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# Collaboratively Analysing Open Research Data in Virtual Research Environments - New Visionary Use Cases

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*Abstract: Virtual Research Environments (VREs) offer new opportunities for collaboratively analysing open research data. This workshop builds on a workshop that we gave at CeDEM16 and aims to refine and discuss requirements for collaboratively analysing Open Government Data (OGD) and open research data through a secure, trusted and multidisciplinary VRE. Presentations about innovative use cases for reusing governmental and research data will be given, and participants will discuss and develop innovative use cases. The conditions for sharing their public or research data with others in a VRE will be discussed. This provides the basis for a discussion on the prioritization of requirements derived from the use cases. Participants are encouraged to provide their view on requirements for a VRE that offers governmental research data as well as directions for VRE projects.*

*Keywords: Open data, Virtual Research Environment, VRE, use case, research infrastructure*

*Acknowledgement: This workshop is related to the H2020 VRE4EIC project ([www.vre4eic.eu](http://www.vre4eic.eu)). The authors would like to thank their colleagues of this project for their input on this paper, although the views expressed are the views of the authors and not necessarily of the project.*

## 1. Topic

The topic of this workshop concerns Open Government Data (OGD) and open research data. The objective of this 1.5-hour workshop is to refine and discuss requirements for collaboratively analysing Open Government Data (OGD) and open research data through a secure, trusted and multidisciplinary VRE.

## 2. Description and Objectives of the Workshop

Researchers can access and use more and more research data opened by the government and by publicly-funded research organizations (Zuiderwijk, 2015). They can use this data to obtain new insights, especially by combining datasets with other data from other disciplines. However,

researchers who want to conduct multidisciplinary research with OGD and open research data often face various problems in existing research environments, such as issues related to data heterogeneity, user experience, trust and security (Zuiderwijk, Jeffery, Bailo & Yin, 2016). Researchers are often willing to share their data with others under certain conditions, yet no VREs exist that meet the requirements for multidisciplinary research. This complicates the reuse of open data by researchers in other disciplines.

Virtual Research Environments (VREs) offer new opportunities for collaboratively analysing open research data, as they provide access to data, tools, resources from different research infrastructures, co-operation or collaboration between researchers at the same or different institutions, co-operation at the intra- and inter-institutional levels, and/or preserving data and other outputs (Carusi & Reimer, 2010). VREs consist of Information and Communication Technology (ICT) facilities, e-Research Infrastructures (providing for the end-user homogeneous access over heterogeneous data, software and resources, and the VRE with its users, who can work together through the VRE (Zuiderwijk et al., 2016). VREs contribute to solutions for issues related to data heterogeneity, user experience, trust and security.

Several new visionary use cases for VREs have been developed in the H2020 VRE4EIC project (<http://www.vre4eic.eu/>). VRE4EIC stands for A Europe-wide Interoperable Virtual Research Environment to Empower Multidisciplinary Research Communities and Accelerate Innovation and Collaboration. The VRE4EIC project aims to develop a reference architecture and prototypes to be used for future VREs including building blocks that can be used to improve existing VREs. The project addresses the key data and software challenges in supporting multidisciplinary data driven sciences<sup>1</sup>.

In this workshop, a number of new visionary use cases from the VRE4EIC project will be presented. Some examples of such use cases include:

- choosing a travel destination for tourists with allergic diseases (Domains: healthcare, environmental sciences);
- investigating the social consequences of increased debts of EU countries (Domains: finance, economy and criminology);
- studying the capacity of the urban infrastructure in case of an evacuation (Domains: geology, mobility, sociological and housing);
- investigating the historical interest of researchers based on current events (Domain: Digital Humanities);
- analyzing the evolution of electric charging (Domains: urban infrastructure, mobility, power grid topology); and
- predicting transport delay (Domains: environmental sciences, transportation) (VRE4EIC project, 2016).

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<sup>1</sup> [www.vre4eic.eu](http://www.vre4eic.eu)

The use cases are used to start a discussion with the participants concerning requirements for data sharing through an innovative VRE for research and government data.

The objective of this 1.5-hour workshop is to refine and discuss requirements for collaboratively analysing Open Government Data (OGD) and open research data through a secure, trusted and multidisciplinary VRE. The workshop is relevant for participants of the international Conference for e-Democracy and Open Government (CeDEM), since it focuses on topics that are key to this conference, including open data, open access, and open and collaborative government. The workshop is of interest to experts that CeDEM brings together in the area of open government, e-participation and e-democracy. The workshop is aimed at (potential) users of (open) (government) research data. It builds on the results from a workshop that was organized at CeDEM16 (Zuiderwijk et al., 2016).

### 3. Format of the Workshop

#### 3.1. Presentations (20 Minutes)

The following presentations will inspire a constructive dialogue:

- Challenges for information sharing of Open Data by researchers. Ricardo Matheus and Anneke Zuiderwijk will present key challenges that exist for sharing Open Research Data with others. Trade-offs and considerations will be discussed. This presentation summarizes the key challenges that were discussed during a preceding workshop at CeDEM16 (Zuiderwijk et al., 2016).
- Visionary use cases concerning the use of multidisciplinary research data. The VRE4EIC project has developed various visionary use cases that will be presented by Anneke Zuiderwijk. The use cases are used to start a discussion with the participants concerning requirements for data sharing through a VRE for research data.

#### 3.2. Brainstorming (35 Minutes): The Development of Visionary Use Cases

The second part of the workshop is dedicated to group discussions. In groups of three to five persons, participants are asked to develop a visionary use case. Participants are asked to select a topic of a societal problem of their choice and examples of such topics will be discussed by the presenters (e.g., climate change, energy sustainability or crime prevention). Participants are asked to collaboratively brainstorm about datasets, data analysis tools and other VRE resources that they would need to investigate this societal problem. Subsequently, we ask them to discuss the needs of (potential) providers and users of (open) research data according to this use case, including the activities that researchers should conduct to execute the use case. Each group develops a different visionary use case that should offer new insights and result in benefits of research data sharing. Participants of the workshop are asked to participate in the discussion, because they might (potentially) use open government data for research purposes.

### 3.3. Discussion of Brainstorming Session (35 Minutes)

The remainder of the workshop is dedicated to discussion, interaction and gathering ideas from the audience on visionary use cases and requirements for the use of open government data by researchers and directions for VRE projects. The findings of the group discussions will be discussed in the plenary by presenting some first results of the visionary use case development by the participants. This discussion and presentation provide participants with insight in the way that open data might be used by researchers in comparison to how it is currently used, and it shows the key requirements that researchers have to develop the use cases. The results of this discussion will be used to develop and further specify the requirements of the VRE4EIC research environment.

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#### About the Organisers

##### *Anneke Zuiderwijk*

Dr. Anneke Zuiderwijk is a researcher at the Faculty of Technology, Policy, and Management at Delft University of Technology. She holds a PhD (with honor) in open data infrastructures. Her research focuses on open data and data infrastructures. She was ranked as one of the most prolific researchers in open data research by Hossain, Dwivedi and Rana (2015). More information:

<http://www.tbm.tudelft.nl/over-faculteit/afdelingen/engineering-systems-and-services/sectie-ict/medewerkers/anneke-zuiderwijk-van-eijk/>.

##### *Ricardo Matheus*

Ricardo Matheus is a researcher and PhD Candidate at Delft University of Technology, The Netherlands. He currently works with Big and Open Linked Data (BOLD) being part of the OpenGovIntelligence Consortium funded by Horizon 2020 ([www.opengovintelligence.eu/](http://www.opengovintelligence.eu/)). Ricardo is a former data analyst at the Rio de Janeiro City Hall (2013-2015). He helped to improve Big Data processes on the IBM Operation Center in Rio

de Janeiro, Brazil, (<http://goo.gl/biYnTx>) and worked on the project "Opening the Cities: Open Government Data in Local Governments of Argentina, Brazil and Uruguay" (<http://goo.gl/s1vgCq>).