

LDAC2023

11th International Workshop on Linked Data in Architecture and Construction

<https://linkedbuildingdata.net/ldac2023/>

#LDAC2023

15-16 June 2023

*Casa delle Tecnologie Emergenti di Matera
Matera, Italy*





LDAC Summary

PLENARY SESSIONS

Plenary sessions include research papers, with the following presentations:

Session 1 - Digital Twinning and Asset Management (Thu 15/06. 10:30 -

for the life cycle assessment of built assets

ylvain Kubicki, Tomas Navarrete Gutierrez and Thomas Beach

Abstract: Life Cycle Assessment (LCA) is a scientific method for the quantification of environmental impacts. It is important for sustainable design and management of our built environment. Conducting LCA on built assets requires contextualized information which can be sourced from the Building Information Model (BIM) or monitoring data. However, interoperability between LCA domain tools and BIM tools is lacking. Our motivation lies in semantically linking different domains by adopting a Semantic Web (SW) technologies. This would result in increased integration and automated automation of information pipelines and more explainable impacts of complex contexts. In this paper, we progress under the SemanticLCA ontology where we modelled several use cases for LCA of built assets. We showcase one case study at the building level, highlighting the semantic alignments between BIM models and LCA data. The paper discusses the implementation challenges and offers suggestions on how such an ontology can be implemented.

[Full paper \(PDF\)](#)

[Presentation \(PDF\)](#)

Learned from Designing and Using bcfOWL

Jyrki Oraskari and Jakob Beetz

Abstract: The bcfOWL ontology has been developed as part of the EU Horizon 2020 BIM4Ren project to support the design and use of BIM Collaboration Format (BCF) Issues and Linked Building Data (LBD) concepts described on the S

Towards a U.S. National Bridge and Infrastructure Data Dictionary: An Introduction


Aaron Costin and Marina Muller

[Abstract](#)

[Full paper \(PDF\)](#)

[Presentation \(PDF\)](#)

12:30 - 13:45: Lunch break

13:45 - 15:45: Plenary session 2 - Data Dictionaries and Smart Buildings  [Livestream](#)

Semantic bSDD: Improving the GraphQL, JSON and RDF Representations of buildingSmart Data

Vladimir Alexiev, Mihail Radkov and Nataliya Keberle

[Abstract](#)

[Full paper \(PDF\)](#)

The semantic link between domain-based BIM models

Wojciech Teclaw, Madsholten Rasmussen, Nathalie Labonnote, Jyrki Oraskari and Eilif Hjelseth

[Abstract](#)

[Full paper \(PDF\)](#)

Making Urban Energy Use More Intelligible Using Semantic Digital Twins

Sander R. de Meij, Alex J.A. Donkers, Dujuan Yang and Matthijs Klepper

[Abstract](#)

[Full paper \(PDF\)](#)

[Presentation \(PDF\)](#)

Modular Knowledge integration for Smart Building Digital Twins

Isaac Fatokun, Arun Raveendran Nair, Thamer Mecharnia, Maxime Lefrançois, Victor Charpen and Zimmermann

[Abstract](#)

[Full paper \(PDF\)](#)

[Presentation \(PDF\)](#)

Metadata Schema Generation for Data-driven Smart Buildings

Lasitha Chamari, Joep van der Weijden, Lolke Boonstra, Stefan Hoekstra, Ekaterina Petrova and Pieter

[Abstract](#)

[Full paper \(PDF\)](#)

[Presentation \(PDF\)](#)

Learning partial correlation graph for multivariate sensor data and detecting sensor community (paper)

Xiang Xie, Manuel Herrera, Tejal Shah, Mohamad Kassem and Philip James

[Abstract](#)

Proceedings

LDAC 2018 Linked Data in Architecture and Construction

Proceedings of the 6th Linked Data in Architecture and Construction Workshop
London, United Kingdom, June 19-21, 2018.

Edited by

María Poveda-Villalón *
Pieter Pauwels **
Ana Roxin ***

* Universidad Politécnica de Madrid, Spain
** Ghent University, Belgium
*** University of Burgundy, France

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María Poveda-Villalón, Raúl García-Castro
- OPM: An ontology for describing properties that evolve over time
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- The IFC to linked building data converter - current status
Mathias Bonduel, Jyrki Oraskari, Pieter Pauwels, Maarten Vergauw
- An IFC-based interoperable framework for building linked data
José Luis Hernández, Pedro Martín Lerores, Sonia Álvarez, Peter
- Semantic encoding of construction regulations
Thomas Henry Beach, Yaelne Rezugli

2018-08-08: submitted by María Poveda-Villalón, metadata incl. bibliographic data published under Creative Commons
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LDAC 2019 Linked Data in Architecture and Construction

Proceedings of the 7th Linked Data in Architecture and Construction Workshop
Lisbon, Portugal, June 19-21, 2019.

Edited by

María Poveda-Villalón *
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Rui De Klerk ***
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** Ghent University, Belgium
*** Universidade de Lisboa, Portugal
**** Bourgogne Franche-Comté University, France

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- Developing the Crowd Simulation Scenario (CSS) ontology supporting building evacuation
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- Integration of environmental data in BIM tool & linked building data
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- BPO: The Building Product Ontology for assembled products
Anna Wagner, Uwe Ruppel

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LDAC 2020 Linked Data in Architecture and Construction

Proceedings of the 8th Linked Data in Architecture and Construction Workshop
Dublin, Ireland, June 17-19, 2020 (virtually hosted).

Edited by

María Poveda-Villalón *
Ana Roxin **
Kris McGlenn ***
Pieter Pauwels ****

* Universidad Politécnica de Madrid, Spain
** Univ. Bourgogne Franche-Comté, France
*** Trinity College Dublin, Ireland
**** Eindhoven University of Technology, Netherlands

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- Linking BIM and GIS standard ontologies with linked data
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LDAC 2021 Linked Data in Architecture and Construction

Proceedings of the 9th Linked Data in Architecture and Construction Workshop
Luxembourg, Luxembourg, October 11-13, 2021.

Edited by

María Poveda-Villalón *
Pieter Pauwels **

* Universidad Politécnica de Madrid, Spain
** Eindhoven University of Technology, Netherlands

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LDAC2023

Local organizers

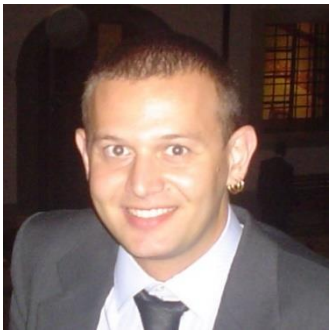
Lucio Tommaso de Paolis



Ugo Erra



Walter Terkaj



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Pieter Pauwels



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Madhumitha Senthilvel



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SSoLDAC2023 Lecturers

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Erwin Folmer **Vladimir Alexiev** **Jeroen Werbrouck** **Mads Holten Rasmussen** **Alex Donkers**



Keynotes

TUESDAY

Shape and Semantics for urban modelling – the role of geometry in city digital twins



Michela Mortara
CNR - IMATI



WEDNESDAY

Connect Sensors to Perception via Semantic Stream

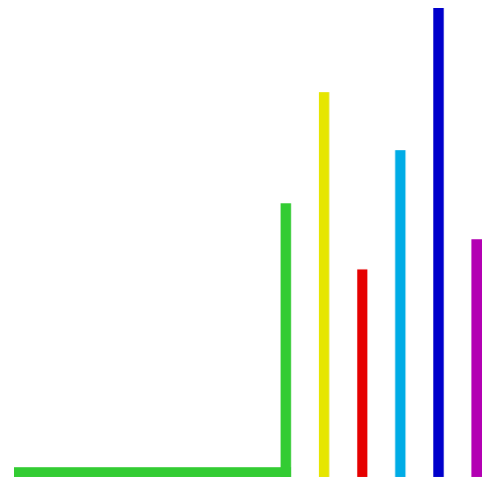
Danh Le Phuoc
Technical University Berlin

THURSDAY

Data-driven AI vs. Model-driven AI:
Which one should we trust more?



Francesca A. Lisi
Università degli Studi di Bari "Aldo Moro"



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Impressions 😊

3rd Summer School of LDAC (SSoLDAC)



<https://www.linkedbuildingdata.net/ldac2023/summerschool/>

Matera, Italy – 12-14 June 2023



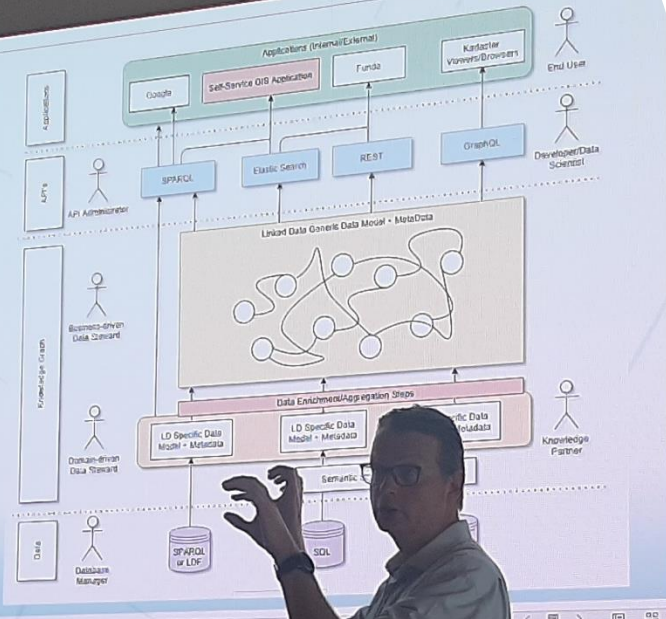
Ontotext Products Overview
GraphDB (database), Semantic Objects (GraphQL), OntoRefine (UI)
Linked Data in Architecture and Construction (LDA) Summer School, 12-14
Workshop Abstracts, PhD, P&P



3rd Summer School on Linked Data in Architecture and Construction
Workshop Abstracts, PhD, P&P



Architecture KKG



```
demo > src > queries > # findProjectResources.js > graphql
1 const query = require('../queryLinkInversal')
2 const {DCAT} = require('@inrupt/vocab-common-rdf')
3
4 const accessPoints = ["http://localhost:3000/architect/duplex"]
5 const q = `SELECT DISTINCT * WHERE {
6
7
8
9
10
11 }distribution
12   var Date: DateConstructor
13   new () => Date {# overloads}
14
15 const now = new Date()
16 query(c, accessPoints)
17   .then((data) => {
18     console.log('Project resources:', b.get("distribution").value)
19     data.map(b => console.log('duration:', new Date() - now))
20   })

```

Terminal Output:

```
PS C:\Users\jannerb\Documents\SSoLDAC2023\SS_Lectures\codebase\demo\src> node .\queries\findProje
ctResources.js
Project resources: http://localhost:3000/architect/madeArchitecture.gltf
Project resources: http://localhost:3000/mp/modeJNEP.gltf
duration: 415
PS C:\Users\jannerb\Documents\SSoLDAC2023\SS_Lectures\codebase\demo\src> node .\queries\findProje
ctResources.js
Project resources: http://localhost:3000/architect/semanticsArchitecture.ttl
Project resources: http://localhost:3000/mp/semanticsJNEP.ttl
duration: 590
PS C:\Users\jannerb\Documents\SSoLDAC2023\SS_Lectures\codebase\demo\src>

```











LDAC Community



More LDAC Community

Best Paper Award

Offered by:



LDAC2023 Best Industry Contribution Award



An open endpoint and framework for the development
of linked data for building energy systems

James Allan, JongGwan An, Reto Fricker, Sascha Stoller, Philipp Heer

james.allan@empa.ch

Scientist

Digital Twin Cluster Lead

Urban Energy Systems Laboratory, Empa, Überlandstrasse 129, Dübendorf 8600, Switzerland

LDAC2023 Runner-Up Award

Modular Knowledge integration for Smart Building Digital Twins

Isaac Fatokun¹, Arun Raveendran Nair Sheela¹, Thamer Mecharnia²,
Maxime Lefrançois^{2,*}, Victor Charpenay², Fabien Badeig² and Antoine Zimmermann²

¹Mines Saint-Etienne, Institut Henri Fayol, F - 42023 Saint-Etienne France

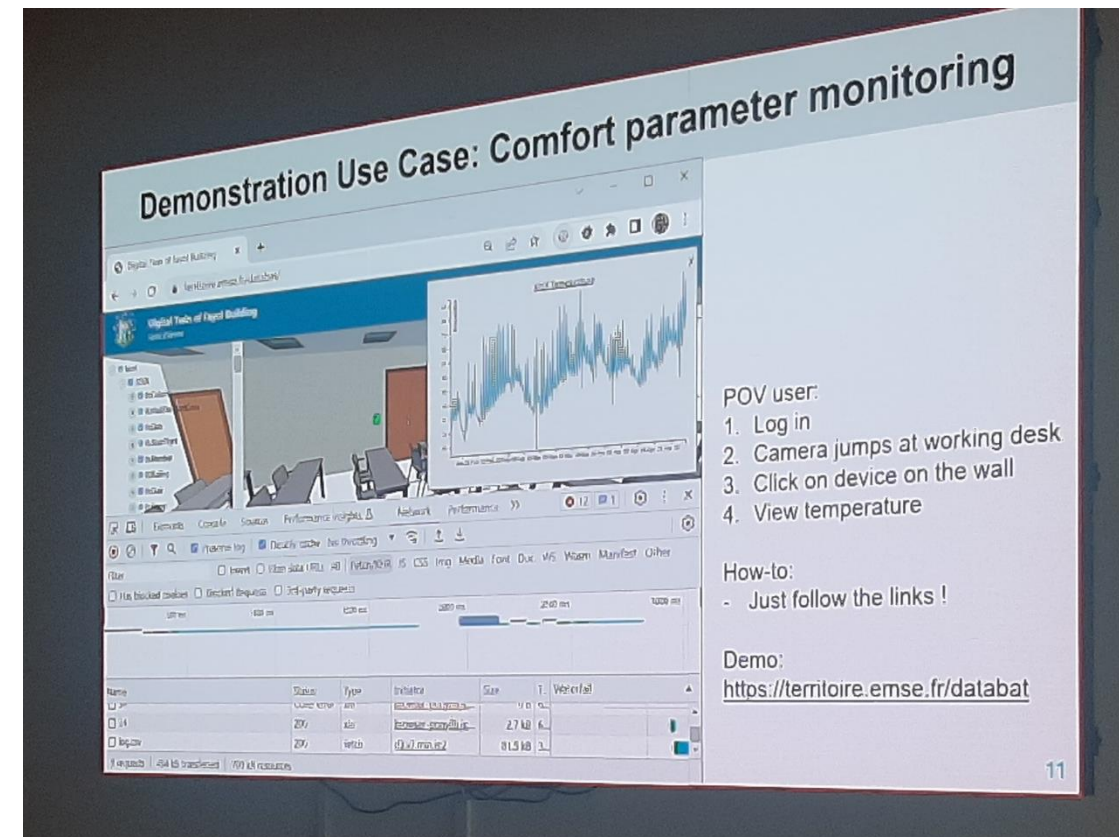
²Mines Saint-Etienne, Univ Clermont Auvergne, INP Clermont Auvergne, CNRS, UMR 6158 LIMOS, F - 42023 Saint-Etienne France

Abstract

It is accepted in the Linked Data for Architecture and Construction (LDAC) community that generating knowledge graphs (KGs) from the BIM model of a building enables higher level use cases such as integration with geographic information systems, operational system integration, semantic digital twins (DTs), or automatic compliance checking. However, existing approaches generate a large, monolithic knowledge graph that is difficult to integrate with other knowledge such as Thing Descriptions (TDs) of Internet of Things (IoT) devices, or information about office occupants and room occupancy schedules. In this work, we describe a set of three modular knowledge graphs that enable knowledge integration for the semantic DT of our building at Mines Saint-Étienne, leveraging the principles of Linked Building Data: (1) KG_{LBD} is automatically generated from the Revit model of our building, (2) KG_{FOAF} is semi-automatically generated from the employee directory of Mines Saint-Étienne, and (3) KG_{TD} is automatically generated from the ETS5 project file describing the KNX network in our building using the W3C TD ontology, and points to real-time and historical data. Our approach offers an alternative with respect to the state of the art such that: (1) relevant bits of the building's KG can be accessed using a simple REST-like interface, where each small KG contains links to other entities that themselves are identified by an IRI and have a small KG accessible; (2) Knowledge potentially served by different servers can be integrated in the same solution; (3) simple access control can be implemented for some parts of the global KG.

Keywords

BIM, IFC, Digital Twin, Linked Data, Knowledge Graphs, Modular Design, KNX



LDAC2023 Best Paper Award

dstv: An ontology-based extension of the DSTV-NC standard for the use of linked data in the automation of steel construction

Lukas Kirner¹, Jyrki Oraskari², Victoria Jung³ and Sigrid Brell-Cokcan⁴

^{1,2,3,4}Chair of Individualized Production (IP), RWTH Aachen University Campus-Boulevard 30, 52074 Aachen, Germany

Abstract

To meet the demands of automated steel construction, there is a need for innovative ways to link process data, measured deviations, and tolerances. Our current research in robotic steel fabrication aims to tackle this challenge by creating an adaptable information model interface that can seamlessly incorporate cross-process considerations required for precise and efficient fabrication beyond current Building Information Modeling (BIM). The goal is to improve existing information interfaces and increase the utilization of flexible and partially automated robot concepts in steel construction. Our approach uses existing standards and product interfaces such as DSTV-NC in steel construction, which we convert and enhance through an ontology that includes tolerances and process parameters. The outcomes of our study contribute to the development of automated systems in construction and support small and medium-sized enterprises in steel construction by addressing challenges related to skills shortages, productivity, and occupational safety.

Keywords

Domain Ontology, Linked Data, Semantic Web, Robotics, Steel Fabrication,



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LDAC Track

- LDAC2012, Ghent
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- LDAC2015, Eindhoven
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- LDAC2021, Luxembourg
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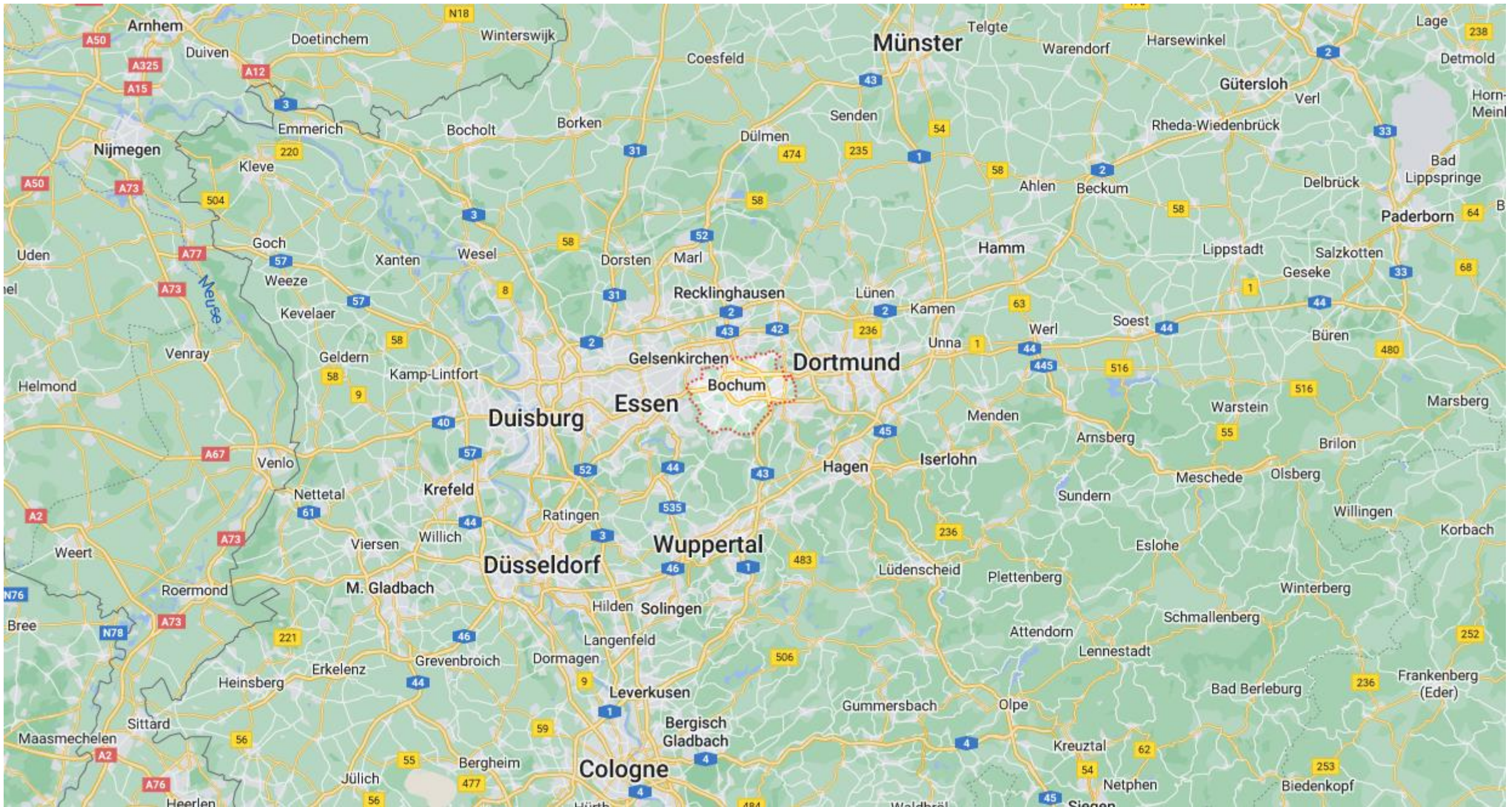


Computing
in Engineering

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Thank you!!!

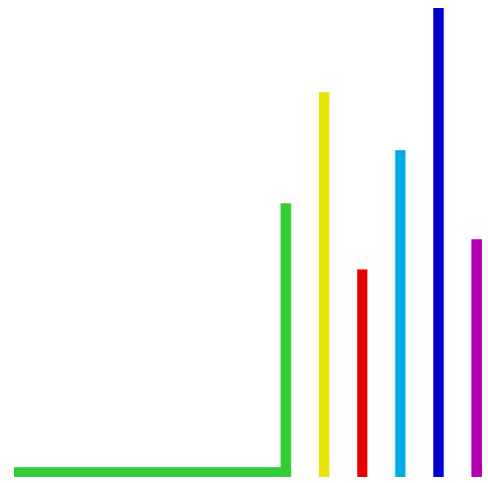


Thanks a million!!

Have a good time still in Matera!

Safe travelling home!

And see you next year in Bochum, Germany!



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