

ORKG: Describing Papers Manually and Creating an ORKG Comparison

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ORKG Comparisons

Acknowledgement
of creators

DOI

Visualizations

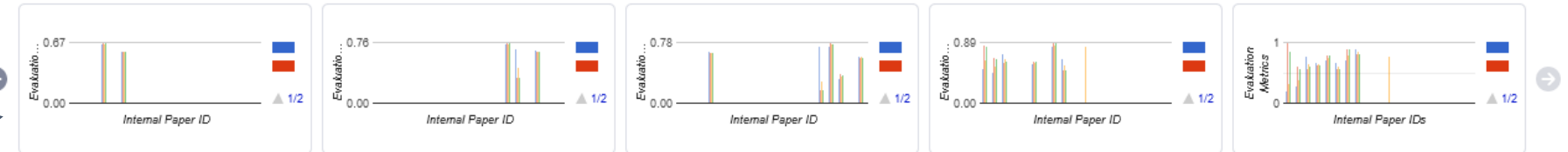
Interactive filtering

Overview of Approaches that Classify User Feedback as Feature Request ☆👁

📅 June 2021 👤 Oliver Karras 👤 Eduard C. Groen

This overview shows the classification results of approaches that use the machine learning algorithms Naïve Bayes, Support Vector Machines, and Decision Trees C4.5 in combination with the machine learning features Bag of Words or Term Frequency - Inverse Document Frequency to classify user feedback as feature request.

DOI: <https://doi.org/10.48366/r112387>



Properties

[has dataset](#)

Software Feature Request
Detection in Issue Tracking
Systems

User Feedback Classification - 2016

https://zenodo.org/record/56907#.YKT_NudCRPY

Mining User Requirements from
Application Store Reviews Using
Frame Semantics

User Feedback Classification - 2017

https://mast.informatik.uni-hamburg.de/wp-content/uploads/2014/03/REJ_data.zip

<https://sites.google.com/site/appuserreviews/>
seel.cse.lsu.edu/data/refsq17.zip

Mining Twitter Feeds for Software
User Requirements

User Feedback Classification - 2017

seel.cse.lsu.edu/data/re17.zip

Automatic Classification of Non-
Functional Requirements from
Augmented App User Reviews

User Feedback Classification - 2017

Not available

Bug reports
simply p

classifying

User Feedback Classification - 2017

https://mast.informatik.uni-hamburg.de/wp-content/uploads/2014/03/REJ_data.zip

Example: ORKG Comparison of Related Work – State of the Art^[5]

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 Klünder

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/R650023>

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 Analysis of Requirements Engineering 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	context	context

<https://doi.org/10.48366/R650023>


Properties	State of Empirical Research in Software Engineering Empirical research - 2007	The type of evidence produced by empirical software engineers Empirical research - 2005	Research in software engineering: an analysis of the literature Empirical research - 2002
method	Literature review	Literature review	Literature review
data availability	✗	✗	✗
time interval/period	1996-01-01	1997-01-01	1999-01-01
"has been investigated"	2006-06-30	2003-12-31	1999-12-31
number of papers	133	119	360

Figure 1: Comparison of related publications on the "current" state and evolution of empirical research in RE and SE [16].

Figure 1 shows an excerpt from a comparison that we created to get an overview of related publications on the "current" state and evolution of empirical research in RE and SE [16]. For three publications, the excerpt shows the method used, the data availability, as well as the period and the number of papers examined. We use the ORKG due to its cross-domain and cross-topic characteristics, as well as its successful application for CrowdRE by Karras et al. [42].

III. RELATED WORK

Below, we review 14 publications that provide snapshots of the "current" state and evolution of empirical research in RE and SE (see Table I) [16]. We only consider publications that address the topic in general and are not limited to specific aspects, such as a method [67], [68] or a context [69], [70].

We found five publications on empirical research in RE published between 2005 and 2016 and nine on empirical research in SE published between 2002 and 2021. While one publication [1] examined empirical research in RE using a survey with 42 respondents, the other 13 publications [2], [3], [5]–[15] used (systematic) literature reviews or systematic mapping studies to analyze on average 402.9 papers (minimum: 20, median: 154, and maximum: 2237 papers) published between 1977 and 2019 with overlapping periods. In total, these 13 publications examined papers from a total of 60 different venues on 18 different themes. Nine of the 60 venues and ten of the 18 themes were examined by more than two publications. These facts show that there is considerable overlap and redundancy between these publications in terms of

goals, methods used, periods, venues, and themes examined. This overlap and redundancy could have been avoided if researchers had collaborated to build on and update earlier works. However, only four out of 14 publications offer their data at all, with only one publication [15] using a public data repository [71], [72]. The other three publications only offer links that no longer work [5], [12], [13].

In terms of key findings, the 14 publications show consistent results, although not all 18 themes were examined in all publications. For example, eleven of the 14 publications reported on the most commonly used research methods. Until 2000, the most common research methods were conceptual analysis and concept implementation [7]. Between 2000 and 2015, the most commonly used research methods changed to case studies and experiments [3], [5], [8]–[11], which were expanded after 2015 to also include surveys and systematic literature reviews [12]–[15]. While this change shows an evolution of research methods used, we also note that experiments and case studies have been the two main research methods for empirical research in RE and SE for more than 20 years. Although these two research methods have been used for a long time, seven publications concluded that there is a need to develop, expand, and use standardized terminology and theories (from other disciplines) to more consistently represent the empirical research conducted and better explain the results found [1], [2], [6]–[8], [12], [13]. In this regard, seven publications also analyzed the information reported for a comprehensive description of a research design. This information includes details about the research question(s) [1], contextual factors [6],

Table I: Details of related publications on the "current" state and evolution of empirical research in RE and SE [16]. Legend: Literature Review (LR), Systematic Literature Review (SLR), and Systematic Mapping Study (SMS)

Paper	Year	Field	Method	Period	Data State	Venues (Frequency > 2)	Themes (Frequency > 2)
[8]	2005	RE	LR	1968 – 2002	35 papers Unavailable	1) Empirical Software Engineering Journal (8)	1) Data collection (12)
[15]	2016	RE	SLR	1977 – 2015	42 respondents Unavailable	2) IEEE Software (4)	2) Research method (11)
[11]	2012	RE	Survey	1970.01.01 – 2011.12.31	2237 papers Unavailable	3) Requirements Engineering Journal (4)	3) Bibliographic metadata (10)
[12]	2014	RE	SLR	Open – 2012	290 papers Unavailable	4) ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (4)	4) Data analysis (8)
[3]	2016	SE	SLR	Open – 2012	48 papers Unavailable	5) IEEE Transactions on Software Engineering (3)	5) Research paradigm (7)
[1]	2005	RE	LR	1997 – 1999	700 papers Unavailable	6) Information and Software Technology Journal (3)	6) Research design (7)
[10]	2006	RE	LR	1997 – 2005	65 papers Unavailable	7) IEEE International Requirements Engineering Conference (3)	7) Research topic (5)
[11]	2007	SE	LR	1996 – 2003	133 papers Unavailable	8) Journal of Systems and Software (3)	8) Research context (4)
[14]	2015	SE	SLR	1996 – 2013	991 papers Broken link	9) International Conference on Software Engineering (3)	9) Theory (5)
[13]	2018	SE	SLR	2017 – 2017	535 papers Broken link		
[14]	2019	SE	SLR	1997 – 2014	941 papers Unavailable		
[15]	2021	SE	SMS	Open – 2019	20 papers Available		

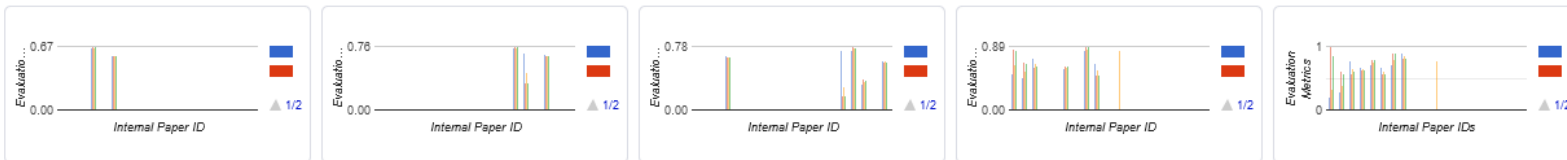
Example: ORKG Comparison of Literature – ML Approaches^[9]

Overview of Approaches that Classify User Feedback as Feature Request ☆🔍

June 2021 Oliver Karras Eduard C. Groen

This overview shows the classification results of approaches that use the machine learning algorithms Naïve Bayes, Support Vector Machines, and Decision Trees C4.5 in combination with the machine learning features Bag of Words or Term Frequency - Inverse Document Frequency to classify user feedback as feature request.

DOI: <https://doi.org/10.48366/r112387>



Properties	Software Feature Request Detection in Issue Tracking Systems <i>User Feedback Classification - 2016</i>	Mining User Requirements from Application Store Reviews Using Frame Semantics <i>User Feedback Classification - 2017</i>	Mining Twitter Feeds for Software User Requirements <i>User Feedback Classification - 2017</i>	Automatic Classification of Non-Functional Requirements from Augmented App User Reviews <i>User Feedback Classification - 2017</i>	Bug reports simply p classifying User Feeds
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/site/appsuserreviews/ seel.cse.lsu.edu/data/refsq17.zip	seel.cse.lsu.edu/data/re17.zip	Not available	https://seel.cse.lsu.edu/data/re17.zip
https://doi.org/10.48366/r112387					



Fig. 2: Excerpt from our comparison for Case II [35].

77 papers from the SLR by Khan et al. [18], describing the relation of the papers to five phases of RE and the CrowdRE utilities applied [36]. We are still in the process of adding the contributions from the remaining 50 papers, which is more time-consuming than for the quantitative data from Case I because of the expert judgments needed for classifying the papers' contributions. The comparison of the 27 papers makes it easy to identify, for example, the four papers that address the runtime purpose of monitoring for requirements evolution.

With the created comparisons [35], [36], we achieved our goal of acquiring and curating the detailed results of both SLRs. The knowledge-based representation in the form of comparisons has several advantages over a purely document-based representation. The comparisons are interactive and allow filtering of views by different scholarly knowledge contained in each row, even by specific value ranges of qualitative and quantitative content. The ORKG also provides a service for generating several graphical visualizations based on data in the comparisons, helping the reader understand information faster than through the large comparison table. The most important feature of the ORKG is that the added contributions and created comparisons are available to anyone. In this way, every crowd member can use the curated scholarly knowledge and created comparisons as a basis for new comparisons. Moreover, the existing comparisons can be expanded with additional scholarly knowledge from papers already included, and even with new contributions from papers added later to the ORKG. We already expanded several contributions, e.g., the results of other classifications reported in Dhinakaran et al.'s paper [40]¹⁹. For Case I, we added the details of the three crowd properties *scale*, *level of knowledge*, *skills & expertise*, and *roles*, which are only briefly and superficially described in the SLR [18]. For Case II, we added links to the datasets used and performance values to classification categories other than "Feature Request". This expansion is relevant to enable long-term curation. For

example, a development succeeding the SLR by Santos et al. [17] are reports of Deep Learning algorithms showing promising results in classifying user feedback [41], [42], which should be successively added to the comparison.

Despite all these advantages, the ORKG also has limitations. Most of the limitations we experienced can be attributed to the development status of the platform, which is currently in beta. Further development of the ORKG must improve interactions for the expert crowd by enabling better workflows for entering data and creating visualizations. Nevertheless, we also experienced that the project team has always responded directly to our reported issues, which we could see getting added to the GitLab issue tracker²¹ and addressed shortly thereafter.

V. DISCUSSION

The ORKG aroused our interest as a crowdsourcing platform for applying and communicating CrowdRE research. In this experience report, we explored whether the ORKG can promote the potential of CrowdRE in open source and open research settings, taking two perspectives: that of CrowdRE researchers and that of crowd members.

Our first contribution is that we provide a comprehensive overview of the ORKG's features as a crowdsourcing platform for acquiring and curating scholarly knowledge [37], mapped to the four key activities of CrowdRE. Our findings show that the ORKG is a crowdsourcing platform offering several features that can facilitate successful CrowdRE. Although the ORKG project team has not yet consciously applied CrowdRE, they already address crucial parts of the CrowdRE cycle by motivating crowd members to participate, eliciting feedback, and monitoring context & usage data, which they analyze to derive and implement the needs and requirements of the crowd. To motivate crowd members, the project team uses established mechanisms and incentives to boost intrinsic and extrinsic motivation (see Finding 1). Feedback is elicited

¹⁹<https://www.orkg.org/orkg/paper/RT6818/R76825>

²¹<https://github.com/TIBHannover/orkg-block-front-end/issues/634>

Example: ORKG Comparison of Literature – Simulation Parameters^[10]

Comparison of Studies on Germany's Energy Supply in 2050 ★🔍

November 2021
 Felix Kullmann
 Jan Göpfert
 Oliver Karras
 Patrick Kuckertz
 Sören Auer
 Markus Stocker
 Peter Markewitz
 Leander Kotzur
 Detlef Stolten



This comparison compiles the results from various studies analyzing a future low-carbon energy system for Germany. The focus of this study comparison is electricity generation. In the future, however, other essential characteristics of the respective energy system designs in the individual studies will be listed. Installed capacity is given in GW and electricity generation is given in TWh. The authors would like to thank the German Federal Government, the German State Governments, and the Joint Science Conference (GWK) for their funding and support as part of the NFDI4Energy consortium. Funded by the German Research Foundation (DFG) - project number: 442146713. This work was also supported by the Helmholtz Association under the program "Energy System Design".

DOI: <https://doi.org/10.48366/r153801>



Properties	Klimaneutrales Deutschland Contribution - 2020	Wasserstoff-Roadmap Nordrhein-Westfalen Contribution - 2020	Wege zu einem klimaneutralen Energiesystem Contribution - 2020	Wege für die Energiewende Contribution - 2019	Den Weg der Energiewende Contribution - 2019
has energy_sources	all sources	all sources	all sources	all sources	
	bioenergy	bioenergy	bioenergy	bioenergy	
	geothermics	geothermics	geothermics	geothermics	
	hydropower	hydropower	hydropower	hydropower	
	import	import			
	net import	net import			

<https://doi.org/10.48366/r153801>

O. Karras et al. | Organizing Scientific Knowledge From Energy System Research Using the ORKG

and GHG scenarios [14] (see Figure 1). In contrast to the traditional way of publishing an overview of scenarios within a publication, ORKG comparisons provide the benefit that they are versionable and can thus be continuously (re)used, updated, and expanded. When researchers publish new scenarios as factsheets or in publications, the ORKG comparisons can be easily extended by describing the new scenarios using the same ORKG templates, adding the new ORKG contribution to the respective ORKG comparison, and publishing the updated ORKG comparison as a new version. The ORKG also supports the supplementation of ORKG comparisons by creating visualizations based on the data contained therein either directly from the web frontend or via various access points, such as a REST API, a Python or R package, or a SPARQL endpoint, for example in combination with a Jupyter notebook.



Figure 1. ORKG comparison of 25 scenarios from GHG studies for Germany [14].

In addition, we established an ORKG observatory on Energy System Research¹². The ORKG observatory serves as a central access point to all related curated publications, comparisons, and visualizations so that other researchers can easily explore the content. For example, Auer et al. [15] already reused the curated scientific knowledge from our two ORKG comparisons by identifying and answering further natural language competency questions from domain experts beyond the previous consideration. For this purpose, they specified the competency question as SPARQL query (see Listing 1). We executed this query on the SPARQL endpoint and visualized the results in Figure 2. In particular, these results show that average energy supply from photovoltaics and onshore wind power increased approximately fourfold from the 2006 – 2010 interval to the 2016 – 2020 interval.

¹²https://orkg.org/observatory/Energy_System_Research

[10] Karras et al.: *Organizing Scientific Knowledge From Energy System Research Using the Open Research Knowledge Graph*. 1st NFDI4Energy Conference, DOI:

[10.48550/arXiv.2401.13365](https://doi.org/10.48550/arXiv.2401.13365), 2024.

Example: ORKG Comparison of Literature – Process Variants^[11]

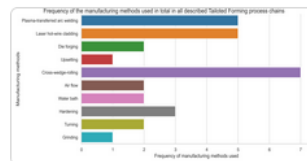
Tailored Forming Process Chain for the Manufacturing of Hybrid Components with Bearing Raceways Using Different Material Combinations ★

May 2022 Oliver Karras Laura Budde Paulina Merkel

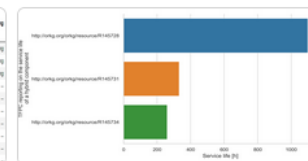
This comparison provides an overview of Tailored Forming process chains carried out in the CRC 1153 "Tailored Forming" for the manufacturing of hybrid components with bearing raceways using different material combinations. A variety of materials combinations is used for the Tailored Forming of such hybrid components. The comparison shows the combined materials, the entire Tailored Forming process chain with its individual steps, and the resulting hybrid component with its qualities. For each step, the comparison shows the measurement methods performed and their results for the individual qualities of the hybrid components. In this way, the comparison shows how different qualities of the hybrid components change during the process due to the manufacturing methods used.

DOI: <https://doi.org/10.48366/r187049>

Data analysis with Jupyter notebook



Step name	Depositor welding	Hot forming	Cooling	Heat treatment	Blowforming
Depositor welding	+	-	-	-	-
Hot forming	-	+	-	-	-
Cooling	-	-	+	-	-
Heat treatment	-	-	-	+	-
Blowforming	-	-	-	-	+



Properties	Investigation of the material combination 20MnCr5 and X45CrSi9-3 in the Tailored Forming of shafts with bearing seats	Investigation of the material combination 20MnCr5 and X45CrSi9-3 in the Tailored Forming of shafts with bearing seats	Investigation of the material combination 20MnCr5 and X45CrSi9-3 in the Tailored Forming of shafts with bearing seats	Investigation of the material combination 20MnCr5 and X45CrSi9-3 in the Tailored Forming of shafts with bearing seats	Cross-welded rolling material
	Air-cooled 2 Cladding Layer Component (x45CrSi9-3) - 2022	Air-cooled 3 Cladding Layer Component (x45CrSi9-3) - 2022	Water-cooled 2 Cladding Layer Component (x45CrSi9-3) - 2022	Water-cooled 3 Cladding Layer Component (x45CrSi9-3) - 2022	1 Cladding Layer (100Cr6)
has material/material					
belongs to material group*	Steel	Steel	Steel	Steel	
has type*	20MnCr5	20MnCr5			
	X45CrSi9-3	X45CrSi9-3			

<https://doi.org/10.48366/r187049>



Figure 7: Comparison of TFFCs for the Manufacturing of Hybrid Components [38].

Example: ORKG Comparison of Literature – Software Features^[12]

Comparison of Hyperparameter Optimization Tools ★

January 2023 Oliver Karras Difan Deng Marius Lindauer

This comparison looks at the capabilities of various optimization tools for hyperparameter optimization, focusing on the following: Complex hyperparameter space, multi-objective, multi-fidelity, instances, command-line interface, and parallel computing. In addition, this comparison provides further information about the respective optimization tool, such as the locations of the code repository, README, software documentation and issue tracker, license and programming language.

DOI: <https://doi.org/10.48366/r281265>

Properties	Tool	BoTorch: A Framework for Efficient Monte-Carlo Bayesian Optimization <i>BoTorch</i> - 2020	OpenBox: A Generalized Black-box Optimization Service <i>OpenBox</i> - 2021	BOHB: Robust and Efficient Hyperparameter Optimization at Scale <i>HpBandSter</i> - 2018	SMAC3: A Versatile Bayesian Optimization Package for Hyperparameter Optimization <i>SMAC3</i> - 2021
result/software					
name*		BoTorch	OpenBox	HpBandSter	SMAC3
software features*		Multi-Fidelity	Complex Hyperparameter Space	Complex Hyperparameter Space	command-line interface
	Space	Multi-Objective	Multi-Objective	Multi-Fidelity	Complex Hyperparameter Space
	g	parallel computing	parallel computing	parallel computing	Instances
					Multi-Fidelity
					Multi-Objective
					parallel computing
complex hyperparameter space*		×	✓	✓	✓
multi-objective*		✓	✓	×	✓
multi-fidelity*		✓	×		
instance*		×	×		

<https://doi.org/10.48366/r281265>

Command-Line Interface

SMAC can not only be executed within a python file but also from the commandline. Consequently, not only algorithms in python can be optimized, but implementations in other languages as well.

Note

Command-line interface has been temporarily disabled in v2.0. Please fall back to v1.4 if you need it.

Comparison

The following table provides an overview of SMAC's capabilities in comparison with other optimization tools.

Package	Complex Hyperparameter Space	Multi-Objective	Multi-Fidelity	Instances	Comm
HyperMapper	✓	✓	×	×	×
Optuna	✓	✓	✓	×	✓
Hyperopt	✓	×	×	×	✓
BoTorch	×	✓	✓	×	×
OpenBox	✓	✓	×	×	×
HpBandSter	✓	×	✓	×	×
SMAC	✓	✓	✓	✓	✓

Goal: ORKG Comparison on Reported Empirical Research

Comparison | 4 contributions

Overview of Reported Empirical Research in Requirements Engineering Publications from 2021

May 2024 | Oliver Kamas

This comparison shows an overview of reported empirical research in publications of the IEEE International Requirements Engineering Conference from the year 2021

Properties	On the impact of using different templates on creating and understanding user stories Contribution 1 - 2021	Ambiguity and Generality in Natural Language Privacy Policies Contribution 1 - 2021	Environment-Driven Abstraction Identification for Requirements-Based Testing Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question/research question				
↳ question*	Do different user story templates have an impact on the creation of user stories?	To what extent does the classification model reduce the manual ontology construction effort?	No question.	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
	Do different user story templates have an impact on the understanding of user stories?	What is the effect of missing transitive hypernymy on classification performance?		What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
				What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
↳ highlighted in text*	✓	✓	✗	✓
	✓	✓		✓
				✓
↳ hidden in text*	✗	✗	✗	✗
	✗	✗		✗
				✗
				✗
data collection method/data collection method				
↳ method*	experiment	experiment	experiment	experiment
↳ number of participants*	41	0	0	30
data analysis method/data analysis method/method*	descriptive statistics	descriptive statistics	comparative analysis	descriptive statistics
	inferential statistics	machine learning	descriptive statistics	inferential statistics
			machine learning	thematic analysis
threats to validity/threats to validity				
↳ conclusion validity*	✓	✗	✗	✗
↳ construct validity*	✓	✓	✓	✓
↳ external validity*	✓			
↳ internal validity*	✓			

<https://sandbox.orkg.org/comparison/R369109>

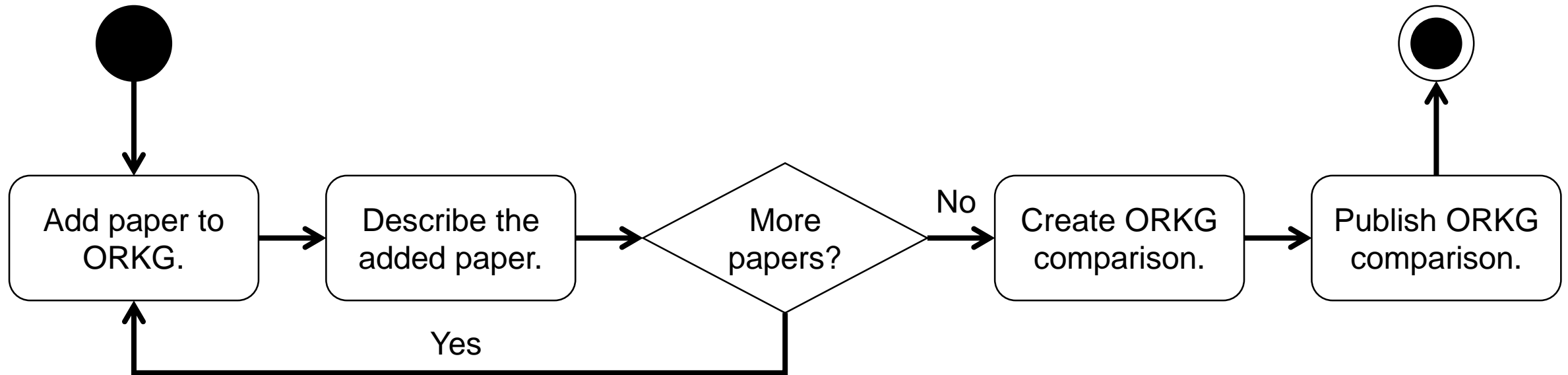
Topic: Reported Empirical Research

- Empirical Research
 - *Research question*
 - Question
 - Hidden in text
 - Highlighted in text
 - *Data Collection Method*
 - Method
 - Number of participants
 - *Data Analysis Method*
 - Method
 - *Threats to Validity*
 - Construct Validity
 - Internal Validity
 - External Validity
 - Conclusion Validity

The screenshot displays the ORKG (Open Research Knowledge Graph) interface. At the top, there is a navigation bar with the ORKG logo, links for 'View', 'Tools', and 'About', and a dropdown menu for 'NFDI4DataScience'. A search bar and a '+ Add new' button are also present. Below the navigation bar, the main content area shows a paper titled 'Environment-Driven Abstraction Identification for Requirements-Based Testing'. The paper is dated September 2021, has 5 citations, and is categorized under 'Software Engineering'. The authors listed are Zedong Peng, Prachi Rathod, Nan Niu, Tanmay Bhowmik, Hui Liu, Lin Shi, and Zhi Jin. The paper was published in the '2021 IEEE 29th International Requirements Engineering Conference (RE)' and has a DOI of <https://doi.org/10.1109/re51729.2021.00029>. The paper is marked as 'Contribution 1'. On the right side, there is a sidebar with a 'Provenance' tab and a 'Timeline' tab. The 'Provenance' tab shows the paper was added on 08 May 2024 by Oliver Karras. Below this, it lists the contributors as Oliver Karras. There is a button 'Assign to observatory' at the bottom of the sidebar. The main content area also features a 'Preferences' button and a table of applied templates. The table has two columns: the first column lists the templates (data analysis method, data collection method, research question, threats to validity) and the second column lists the corresponding values (comparative analysis, machine learning, descriptive statistics, experiment, No question, Construct validity: true, Internal validity: true, External validity: true Conclusion validity: false).

Applied templates	Value
data analysis method	comparative analysis machine learning descriptive statistics
data collection method	experiment
research question	No question.
threats to validity	Construct validity: true, Internal validity: true, External validity: true Conclusion validity: false

Overall Process for Creating an ORKG Comparison

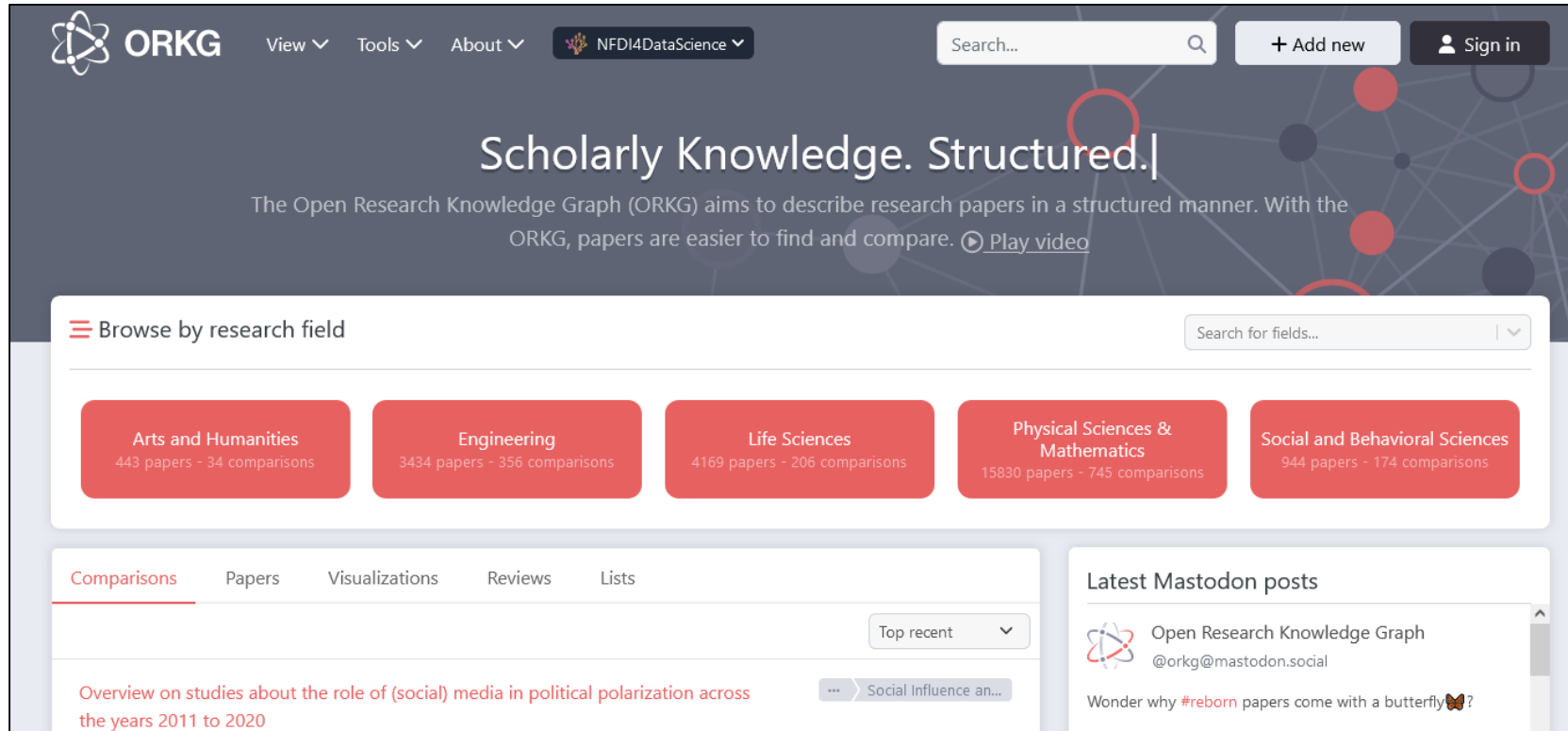


Remark:

Instead of going through the loop, we will work **collaboratively** in the tutorial as conceived by ORKG. We will take all papers from all participants and compare them with each other in an ORKG comparison.

An ORKG comparison requires **at least two** publications.

1. Open ORKG Website



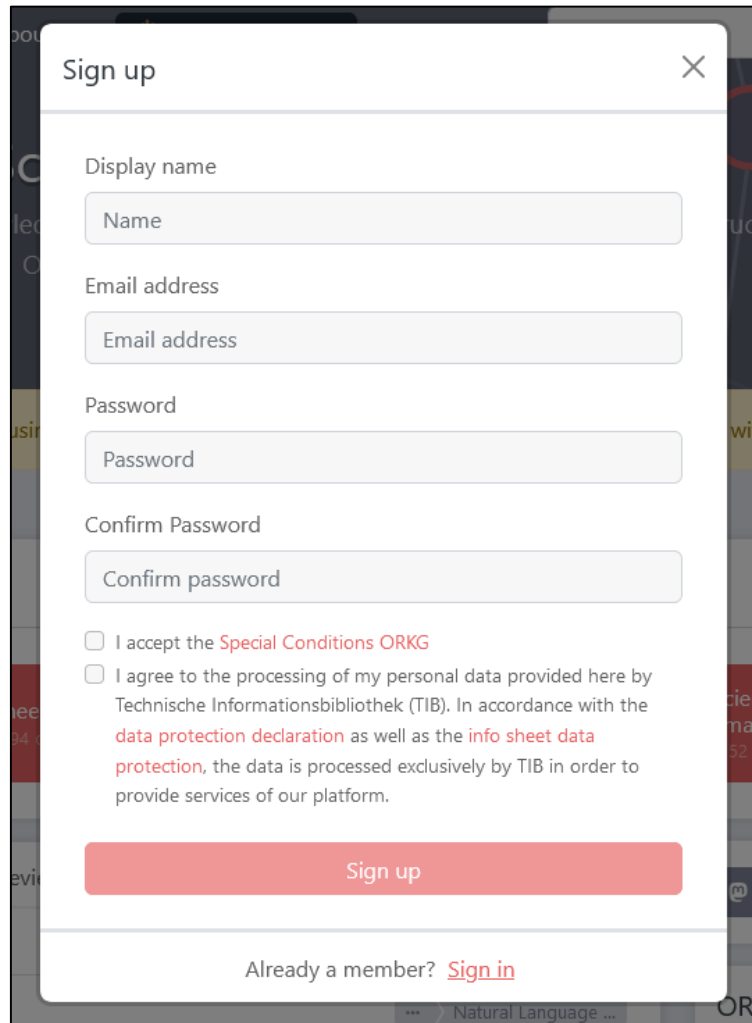
Remark:

For the tutorial, we use the **ORKG test environment** (<https://sandbox.orkg.org/>) to try everything without hesitation. You can find the official ORKG at <https://orkg.org/>.

Get your exemplary paper: <https://bit.ly/3UGFwhj>

Use <https://sandbox.orkg.org/>!
NOT <https://orkg.org/>!

2. Sign Up & Sign In



A screenshot of a 'Sign up' form. The form has a title bar with 'Sign up' and a close button. It contains four input fields: 'Display name' (with a placeholder 'Name'), 'Email address', 'Password', and 'Confirm Password' (with a placeholder 'Confirm password'). Below the fields are two checkboxes with text: 'I accept the Special Conditions ORKG' and 'I agree to the processing of my personal data provided here by Technische Informationsbibliothek (TIB). In accordance with the data protection declaration as well as the info sheet data protection, the data is processed exclusively by TIB in order to provide services of our platform.' At the bottom is a red 'Sign up' button and a link 'Already a member? Sign in'.

Sign up

Display name

Name

Email address

Email address

Password

Password

Confirm Password

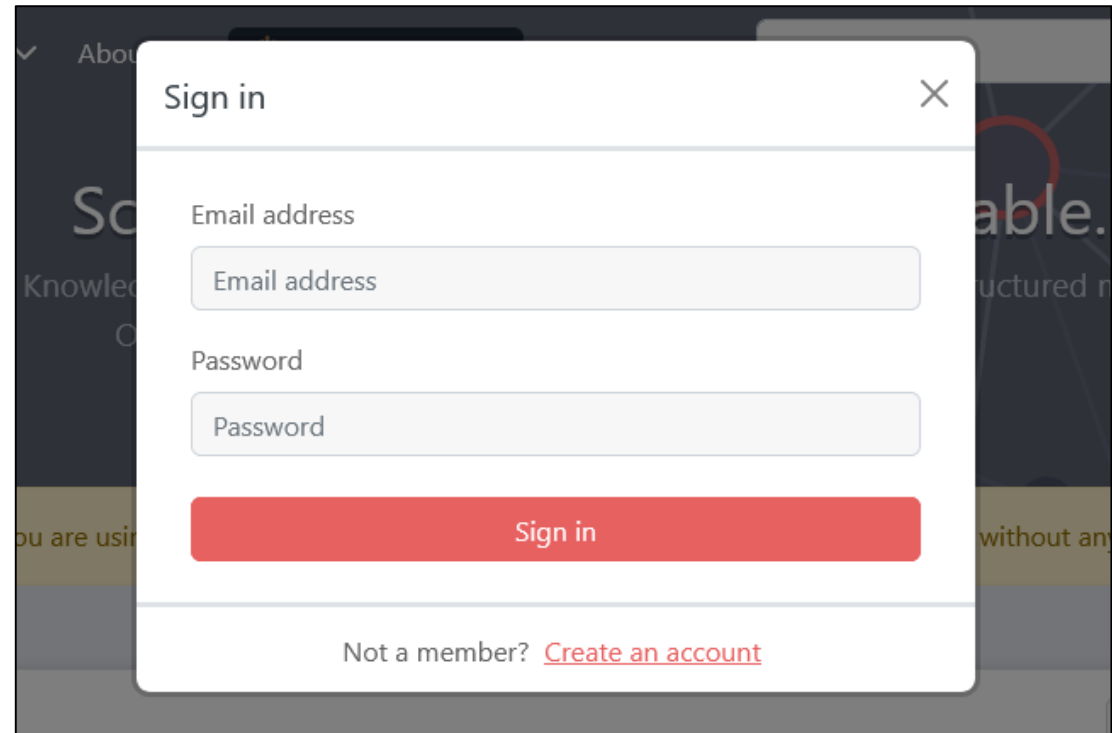
Confirm password

☐ I accept the [Special Conditions ORKG](#)

☐ I agree to the processing of my personal data provided here by Technische Informationsbibliothek (TIB). In accordance with the [data protection declaration](#) as well as the [info sheet data protection](#), the data is processed exclusively by TIB in order to provide services of our platform.

Sign up

Already a member? [Sign in](#)



A screenshot of a 'Sign in' form. The form has a title bar with 'Sign in' and a close button. It contains two input fields: 'Email address' and 'Password'. Below the fields is a red 'Sign in' button. At the bottom is a link 'Not a member? Create an account'.

Sign in

Email address

Email address

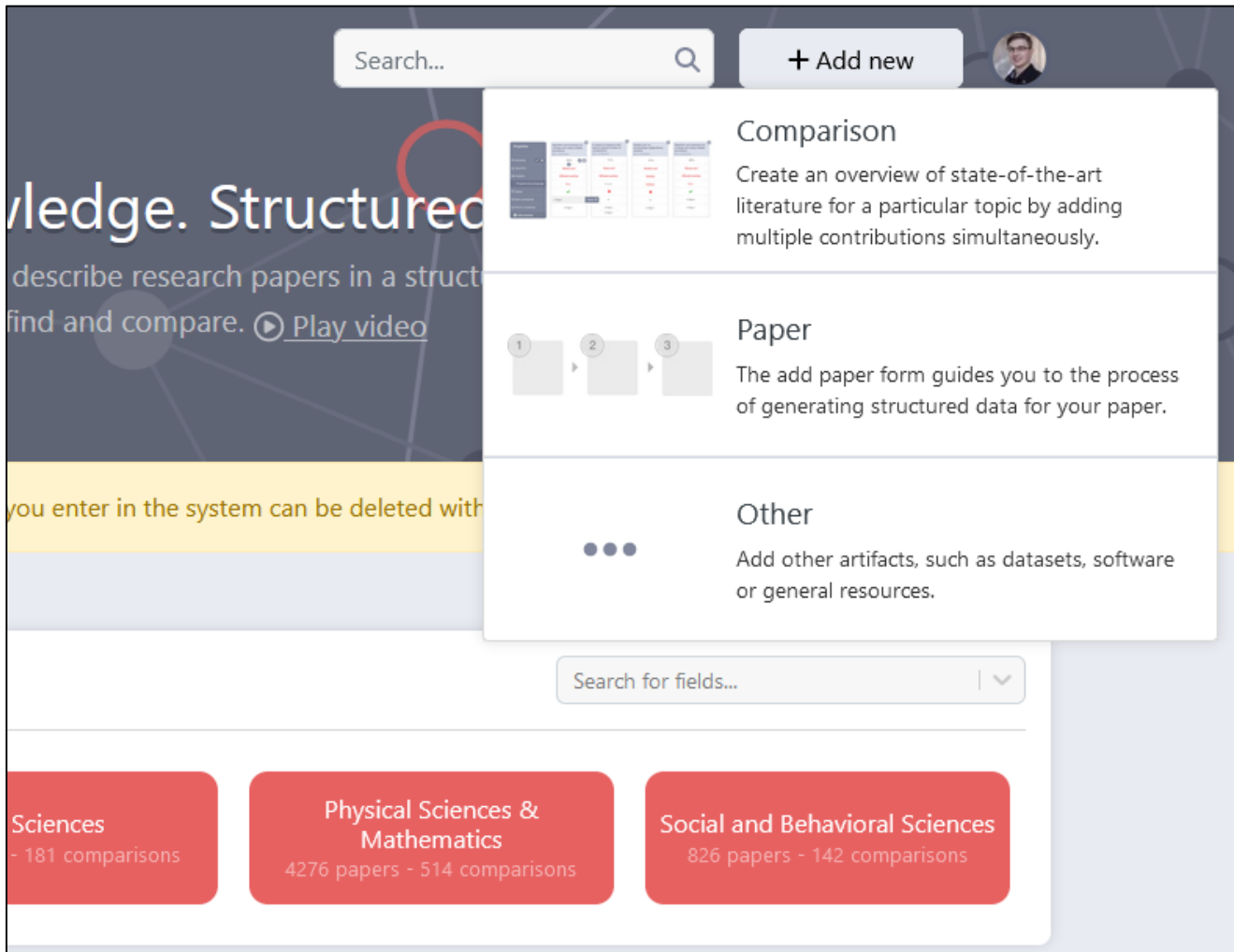
Password

Password

Sign in

Not a member? [Create an account](#)

3. Add a New Comparison to the ORKG





1. Click on “+Add new”
2. Select “Comparison”

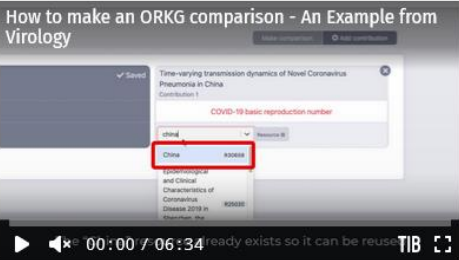
Remark:

We could also start by adding individual papers, but since we want to create a comparison at the end, it is easy to start immediately.

4. Go to the Contribution Editor

 View Tools About NFDI4DataScience Search... + Add new 


Add comparison



How to make an ORKG comparison - An Example from Virology

Comparisons in ORKG provide an overview of state-of-the-art literature for a particular topic. Comparisons are dynamic and FAIR. A comparison is created from contributions, [view example of comparison](#). To create your own comparisons in ORKG, you can either import existing data (via CSV import) or start from scratch by adding your own contributions. This page guides you in creating new comparisons.


1. Existing data



In case you have existing data, you can import this via the CSV import tool. This is especially helpful if you already have a large file in which related work is compared.

[Go to CSV import tool](#)


2. Contribution editor



If you don't have existing data, go to the contribution editor to add contributions that will be used in the comparison. After creating contributions, you can create a comparisons.

[Go to contribution editor](#)

3. Publish comparison



Once you are done editing contributions, you can create and publish a comparison. Published comparisons are persistent so they are perfectly suitable for publications.

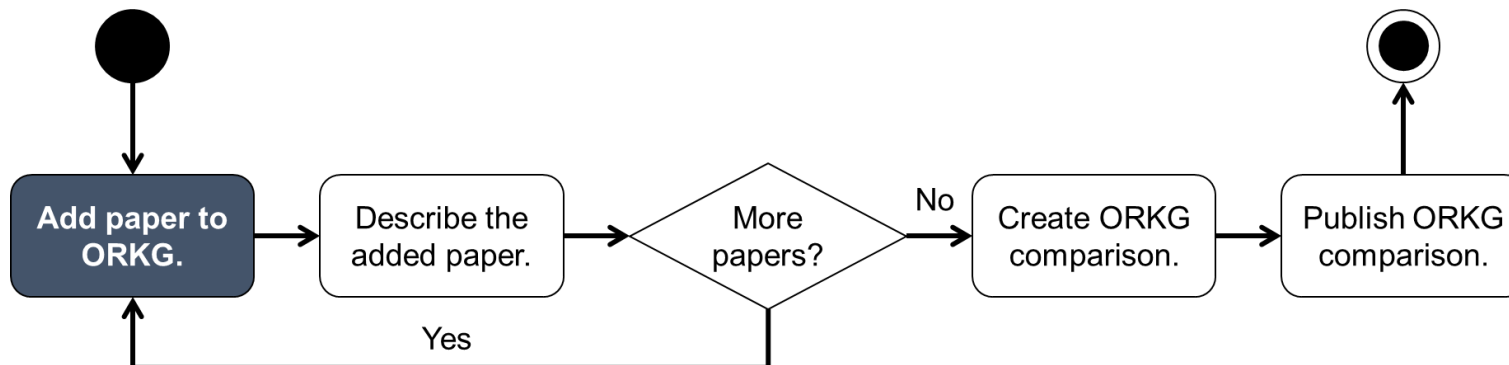
1. Click on “Go to contribution editor”

Remark:

When the data is already extracted, e.g., in a spreadsheet, we could use CSV import tool. However, the tool is a prototype and still requires a lot of manual work to map the data.

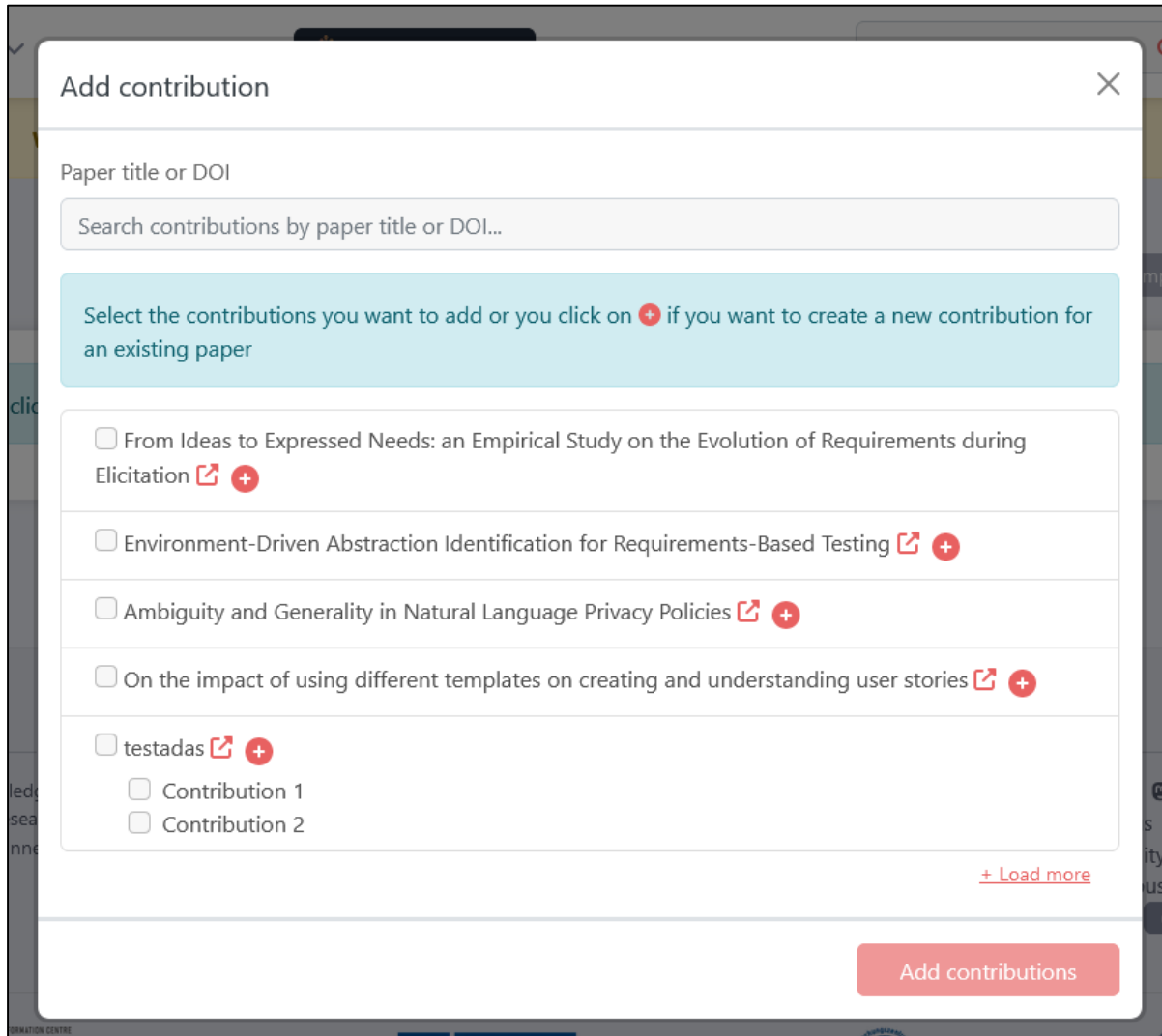
5. Add a Paper

The screenshot shows the ORKG (Open Research Knowledge Graph) Contribution editor interface. At the top, there is a navigation bar with the ORKG logo, links for View, Tools, and About, a dropdown menu for NFDI4DataScience, a search bar, and a red button labeled '+ Add new'. Below the navigation bar is a yellow warning banner that reads: 'Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice.' The main area is titled 'Contribution editor' and contains a light blue instruction box: 'Start adding contributions by clicking the button *Add contribution* on the right'. On the right side of the main area, there are two buttons: 'View comparison' and '+ Add contribution'.



1. Click on “Add contribution”

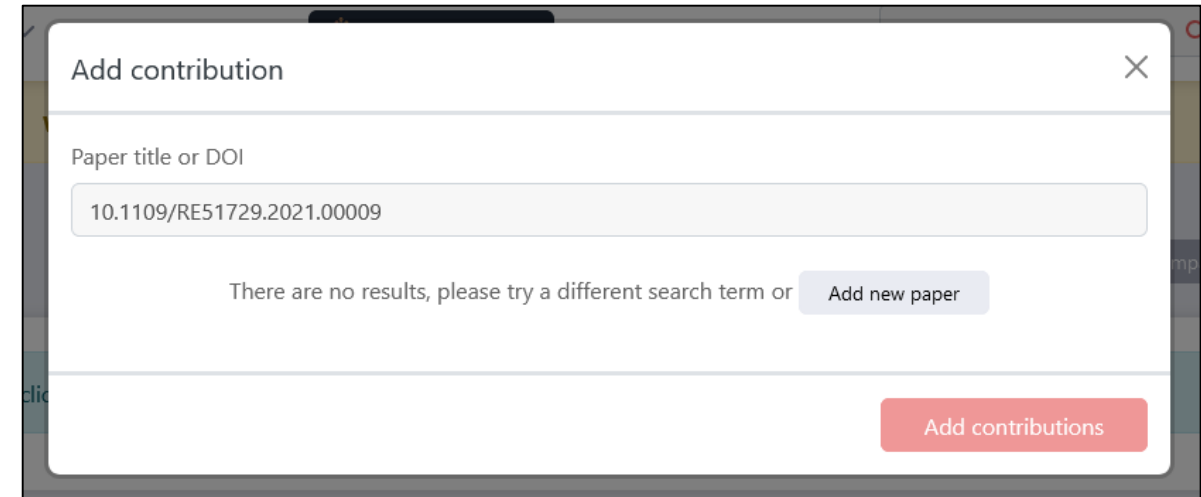
5. Add a Paper: Enter DOI (or Paper Title)



The 'Add contribution' dialog box features a search bar with the placeholder text 'Search contributions by paper title or DOI...'. Below the search bar is a light blue instruction box: 'Select the contributions you want to add or you click on + if you want to create a new contribution for an existing paper'. A list of search results follows, each with a checkbox, a document icon, and a red '+' icon. The results are:

- ☐ From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation
- ☐ Environment-Driven Abstraction Identification for Requirements-Based Testing
- ☐ Ambiguity and Generality in Natural Language Privacy Policies
- ☐ On the impact of using different templates on creating and understanding user stories
- ☐ testadas
 - ☐ Contribution 1
 - ☐ Contribution 2

A '+ Load more' link is located at the bottom right of the list. An 'Add contributions' button is at the bottom right of the dialog.



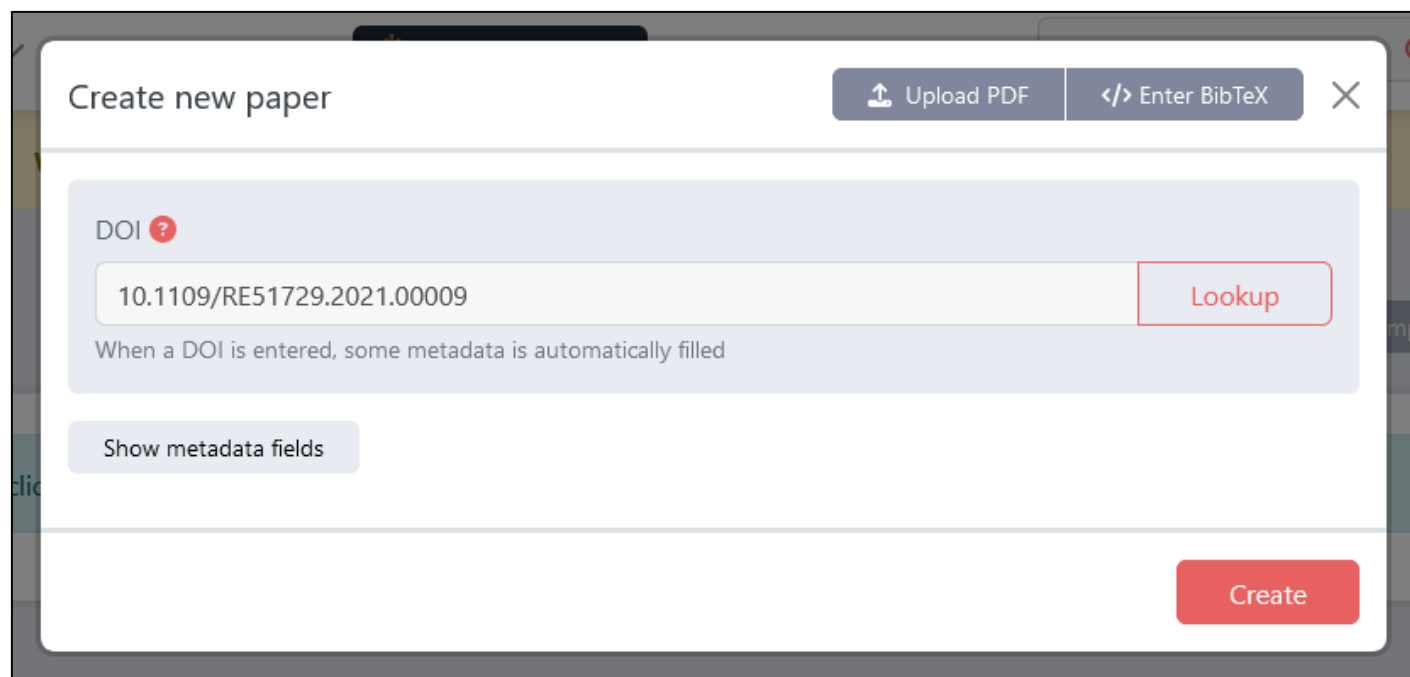
The 'Add contribution' dialog box shows the search bar containing the DOI '10.1109/RE51729.2021.00009'. Below the search bar, the text 'There are no results, please try a different search term or' is displayed, followed by an 'Add new paper' button. An 'Add contributions' button is located at the bottom right of the dialog.

1. Click on “Add new paper”

Remark:

If the paper is already in the ORKG, it is shown and we can either reuse an existing contribution or create a new one.

5. Add a Paper: Lookup Paper by DOI

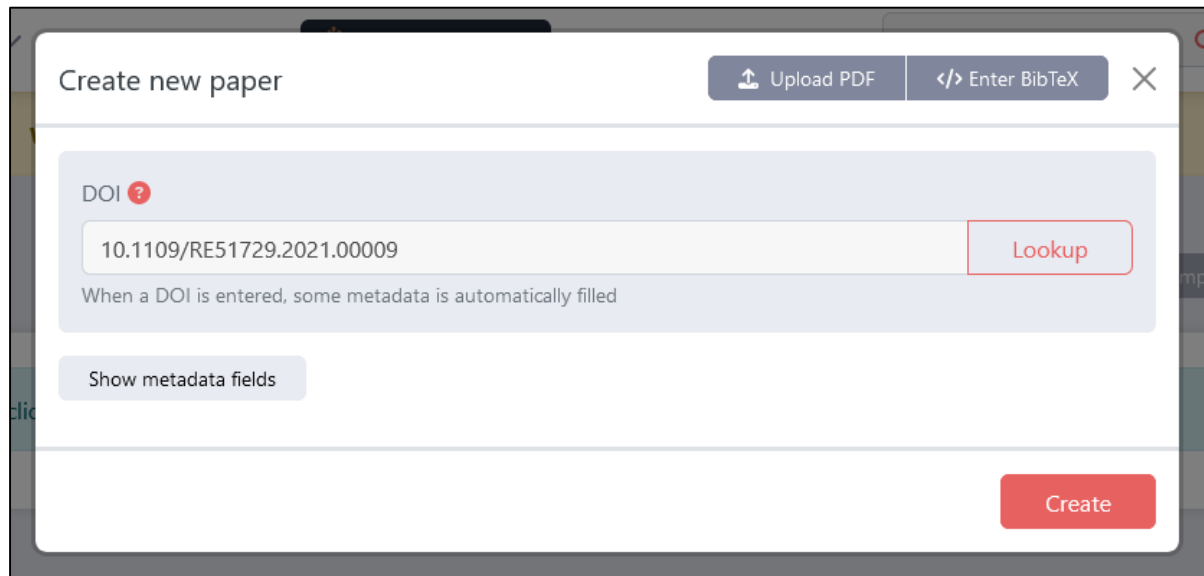


The screenshot shows a web interface for creating a new paper. At the top, there's a header bar with the title 'Create new paper' and two buttons: 'Upload PDF' and 'Enter BibTeX'. Below this, there's a section for entering a DOI. It includes a label 'DOI' with a red question mark icon, a text input field containing '10.1109/RE51729.2021.00009', and a red 'Lookup' button. Below the input field, a note states: 'When a DOI is entered, some metadata is automatically filled'. Underneath this note is a button labeled 'Show metadata fields'. At the bottom right of the dialog, there is a red 'Create' button.

Remark:

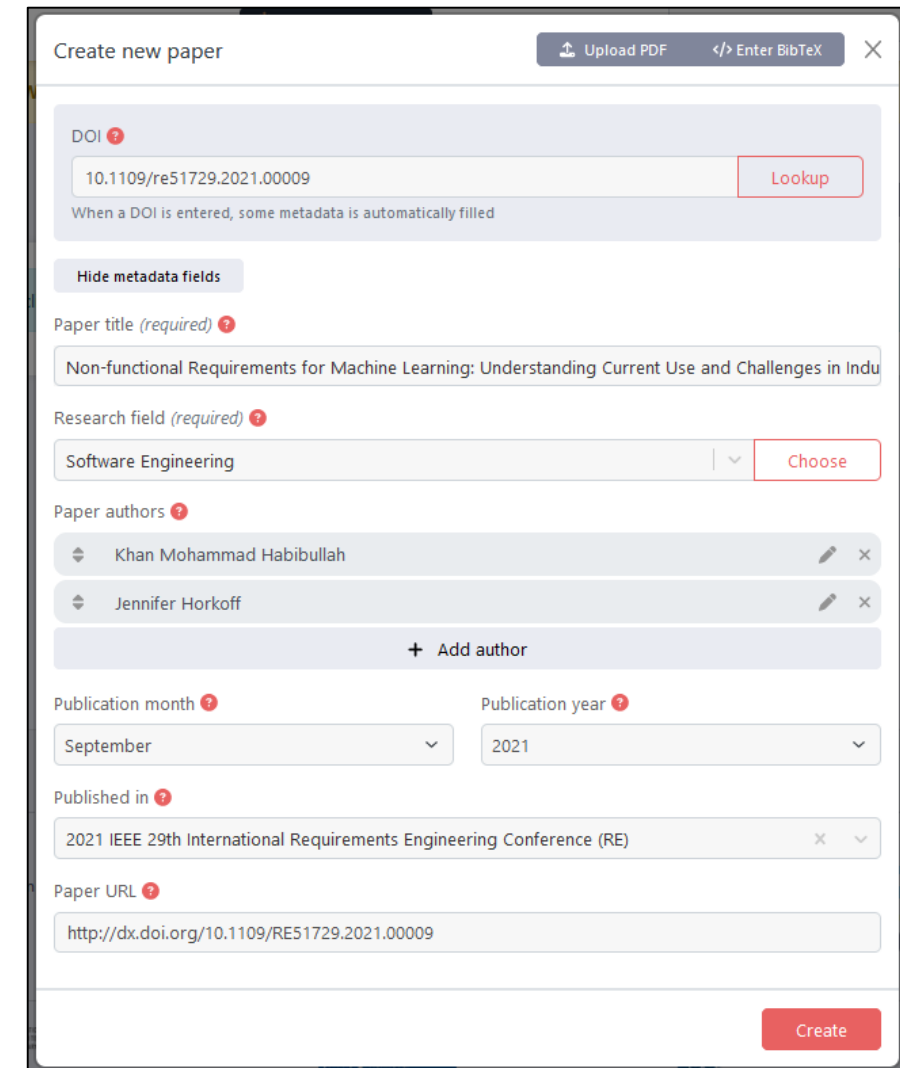
ORKG attempts to retrieve the metadata automatically. If the retrieval is not successful, you can also manually enter or correct the metadata.

5. Add a Paper: Lookup Paper by DOI



The screenshot shows a 'Create new paper' dialog box. At the top, there are two buttons: 'Upload PDF' and 'Enter BibTeX'. Below these, there is a section for 'DOI' with a red question mark icon. A text input field contains the DOI '10.1109/RE51729.2021.00009'. To the right of the input field is a red 'Lookup' button. Below the input field, a small text note says 'When a DOI is entered, some metadata is automatically filled'. At the bottom left, there is a 'Show metadata fields' button. At the bottom right, there is a red 'Create' button.

1. Click on “Lookup”
2. Check metadata fetched
3. Add a “Research field”. We use “Software Engineering”.
4. Click on “Create”



The screenshot shows the 'Create new paper' dialog box after the DOI lookup. The 'DOI' field is filled with '10.1109/re51729.2021.00009' and a red 'Lookup' button is visible. Below the DOI field, a small text note says 'When a DOI is entered, some metadata is automatically filled'. There is a 'Hide metadata fields' button. The 'Paper title (required)' field is filled with 'Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Indu'. The 'Research field (required)' dropdown menu is set to 'Software Engineering' with a red 'Choose' button. The 'Paper authors' section lists 'Khan Mohammad Habibullah' and 'Jennifer Horkoff' with an 'Add author' button. The 'Publication month' dropdown is set to 'September' and the 'Publication year' dropdown is set to '2021'. The 'Published in' dropdown is set to '2021 IEEE 29th International Requirements Engineering Conference (RE)'. The 'Paper URL' field is filled with 'http://dx.doi.org/10.1109/RE51729.2021.00009'. A red 'Create' button is at the bottom right.

6. Describe a Paper

Contribution editor

View comparison

+ Add contribution

Properties

✓ Saved

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

Start adding properties or use templates by using the buttons below

+ Add property

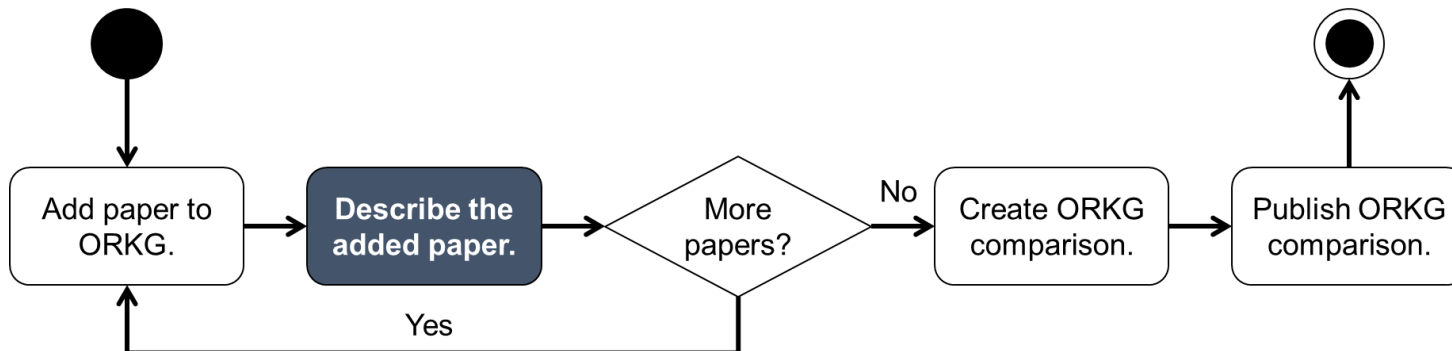
💡

+ Templates

Suggested properties

+ research problem

Problem



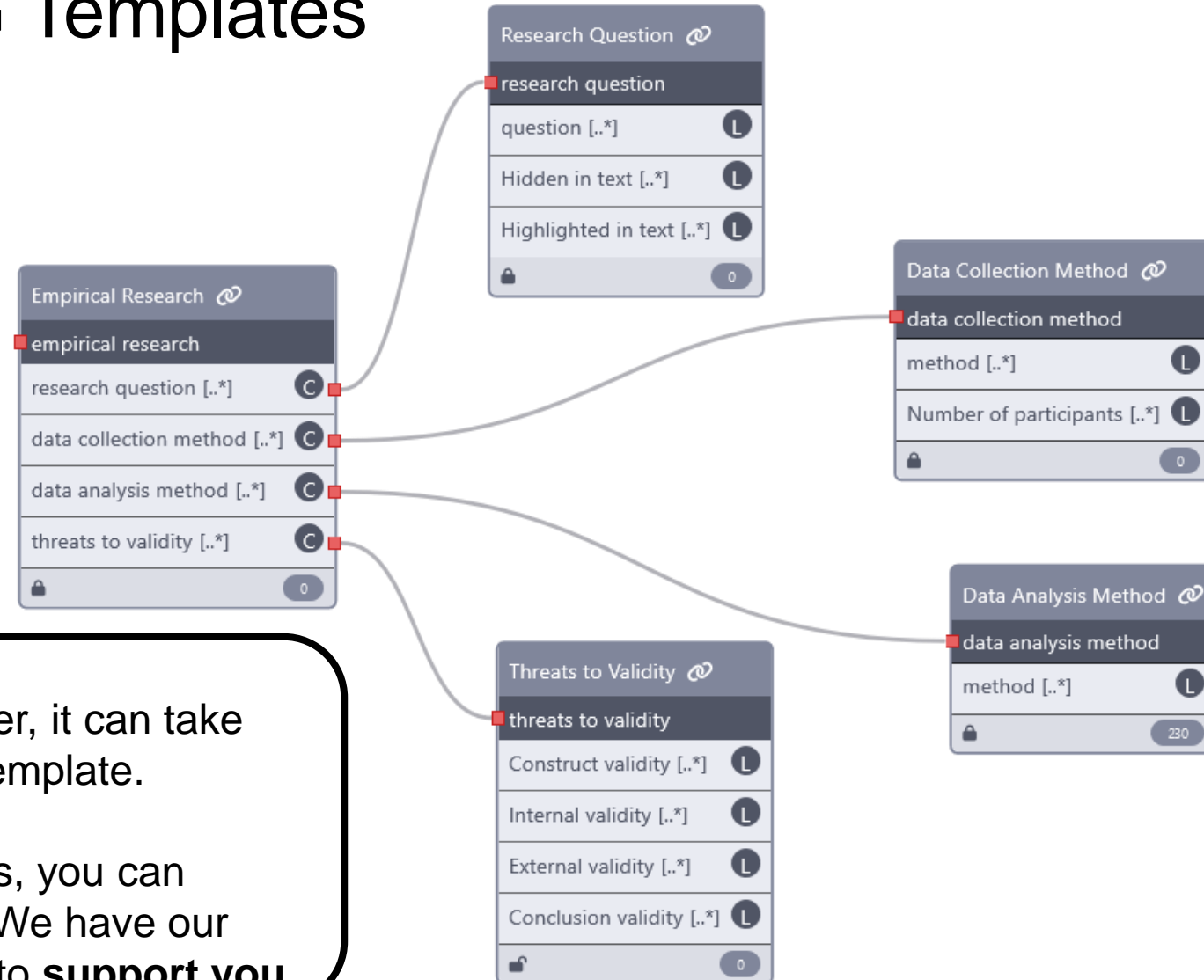
Remark:

Instead of adding all properties individually, we use an ORKG template.

6. Describe a Paper: ORKG Templates

An **ORKG template** specifies the **structure** and **terminology** used to describe a **publication** in the ORKG. Its use **ensures FAIR data** that is **consistent** and **comparable** across publications.

<https://sandbox.orkg.org/template/R369028>



Remark:

Every user can create ORKG templates. However, it can take some time and practice to build a good ORKG template.

If you want to use the feature and have problems, you can always contact the ORKG team, especially me. We have our own **Curation and Community Building team** to **support you**.

6. Describe a Paper: Add Template “Empirical Research”

Contribution editor

View comparisonAdd contribution

Properties

✓ Saved

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

Start adding properties or use templates by using the buttons below

+ Add property

+ Templates

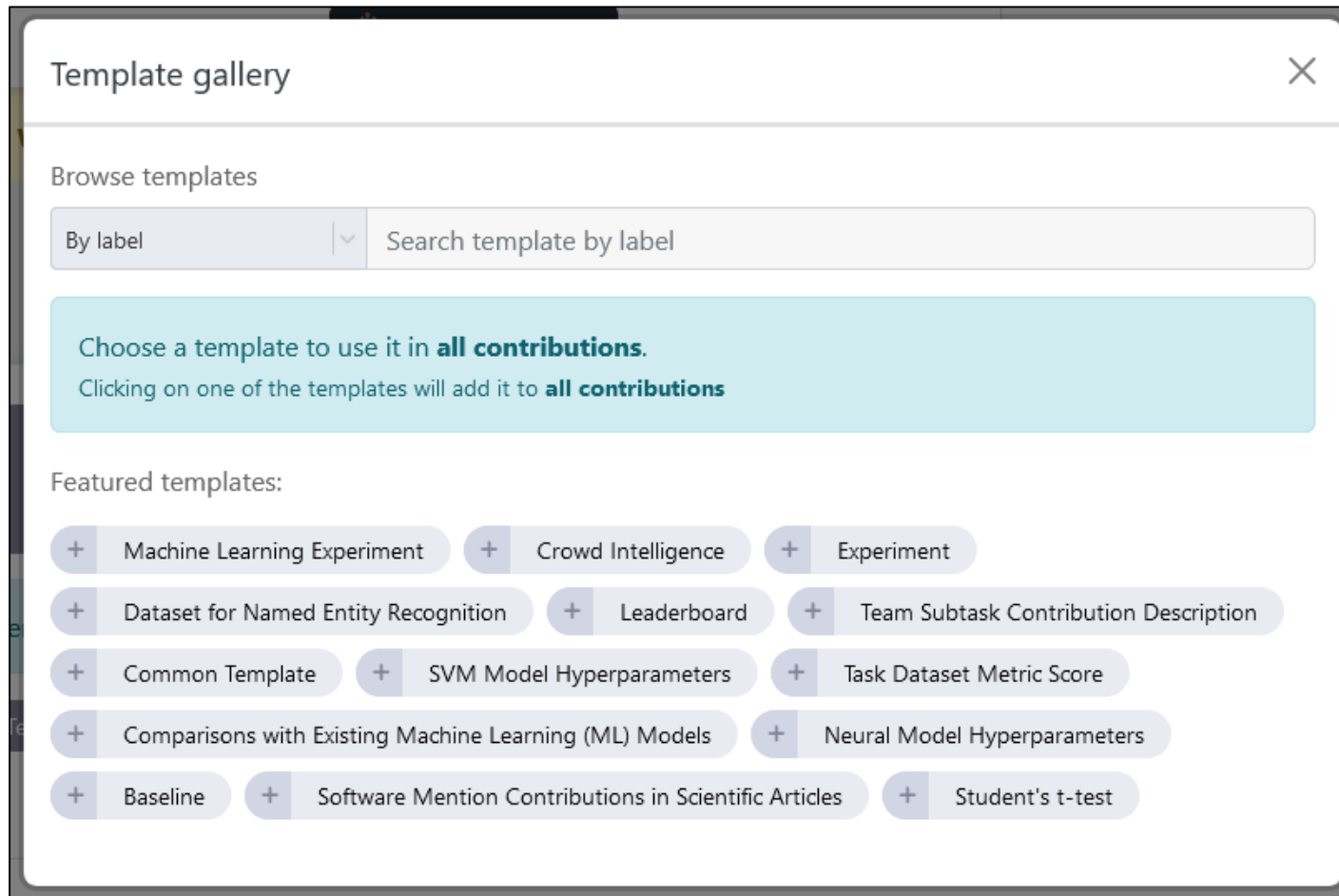
Suggested properties

+ research problem

Problem

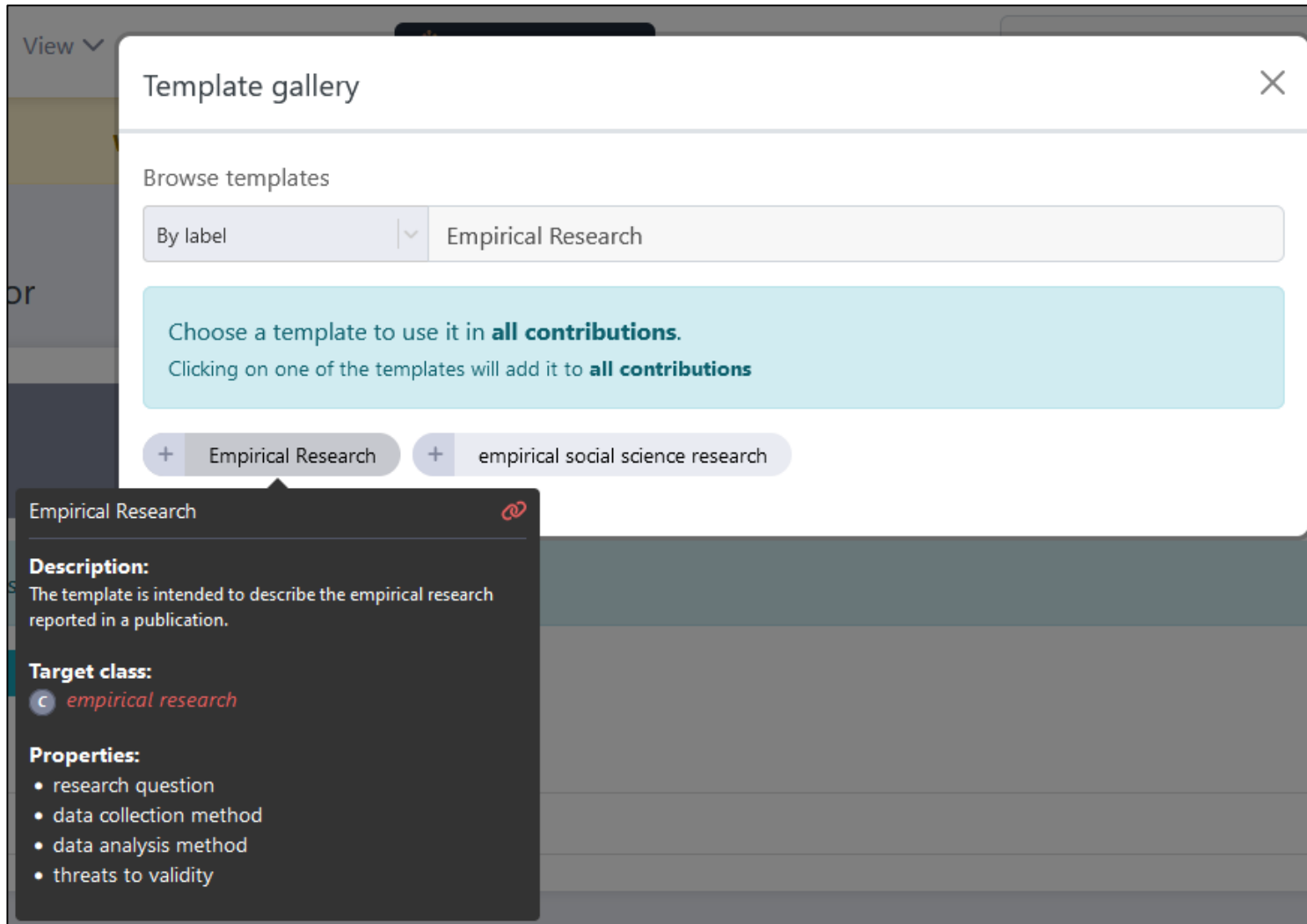
1. Click on “Templates”

6. Describe a Paper: Add Template “Empirical Research”



1. Search for “Empirical Research”

6. Describe a Paper: Add Template “Empirical Research”



1. Select “Empirical Research”

6. Describe a Paper: Fill out the Table

Contribution editor

View comparison

+ Add contribution

Properties

✓ Saved

data analysis method

data collection method

research question

threats to validity

+ Add property

Templates

Suggested properties

+ research problem

Problem

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

Add value

+

1. Click “Add value” for adding the data analysis method

6. Describe a Paper: Enter the Data Analysis Method(s)

The screenshot shows the ORKG Contribution editor interface. A modal window titled "View existing resource: Data Analysis Method" is open, displaying the "Applied template: Data Analysis Method". Below the template name, there is a text input field containing the word "method" and a plus icon to its right. The background interface includes a "Properties" sidebar with links like "data analysis method", "data collection method", "research question", and "threats to validity". At the bottom, there is a "Suggested properties" section with a "+ research problem" button.

1. Click the +
2. Enter method

6. Describe a Paper: Enter the Data Analysis Method(s)

The screenshot shows the ORKG Contribution editor interface. A modal dialog titled "View existing resource: Data Analysis Method" is open. The dialog has a header bar with "Open resource" and a close button. Below the header, there are tabs for "Templates", "Help", and "Preferences". The main content area shows "Applied template: Data Analysis Method". Below this, there is a text input field labeled "method" containing the text "thematic analysis". To the right of the input field are buttons for "Text" (a dropdown), a lightbulb icon, "Cancel", and "Create". At the bottom of the dialog is a button labeled "+ Add property". The background shows the "Contribution editor" with a "Properties" panel on the left containing links like "data analysis method", "data collection method", "research question", and "threats to validity". There is also a "Suggested properties" section at the bottom with a "+ research problem" button.

1. Click “Create”
2. Close dialog

6. Describe a Paper: Enter the Data Analysis Method(s)

The screenshot shows the ORKG (Open Research Knowledge Graph) Contribution editor. At the top, there's a navigation bar with the ORKG logo, links for View, Tools, and About, a user profile icon, and a search bar. A yellow warning banner states: "Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice." Below this, the "Contribution editor" section has buttons for "View comparison" and "Add contribution". The main area is divided into two panels. The left panel, titled "Properties", shows a list of properties: "data analysis method", "data collection method", "research question", and "threats to validity". The "data analysis method" property is selected and its value, "thematic analysis", is displayed in the right panel. Below the properties list are buttons for "Add property", a lightbulb icon, and "Templates". At the bottom, the "Suggested properties" section shows a "+ research problem" button with a "Problem" tag.

ORKG View Tools About NFDI4DataScience Search... + Add new

Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice.

Contribution editor View comparison + Add contribution

Properties ✓ Saved

data analysis method

data collection method

research question

threats to validity

+ Add property Templates

Suggested properties

+ research problem Problem

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

thematic analysis

If you have more analysis methods, **repeat** the process.

Otherwise, continue with the next property.

6. Describe a Paper: Enter the Data Collection Method(s)

The screenshot shows the ORKG Contribution editor interface. A modal dialog titled "View existing resource: Data Collection Method" is open. The dialog has a header bar with "Open resource" and a close button. Below the header, there are tabs for "Templates", "Help", and "Preferences". The main content area shows the "Applied template: Data Collection Method". Under this, there are two input fields: "method" and "Number of participants", each with a plus icon to its right. At the bottom of the dialog is a "+ Add property" button. The background shows the "Contribution editor" with a "Properties" panel on the left containing links like "data analysis method", "data collection method", "research question", and "threats to validity". There are also buttons for "+ Add property" and "Templates" at the bottom of the editor.

1. Click the +
2. Enter method
3. Click the +
4. Enter number of participants

6. Describe a Paper: Enter the Data Collection Method(s)

The screenshot shows the ORKG Contribution editor interface. A modal dialog box titled "View existing resource: Data Collection Method" is open. The dialog has a header bar with "Open resource" and a close button. Below the header, there are tabs for "Templates", "Help", and "Preferences". The main content area shows the "Applied template: Data Collection Method". There are two input fields: "method" with a dropdown set to "Text" and a value of "interview", and "Number of participants" with a dropdown set to "Integer" and a value of "10". Each input field has a lightbulb icon, a "Cancel" button, and a "Create" button. At the bottom of the dialog is a "+ Add property" button. The background shows the "Contribution editor" with a "Properties" panel on the left containing links for "data analysis method", "data collection method", "research question", and "threats to validity". At the bottom of the background, there is a "Suggested properties" section with a "+ research problem" button and a "Problem" button.

1. Click “Create”
2. Click “Create”
3. Close dialog

6. Describe a Paper: Enter the Data Collection Method(s)

The screenshot shows the ORKG (Open Research Knowledge Graph) Contribution editor. At the top, there's a navigation bar with the ORKG logo, links for View, Tools, and About, a user profile icon, and a search bar. A yellow warning banner states: "Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice." The main area is titled "Contribution editor" and contains a table with properties. The "data collection method" property is selected, showing a list of values: "thematic analysis" and "interview". Below the table, there are buttons for "Add property", "Templates", and "Suggested properties".

ORKG View Tools About NFDI4DataScience Search... + Add new

Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice.

Contribution editor View comparison + Add contribution

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry
data analysis method	thematic analysis
data collection method	interview
research question	
threats to validity	

+ Add property Templates

Suggested properties

+ research problem Problem

If you have more collection methods, **repeat** the process.

Otherwise, continue with the next property.

6. Describe a Paper: Enter the Research Question(s)

The screenshot shows the ORKG Contribution editor interface. A modal dialog titled "View existing resource: Research Question" is open. The dialog has a header with "Open resource" and a close button. Below the header are tabs for "Templates", "Help", and "Preferences". The main content area shows the "Applied template: Research Question" and a list of properties with their values and a "+" button to add more:

Property	Value	Action
question		+
Hidden in text		+
Highlighted in text		+

At the bottom of the dialog is a "+ Add property" button. The background shows the "Contribution editor" with a "Properties" sidebar containing links for "data analysis method", "data collection method", "research question", and "threats to validity". At the bottom of the editor are buttons for "+ Add property", "Templates", and "Suggested properties" with a search bar containing "+ research problem".

1. Click the +
2. Enter question
3. Click the +
4. Enter, if the question is hidden in text
5. Click the +
6. Enter, if the question is highlighted in text

6. Describe a Paper: Enter the Research Question(s)




The screenshot shows the ORKG Contribution editor interface. A modal dialog titled "View existing resource: Research Question" is open. The dialog has a header with "Open resource" and a close button. Below the header are tabs for "Templates", "Help", and "Preferences". The main content area shows the "Applied template: Research Question". There are three input fields with "Cancel" and "Create" buttons:

- question**: Text input with the value "nt treatment of NFRs in ML in industry?".
- Hidden in text**: Boolean input with the value "False".
- Highlighted in text**: Boolean input with the value "True".

At the bottom of the dialog is a "+ Add property" button. The background shows the "Contribution editor" with a "Properties" sidebar containing links like "data analysis method", "data collection method", "research question", and "threats to validity". A "Suggested properties" section at the bottom shows a "+ research problem" button.

1. Click “Create”
2. Click “Create”
3. Click “Create”
4. Close dialog

6. Describe a Paper: Enter the Research Question(s)

 View ▾ Tools ▾ About ▾ NFDI4DataScience ▾ Search...  + Add new 

Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice.

Contribution editor


Properties ✓ Saved


[data analysis method](#)

[data collection method](#)

[research question](#)

[threats to validity](#)

+ Add property 

 Templates

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry ✕

Contribution 1

[thematic analysis](#)

[interview](#)

[What is the perception and current treatment of NFRs in ML in industry?](#)

Suggested properties

+ research problem

Problem

If you have more research questions, **repeat** the process.

Otherwise, continue with the next property.

6. Describe a Paper: Enter the Threats to Validity

The screenshot shows the ORKG Contribution editor interface. A modal window titled 'View existing resource: Threats to Validity' is open, displaying a template for describing threats to validity. The template includes a list of properties: Construct validity, Internal validity, External validity, and Conclusion validity, each with a '+' button to add a value. The background shows the 'Contribution editor' with a 'Properties' panel on the left containing links like 'data analysis method', 'data collection method', 'research question', and 'threats to validity'. The bottom of the editor shows 'Suggested properties' with a '+ research problem' button.

View existing resource: Threats to Validity [Open resource](#) ✕

Templates Help Preferences

Applied template: Threats to Validity

Construct validity	+
Internal validity	+
External validity	+
Conclusion validity	+

+ Add property

+ Add property

Suggested properties

+ research problem



1. Click the +
2. Enter construct validity
3. Click the +
4. Enter internal validity
5. Click the +
6. Enter external validity
7. Click the +
8. Enter conclusion validity

6. Describe a Paper: Enter the Threats to Validity

The screenshot shows the ORKG Contribution editor interface. A modal dialog titled "View existing resource: Threats to Validity" is open. The dialog has a header with "Open resource" and a close button. Below the header are tabs for "Templates", "Help", and "Preferences". The main content area shows the "Applied template: Threats to Validity". There are four rows of form fields, each with a label, a "Boolean" dropdown, a "True" value, a dropdown arrow, a lightbulb icon, and "Cancel" and "Create" buttons. The rows are: "Construct validity", "Internal validity", "External validity", and "Conclusion validity". At the bottom of the dialog is a "+ Add property" button with a lightbulb icon. The background shows the "Contribution editor" with a "Properties" panel on the left containing links like "data analysis method", "data collection method", "research question", and "threats to validity". There is also a "Suggested properties" section at the bottom with a "+ research problem" button.

1. Click “Create”
2. Click “Create”
3. Click “Create”
4. Click “Create”
5. Close dialog

6. Describe a Paper: Enter the Threats to Validity

 View ▾ Tools ▾ About ▾ NFDI4DataScience ▾ + Add new 

Warning: You are using a testing environment. Data you enter in the system can be deleted without any notice.

Contribution editor

Properties ✓ Saved


[data analysis method](#)

[data collection method](#)

[research question](#)

[threats to validity](#)

+ Add property

 Templates

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

[thematic analysis](#)

[interview](#)

[What is the perception and current treatment of NFRs in ML in industry?](#)

[Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: true](#)

Suggested properties

+ research problem

Problem

Now, we have described our first paper regarding its reported empirical research.

We can repeat the entire process for the next paper or work collaboratively!

7. Add the Next Paper

Contribution editor

View comparison Add contribution

Properties ✓ Saved

[data analysis method](#)

[data collection method](#)

[research question](#)

[threats to validity](#)

+ Add property

Suggested properties

+ research problem

Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry

Contribution 1

[thematic analysis](#)

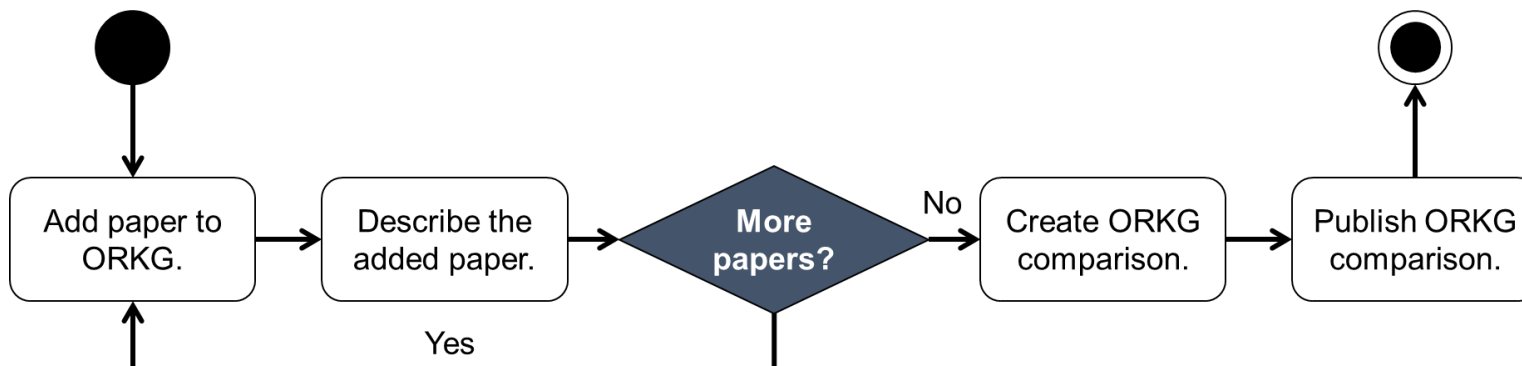
[interview](#)

[What is the perception and current treatment of NFRs in ML in industry?](#)

[Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: true](#)

Problem

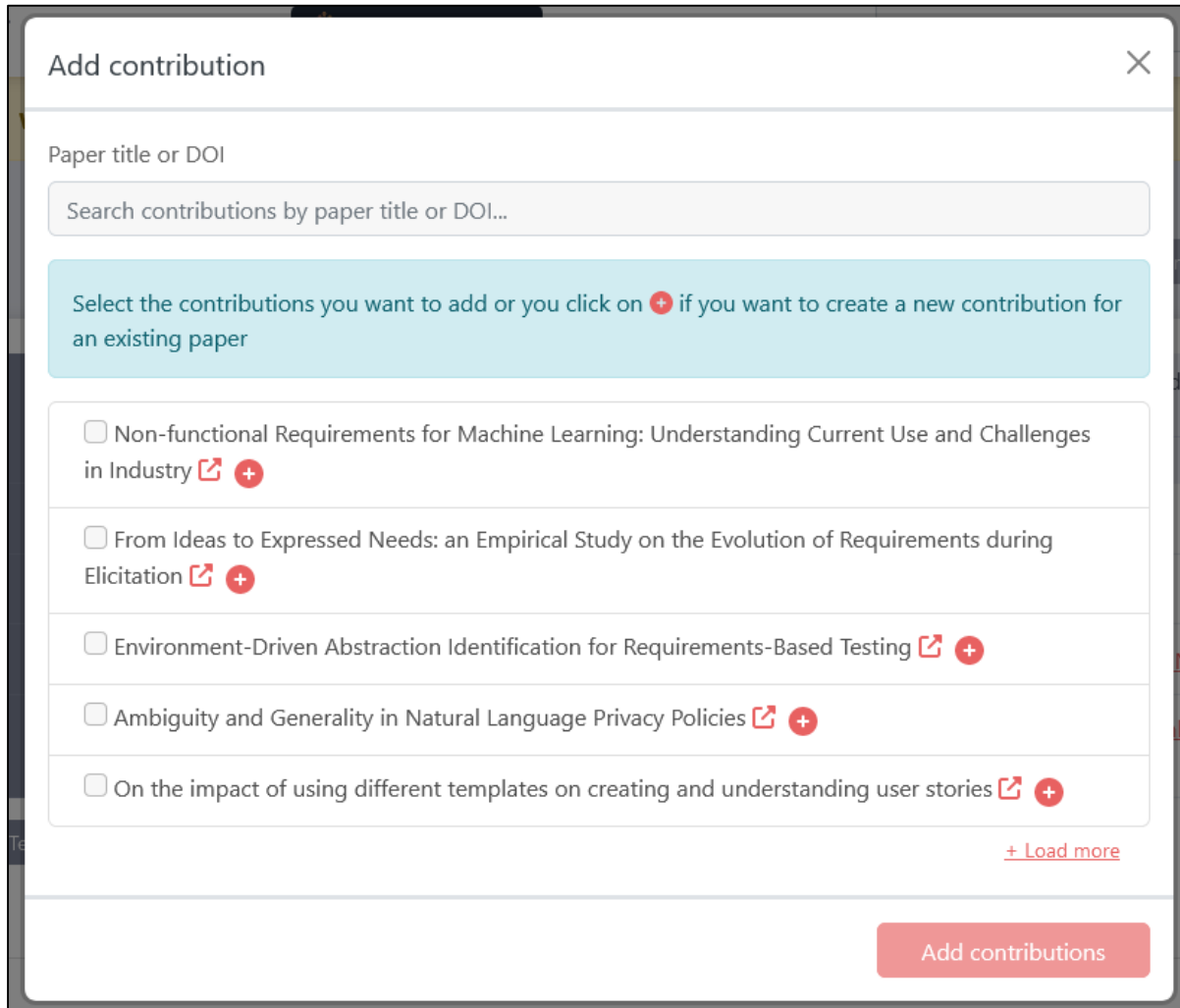
1. Click on “Add contribution”



Remark:

Now, we use a paper called **“From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation”** already described with the ORKG template.

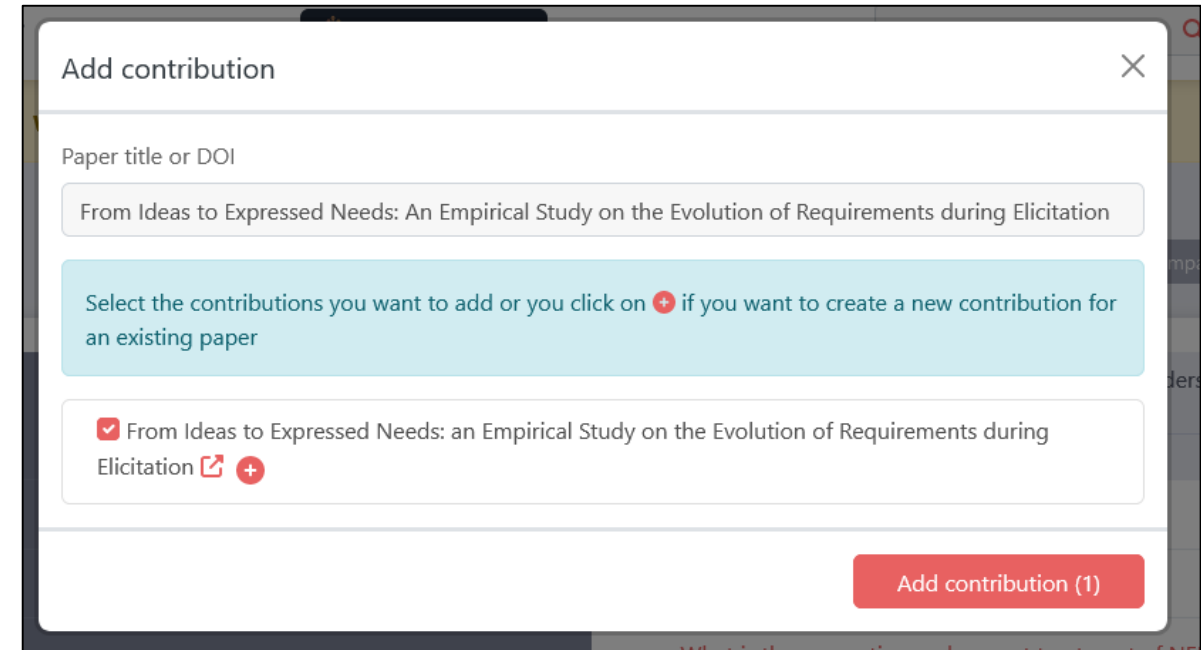
7. Add the Next Paper: Enter Paper Title



The 'Add contribution' dialog box has a title bar with a close button (X). Below the title bar is a section labeled 'Paper title or DOI' containing a search input field with the placeholder text 'Search contributions by paper title or DOI...'. A light blue instruction box states: 'Select the contributions you want to add or you click on + if you want to create a new contribution for an existing paper'. Below this is a list of five papers, each with an unchecked checkbox, a paper title, an external link icon, and a red '+' icon:

- ☐ Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry
- ☐ From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation
- ☐ Environment-Driven Abstraction Identification for Requirements-Based Testing
- ☐ Ambiguity and Generality in Natural Language Privacy Policies
- ☐ On the impact of using different templates on creating and understanding user stories

At the bottom right of the list is a red link '+ Load more'. At the bottom center is a red button labeled 'Add contributions'.



This screenshot shows the 'Add contribution' dialog box after the first paper has been selected. The search input field now contains the text: 'From Ideas to Expressed Needs: An Empirical Study on the Evolution of Requirements during Elicitation'. The instruction box remains the same. In the list, the first paper's checkbox is now checked, and its title is truncated: 'From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation'. The red '+' icon is still present. At the bottom right, a red button now reads 'Add contribution (1)'.

1. Enter paper title
2. Select the checkbox
3. Click “Add contribution (1)”

7. Add the Next Paper: Result

Contribution editor
View comparison
Add contribution

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation
	Contribution 1	Contribution 1
data analysis method	thematic analysis	thematic analysis inferential statistics descriptive statistics
data collection method	interview	experiment
research question	What is the perception and current treatment of NFRs in ML in industry?	What is the relevance given to the different categories of requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial ideas? How much is the difference in terms of documented requirements and roles with respect to initial ideas?
threats to validity	Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: true	Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: false

Now, we have two described papers.

If we want, we can add further ones or we can create an ORKG comparison.

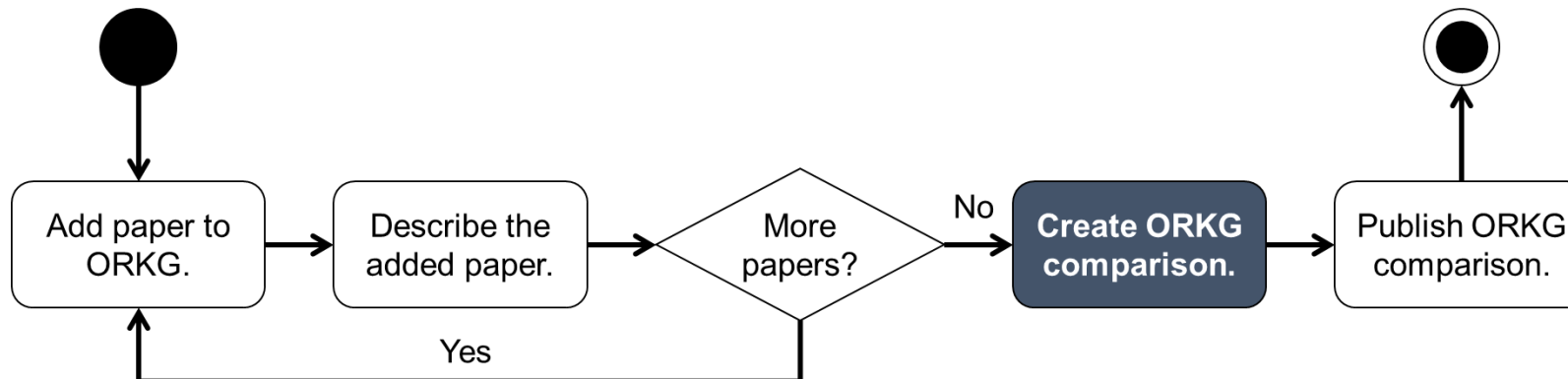
8. Create ORKG Comparison

Contribution editor

View comparison Add contribution

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation
	Contribution 1	Contribution 1
data analysis method	thematic analysis	thematic analysis
		inferential statistics
		descriptive statistics
data collection method	interview	experiment
research question	What is the perception and current treatment of NFRs in ML in industry?	What is the relevance given to the different categories of requirements and roles with respect to initial Ideas?
		What is the relevance given to the different categories of requirements and roles with respect to initial Ideas?
		How much is the difference in terms of documented requirements and roles with respect to initial ideas?
		+
threats to validity	Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: true	Construct validity: true, Internal validity: true, External validity: true, Conclusion validity: false

1. Click on “View comparison”



8. Create ORKG Comparison: Result and Improvements

Comparison 2 contributions		
Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
data.analysis.method	Data Analysis Method	Data Analysis Method
		Data Analysis Method
		Data Analysis Method
data.analysis.method/data.analysis.method/method*	thematic analysis	descriptive statistics
		inferential statistics
		thematic analysis
data.collection.method	Data Collection Method	Data Collection Method
data.collection.method/data.collection.method		
method*	interview	experiment
number of participants*	10	30
research question	Research Question	Research Question
		Research Question
		Research Question
research question/research question		
hidden in text*	✗	✗
		✗
		✗
highlighted in text*	✓	✓
		✓
		✓
question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
		What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
		What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
threats to validity	Threats to Validity	Threats to Validity
threats to validity/threats to validity		
conclusion validity*	✓	✗
construct validity*	✓	✓
external validity*	✓	✓
internal validity*	✓	✓

Now, we **created our ORKG comparison**.

Options before publishing the ORKG comparison:

1. Edit the ORKG comparison by ordering the rows

Edit → Drag & Drop the property cells as required

2. Select properties we want to show.

Actions → Select properties → Disable checkboxes of properties to hide

3. Save ORKG comparison as a draft for later

Actions → Save as draft → Enter title → Save → Draft in “My account”

9. Improve ORKG Comparison: Order Rows

Comparison | 2 contributions

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
data.analysis.method	Data Analysis Method	Data Analysis Method
data.analysis.method/data.analysis.method/method*	thematic analysis	descriptive statistics
		inferential statistics
		thematic analysis
data.collection.method	Data Collection Method	Data Collection Method
data.collection.method/data.collection.method		
method*	interview	experiment
number of participants*	10	30
research question	Research Question	Research Question
		Research Question
		Research Question
research question/research question		
hidden in text*	✗	✗
		✗
		✗
highlighted in text*	✓	✓
		✓
		✓
question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
		What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
		What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
threats to validity	Threats to Validity	Threats to Validity
threats to validity/threats to validity		
conclusion validity*	✓	✗
construct validity*	✓	✓
external validity*	✓	✓
internal validity*	✓	✓

ORKG View Tools About NFDI4DataScience

Search... + Add new

Comparison | 2 contributions

Stop editing + Add contribution Visualize Actions

Edit mode

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question		
data analysis	Data Analysis Method	Data Analysis Method
		Data Analysis Method
		Data Analysis Method
data analysis method/data analysis method/method*	thematic analysis	descriptive statistics
		inferential statistics
		thematic analysis

1. Click on “Edit”
2. Click on the grey property cell you want to move
3. Drag & Drop the property cell where you want

9. Improve ORKG Comparison: Order Rows – Result

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry <i>Contribution 1 - 2021</i>	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation <i>Contribution 1 - 2021</i>
data.analysis.method	Data Analysis Method	Data Analysis Method
data.analysis.method/data.analysis.method/method*	thematic analysis	descriptive statistics inferential statistics thematic analysis
data.collection.method	Data Collection Method	Data Collection Method
data.collection.method/data.collection.method		
↳ method*	interview	experiment
↳ number of participants*	10	30
research.question	Research Question	Research Question
research.question/research.question		
↳ hidden in text*	✗	✗
↳ highlighted in text*	✓	✓
↳ question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
threats.to.validity	Threats to Validity	Threats to Validity
threats.to.validity/threats.to.validity		
↳ conclusion validity*	✓	✗
↳ construct validity*	✓	✓
↳ external validity*	✓	✓
↳ internal validity*	✓	✓

Data Analysis

Data Collection

Research Question

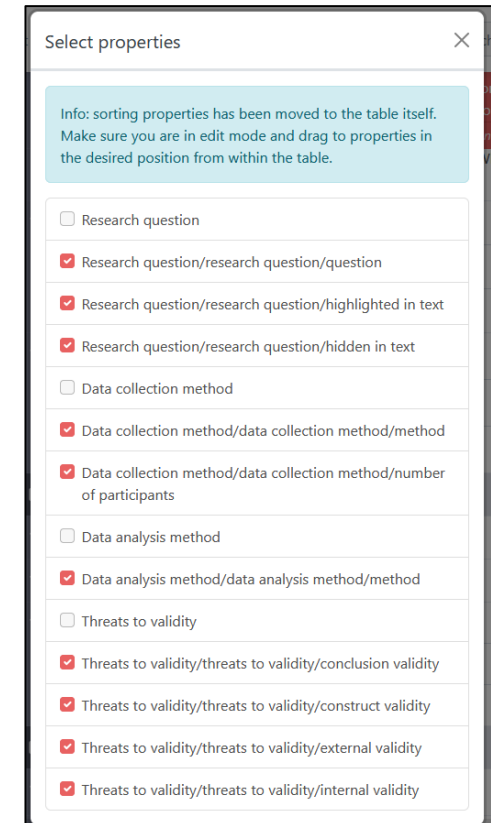
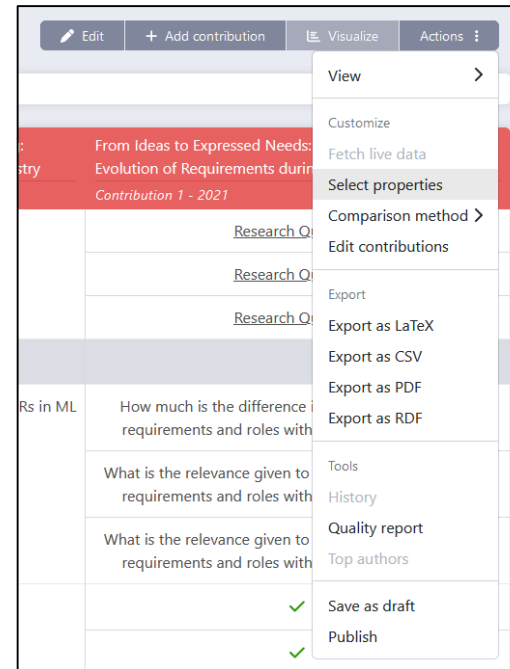
Threats to Validity

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry <i>Contribution 1 - 2021</i>	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation <i>Contribution 1 - 2021</i>
research.question	Research Question	Research Question
research.question/research.question		
↳ question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial ideas?
↳ highlighted in text*	✓	✓
↳ hidden in text*	✗	✗
data.collection.method	Data Collection Method	Data Collection Method
data.collection.method/data.collection.method		
↳ method*	interview	experiment
↳ number of participants*	10	30
data.analysis.method	Data Analysis Method	Data Analysis Method
data.analysis.method/data.analysis.method/method*	thematic analysis	descriptive statistics inferential statistics thematic analysis
threats.to.validity	Threats to Validity	Threats to Validity
threats.to.validity/threats.to.validity		
↳ conclusion validity*	✓	✗
↳ construct validity*	✓	✓
↳ external validity*	✓	✓
↳ internal validity*	✓	✓

9. Improve ORKG Comparison: Select Properties

Comparison | 2 contributions

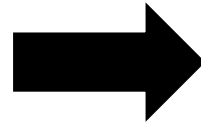
Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: An Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question	Research Question	Research Question
research question/research question		Research Question
question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial Ideas?
highlighted in text*	✓	✓
hidden in text*	✗	✗
data collection method	Data Collection Method	Data Collection Method
data collection method/data collection method		
method*	interview	experiment
number of participants*	10	30
data analysis method	Data Analysis Method	Data Analysis Method
data analysis method/data analysis method/method*	thematic analysis	descriptive statistics
threats to validity	Threats to Validity	Threats to Validity
threats to validity/threats to validity		
conclusion validity*	✓	✗
construct validity*	✓	✓
external validity*	✓	✓
internal validity*	✓	✓



1. Click on “Actions”
2. Click on “Select properties”
3. Disable all checkboxes of properties you want to hide
4. Close dialog

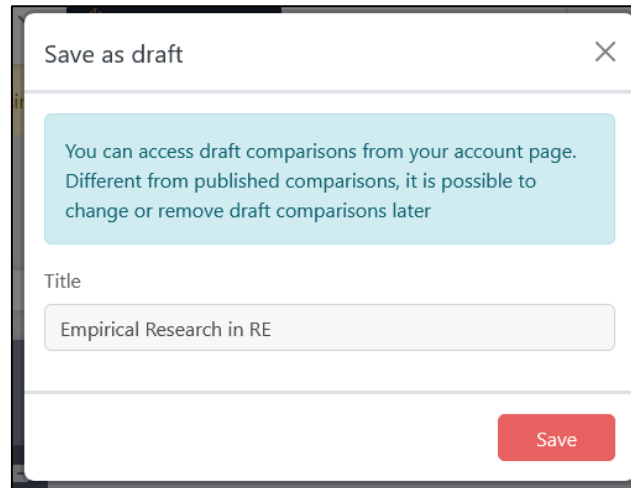
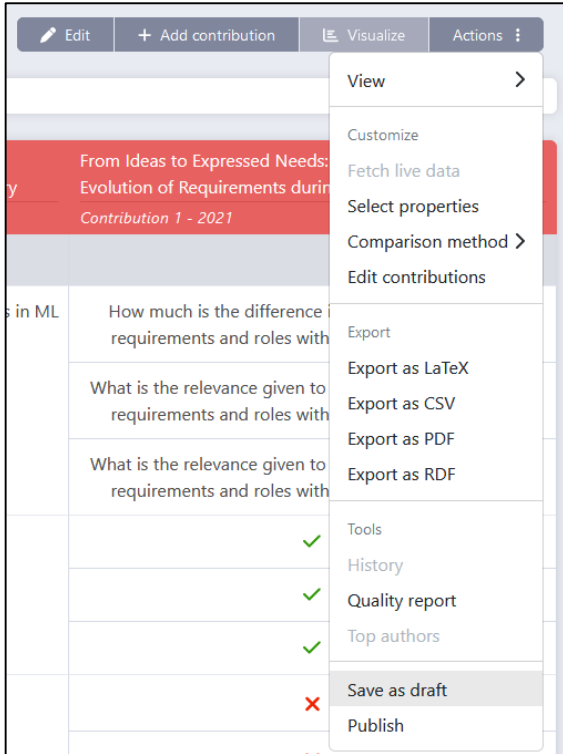
9. Improve ORKG Comparison: Select Properties – Result

Comparison 2 contributions		
Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question	Research Question	Research Question
research question/research question		Research Question
↳ question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
↳ highlighted in text*	✓	✓
↳ hidden in text*	✗	✗
data collection method	Data Collection Method	Data Collection Method
data collection method/data collection method		
↳ method*	interview	experiment
↳ number of participants*	10	30
data analysis method	Data Analysis Method	Data Analysis Method
data analysis method/data analysis method/method*	thematic analysis	descriptive statistics
threats to validity	Threats to Validity	Threats to Validity
threats to validity/threats to validity		
↳ conclusion validity*	✓	✗
↳ construct validity*	✓	✓
↳ external validity*	✓	✓
↳ internal validity*	✓	✓



Comparison 2 contributions		
Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question/research question		
↳ question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
↳ highlighted in text*	✓	✓
↳ hidden in text*	✗	✗
data collection method/data collection method		
↳ number of participants*	10	30
↳ method*	interview	experiment
data analysis method/data analysis method/method*	thematic analysis	descriptive statistics
threats to validity/threats to validity		
↳ conclusion validity*	✓	✗
↳ construct validity*	✓	✓
↳ external validity*	✓	✓
↳ internal validity*	✓	✓

9. Improve ORKG Comparison: Save as Draft

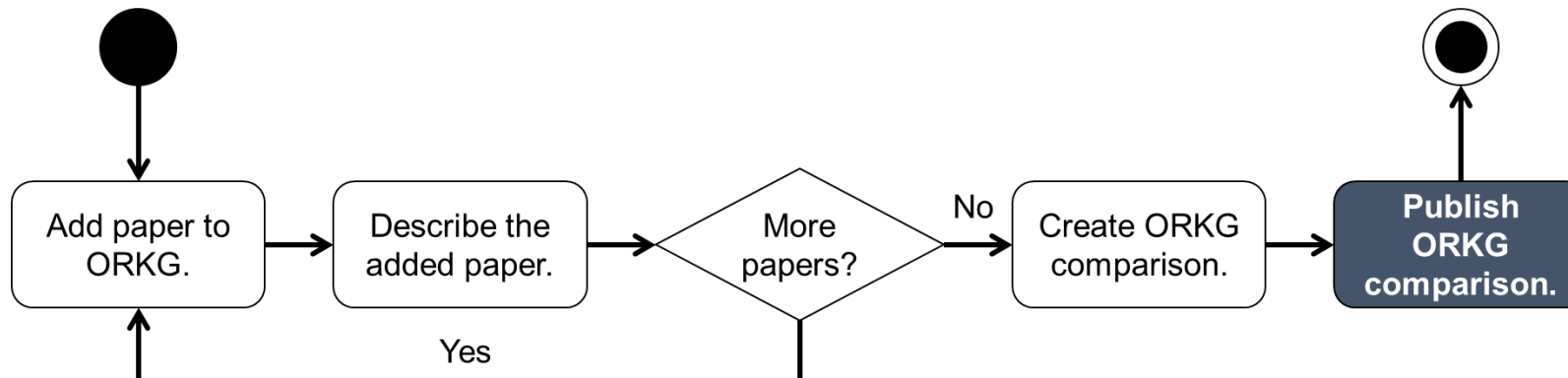
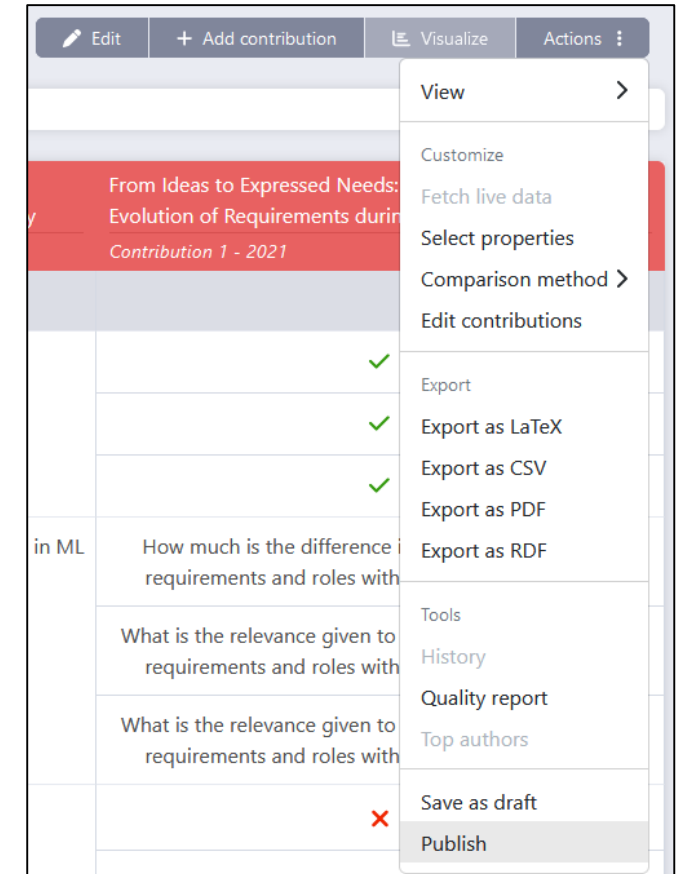


1. Click on “Actions”
2. Click on “Save as draft”
3. Enter a title and click on “Save”
4. The draft is saved in your account

10. Publish ORKG Comparison

Comparison | 2 contributions

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry <i>Contribution 1 - 2021</i>	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation <i>Contribution 1 - 2021</i>
research question/research question		
↳ highlighted in text*	✓	✓
↳ question*	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas? What is the relevance given to the different categories of requirements and roles with respect to initial Ideas? What is the relevance given to the different categories of requirements and roles with respect to initial Ideas?
↳ hidden in text*	✗	✗



1. Click on “Actions”
2. Click on “Publish”

10. Publish ORKG Comparison

Publish comparison [X]

A published comparison is made public to other users. The state of the comparison is saved and a persistent link is created.

Title [?]
[Text input field]

Description [?]
[Text input field] [Lightbulb icon]

Research field [?]
[Dropdown menu] [Choose]

Creators [?]
[Text input field] + Add creator

☐ Assign a DOI to the comparison [?]

Reference (optional) [?]
[Text input field] + Add

Sustainable development goals (optional) [?]
No SDGs assigned [Pencil icon]

Conference (optional) [?]
[Dropdown menu]

[Publish]

1. Fill out the dialog
2. Click on “Publish”

Remark:

You can add

- A **DOI** for citation (can also be done later)
- Additional **References**
- Related **Sustainable development goals**
- ORKG partner **Conferences**, such as **REFSQ'25**, that award the **Best ORKG Comparison Award**

Publish comparison [X]

A published comparison is made public to other users. The state of the comparison is saved and a persistent link is created.

Title [?]
An Overview of Empirical Research in Requirements Engineering

Description [?]
This comparison shows an overview of empirical research reported in publication of the IEEE International Requirements Engineering Conference 2021 regarding the topics research question, data collection, data analysis, and threats to validity. [Lightbulb icon]

Research field [?]
Software Engineering [Dropdown menu] [Choose]

Creators [?]
Oliver Karras [Pencil icon] [X]
+ Add creator

☐ Assign a DOI to the comparison [?]

Reference (optional) [?]
[Text input field] + Add

Sustainable development goals (optional) [?]
No SDGs assigned [Pencil icon]

Conference (optional) [?]
[Dropdown menu]
a conference
asdadfa
31st International Working Conference on Requirement Engineering: Foundation for Software Quality (REFSQ'25)

10. Publish ORKG Comparison: Result

Comparison | 2 contributions

An Overview of Empirical Research in Requirements Engineering ☆

May 2024 | Oliver Karras

This comparison shows an overview of empirical research reported in publication of the IEEE International Requirements Engineering Conference 2021 regarding the topics research question, data collection, data analysis, and threats to validity.

Properties	Non-functional Requirements for Machine Learning: Understanding Current Use and Challenges in Industry Contribution 1 - 2021	From Ideas to Expressed Needs: an Empirical Study on the Evolution of Requirements during Elicitation Contribution 1 - 2021
research question/research question		
highlighted in text	✓	✓
question	What is the perception and current treatment of NFRs in ML in industry?	How much is the difference in terms of documented requirements and roles with respect to initial ideas?
hidden in text	✗	✗
data collection method/data collection method		
method	interview	experiment
number of participants	10	30
data analysis method/data analysis method/method	thematic analysis	descriptive statistics inferential statistics thematic analysis
threats to validity/threats to validity		
conclusion validity	✓	✗
construct validity	✓	✓
external validity	✓	✓
internal validity	✓	✓

Added by: Oliver Karras

Assign to observatory

Now, we **published our ORKG comparison**, a stable version that can be maintained, extended, updated, and published as new versions.

Options after publishing the ORKG comparison:

1. Add visualizations
2. Add DOI later and export citation
3. Use the quality report to get feedback from other researchers
4. Fetch live data for a new draft or published version
5. Fetch data for later analysis with different interfaces

Remark:

These options are only demonstrated live in the tutorial. If you need help, do not hesitate to contact the ORKG team, especially **Oliver Karras** (oliver.karras@tib.eu).