How does exposure to nature effect overall health and well-being?' with a 'Search' button. Below the search box are filter sections for 'Year', 'Language', and 'Add filter...'. A sidebar on the right has a 'Feedback' button. The main content area shows a warning message about the use of a large language model. Below this is an 'Answer (based on top 5 papers)' section with a paragraph of text. At the bottom, there's a table with four columns: 'Answer', 'Insights', 'TL;DR', and 'Conclusions'. The table contains two rows of results, each with a title, authors, date, DOI, and detailed content in the respective columns.

Search query
How does exposure to nature effect overall health and well-being?

Filters
Year
Language
Add filter...

ORKG Ask is brought to you by **TIB**

Warning: The answer and the extracted information was obtained with a large language model and might contain errors and inaccuracies. All information presented by ORKG Ask needs to be carefully checked.

Answer (based on top 5 papers)
Exposure to nature, whether in actual settings or through virtual means, has been shown to increase positive emotions, attentional capacity, and ability to reflect on life problems [1], while contact with natural environments also improves air quality and reduces stress [2]. Moreover, a psychological characteristic called nature relatedness, which reflects the degree of connection one feels towards nature, is linked to better overall health and reduced symptoms of depression, anxiety, and stress [3,4]. [5] adds that cultural connections to nature contribute significantly to human well-being, affecting mental, physical, and spiritual health, as well as inspiration and identity.

| Answer | Insights | TL;DR | Conclusions |
|--|---|--|---|
| Why is nature beneficial? The role of connectedness to nature Mayer, F. Stephan • Frantz, Cynthia M. • Bruehlman-Senecal, E. • Dolliver, Kyffin September 2009 • 10.1177/0013916508319745 | Increased connectedness to nature, Positive emotions, Ability to reflect on a life problem | The study discusses the mechanisms underlying the exposure to nature/well-being effects and the ecological validity of laboratory studies. | Exposure to nature improves connectedness to nature, enhances cognitive abilities, and boosts positive emotions. |
| Health benefits of nature Berg, van den, A.E. • Joye, Y. • Vries, de, S. January 2018 • 10.1002/9781119241072.ch6 | Improvement in air quality, stimulation of physical activity, facilitation of social cohesion, stress reduction | The scientific research and insights discussed in the chapter | Exposure to nature leads to improvements in air quality, stimulation of physical activity, facilitation of social cohesion, and stress reduction. |

1. Enter a natural language **question** in the **UI**
2. **Semantic search** finds the most relevant **papers**
3. **LLMs** extract the required information and create the **answer**
4. **KGs** are used to **support** content extraction, synthesis, and enhancement