

# LDAC2023

## 11<sup>th</sup> 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 BreadCrumbTrail

# LDAC Track

- LDAC2012, Ghent
- LDAC2014, Helsinki
- LDAC2015, Eindhoven
- LDAC2016, Madrid
- LDAC2017, Dijon
- LDAC2018, London
- LDAC2019, Lisbon
- LDAC2020, Dublin
- LDAC2021, Luxembourg
- LDAC2022, Crete
- LDAC2023, Matera





LDAC 2022, Heraklion + Cercedilla



LDAC 2021, Luxembourg



Technical sessions, 2015, 2016

# LDAC2023 Organisation



# Programme Committee

All submissions are reviewed by at least two members of the Program Committee.

Jakob Beetz  
Calin Boje  
Mathias Bonduel  
Nicolas Bus  
Andrea Cimmino  
Goncal Costa  
Aaron Costin  
Diellza Elshani  
Paola Espinoza Arias  
Raúl García-Castro

Philipp Hagedorn  
Al-Hakam Hamdan  
Cheong Hyunmin  
Felix Larrinaga Barrenechea  
Maxime Lefrancois  
Dimitris Mavrokapnidis  
Thamer Mecharnia  
Nandana Mihindukulasooriya  
Claudio Mirarchi  
Jyrki Oraskari

Ekaterina Petrova  
Dimitrios Rovas  
Ana Roxin  
Georg Schneider  
Oliver Schulz  
Alvaro Sicilia  
Daniele Spoladore  
Ranjith Soman  
Edlira Vakaj

# Local organising committee

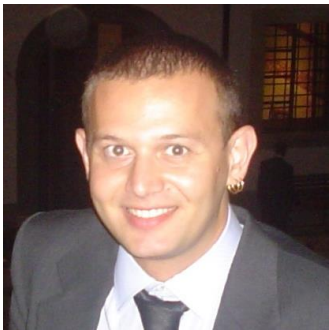
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**Ugo Erra**



**Walter Terkaj**



**Sara Arlati**



# LDAC Committee

**Pieter Pauwels**



**María Poveda Villalón**



**Walter Terkaj**



**Madhumitha Senthilvel**



**Jeroen Werbrouck**



**Alex Donkers**



# Proceedings

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## 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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- Preface
- Toward French smart building code: compliance checking based on IFC  
*Nicolas Bus, Ana Roxin, Guillaume Picinbono, Muhammad Fahad*
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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  
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- 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, Yaeline Rezgui*

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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 \*  
Pieter Pauwels \*\*  
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\* Universidad Politécnica de Madrid, Spain  
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\*\*\*\* Bourgogne Franche-Comté University, France

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*Georg Feralindo Schneider*
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*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 McGlavin \*\*\*  
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\* Universidad Politécnica de Madrid, Spain  
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\*\*\* Trinity College Dublin, Ireland  
\*\*\*\* Eindhoven University of Technology, Netherlands

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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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# Online publication

## Thursday 15 June

9:00 - 9:05: LDAC2023 workshop introduction and opening

9:05 - 10:00: Keynote session  [Livestream](#)




### **Connect Sensors to Perception via Semantic Stream**

Danh Le Phuoc


[Abstract](#)

10:00 - 10:30: Coffee break

10.30 - 12:30: Plenary session 1 - Digital Twinning and Asset Management  [Livestream](#)

### **Linked data for the life cycle assessment of built assets**

Calin Boje, Sylvain Kubicki, Tomas Navarrete Gutierrez and Thomas Beach

 [Abstract](#)

### **Lessons Learned from Designing and Using bcfOWL**

Oliver Schulz, Jyrki Oraskari and Jakob Beetz

[Abstract](#)

### **Towards usable ICDD containers for ontology-driven data linking and link validation**

Philipp Hagedorn, Madhumita Senthilvel, Hans Schevers and Lucas Verhelst

[Abstract](#)

- maintained over time
- single location: [linkedbuildingdata.net](https://linkedbuildingdata.net)
- updated throughout workshop(s)
  
- Abstracts, Papers, Presentations
- Livestream links

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

# Online book of abstracts

## PLENARY SESSIONS

Plenary sessions include research papers, with the following presentations:

### Plenary session 1 - Digital Twinning and Asset Management (Thu 15/06. 10:30 - 12:30)

#### Linked data for the life cycle assessment of built assets

Calin Boje, Sylvain Kubicki, Tomas Navarrete Gutierrez and Thomas Beach

**Abstract:** Life Cycle Assessment (LCA) is a scientific method for the quantification of environmental impacts on a product system, which is important for sustainable design and management of our built environment. Conducting LCA on buildings requires access to highly contextualized information which can be sourced from the Building Information Model (BIM) or monitoring systems in place. The interoperability between LCA domain tools and BIM tools is lacking. Our motivation lies in semantically bridging LCA and built environment domains by adopting a Semantic Web (SW) technologies. This would result in increased interoperability on the web, increased automation of information pipelines and more explainable impacts of complex contexts. In this paper we introduce the work in progress under the SemanticLCA ontology where we modelled several use cases for LCA of built assets. To demonstrate this, we showcase one case study at the building level, highlighting the semantic alignments between BIM models, LCA data and sensing devices. The paper discusses the implementation challenges and offers suggestions on how such an ontology can be used in the future.

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

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

# 3<sup>rd</sup> Summer School of LDAC (SSoLDAC)

Fully booked



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

Matera, Italy – 12-14 June 2023

# LDAC2023 Programme and Practicals



## Thursday 15 June

<b>08:30-09:00</b>	<b>Registration at Casa delle Tecnologie Emergenti (CTE)</b>	
09:00-09:05	<b>LDAC2023 workshop introduction and opening</b>	P.Pauwels , W.Terkaj, M.Poveda-Villalón
09:05-10:00	<b>Keynote session: Connect Sensors to Perception via Semantic Stream</b>	D.Le Phuoc
<b>10:00-10:30</b>	<b>Coffee break</b>	
<b>10:30-12:30</b>	<b>Plenary session 1 - digital twinning and asset management</b>	
	Linked data for the life cycle assessment of built assets	C.Boje, S.Kubicki, T.Navarrete Gutierrez, T.Beach
	Lessons Learned from Designing and Using bcfOWL	O.Schulz, J.Oraskari, J.Beetz
	Toards usable ICDD containers for ontology-driven data linking and link validation	P.Hagedorn, M.Senthilvel, H.Schevers, L.Verhelst
	dstv: An ontology-based extension of the DSTV-NC standard for the use of linked data in the automation of steel construction	L.Kirner, J.Oraskari, V.Jung, S.Brell-Cokcan
	Development of a National Scale Digital Twin for Domestic Building Stock	C.Hoare, T.Alqazzaz, U.Ali, S.Hu, J.O'Donnell
	Towards a U.S. National Bridge and Infrastructure Data Dictionary: An Introduction	A.Costin, M.Muller
<b>12:30-13:45</b>	<b>Lunch break</b>	
<b>13:45-15:45</b>	<b>Plenary session 2 - data dictionaries and smart buildings</b>	
	Semantic bSDD: Improving the GraphQL, JSON and RDF Representations of buildingSmart Data Dictionary	V.Alexiev, M.Radkov, N.Keberle
	The semantic link between domain-based BIM models	W.Teclaw, M.H.Rasmussen, N.Labonnote, J.Oraskari, E.Hjelseth
	Making Urban Energy Use More Intelligible Using Semantic Digital Twins	S.R. de Meij, A.J.A. Donkers, D.Yang, M.Klepper
	Modular Knowledge integration for Smart Building Digital Twins	I.Fatokun, A.Raveendran Nair, T.Mecharnia, M.Lefrançois, V.Charpénay, F.Badeig, A.Zimmermann
	Metadata Schema Generation for Data-driven Smart Buildings	L.Chamari, J. van der Weijden, L.Boonstra, S.Hoekstra, E.Petrova, P.Pauwels
	Learning partial correlation graph for multivariant sensor data and detecting sensor communities in smart buildings	X.Xie, M.Herrera, T.Shah, M.Kassem, P.James
<b>15:45-16:15</b>	<b>Coffee break</b>	

**All sessions will be held in the Conference room located on the 4th floor**

<b>16:15-17:30</b>	<b>Industry track 1</b>	
	Asset Information Management for a Communications Network in Ireland	A.O'Keeffe, D.Torrado
	bhOWL: BHoM with Semantic Web Technologies	A.Lombardi, D.Elshani, T.Wortmann, A.Fisher
	An open endpoint and framework for the development of linked data for building energy systems	J.Allan, JongGwan An, R.Fricker, S.Stoller, P.Heer
	The use of the Semantic Web Technologies to provide portfolio-level end of life analysis of the Dutch transport infrastructure	E.Bektas
	Graph and Graphics: Combining two powerhouses into one machine	P.Dohmen, E.Argyris, M.Färber, M.Reeßing

<b>20:00-23:00</b>	<b>Dinner at Ristorante Oi Mari</b>	
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## Friday 16 June

09:00-10:00	<b>Keynote session: Data-driven AI vs. Model-driven AI: Which one should we trust more?</b>	F.A.Lisi
<b>10:00-10:30</b>	<b>Coffee break</b>	
<b>10:30-12:30</b>	<b>Plenary session 3 - compliance checking</b>	
	Linked data for a construction big data platform	D.Simeone
	Don't Shoehorn, but Link Compliance Checking Data	R.Kruiper, I.Konstas, A.J.G. Gray, F.Sadeghineko, R.Watson, B.Kumar
	Validation of building models against legislation using SHACL	E.Nuyts, J.Werbrouck, R.Verstraeten, L.Deprez
	WE-TEST: Leveraging Word Embeddings and Transformers to Extract Semantics from Building Regulations Text	O.Okonkwo, A.Dridi, E.Vakaj
	Taking stock: a Linked Data inventory of Compliance Checking terms derived from Building Regulations	R.Kruiper, I.Konstas, A.J.G. Gray, F.Sadeghineko, R.Watson, B.Kumar
	Terrestrial Laser Scanning for Surveying and 3D Modelling of Underground Built Heritage: A Case Study of Hypogea in the Sassi of Matera	N.M. Notarangelo, N.Capece, G.Manfredi, N.Abate, N.Masini, A.Sole, U.Erra

<b>12:30-13:45</b>	<b>Lunch break</b>	
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<b>13:45-14:30</b>	<b>Industry track 2</b>	
	Using semantic rules for generating SPARQL from semantic mark-up	N.Nisbet
	Implementing and managing mappings for data transformation using SHACL Rules	L.Verhelst
	Semantisation of Rules for Automated Compliance Checking	E.Vakaj, M.Lefrançois, A.Dridi, T.Beach, M.Gaber, G.Costa Jutglar, H.Tan
<b>14:30-15:00</b>	<b>Closing and Awards session</b>	
		P.Pauwels , W.Terkaj, M.Poveda-Villalón

# Thursday 15 June

09:00 - 09:15: LDAC 2023 introduction and opening

09:15 - 10:00: Keynote session

- **Connect Sensors to Perception via Semantic Stream**  
**Danh Le Phuoc, TU Berlin**



10:00 - 10:30: coffee break

10:30 - 12:30: **plenary session 1 - Digital Twinning and Asset Management** (Walter Terkaj)

12:30 - 13:45: lunch break

13:45 - 15:45: **plenary session 2 - Data Dictionaries and Smart Buildings** (Madhumitha Senthilvel)

15:45 - 16:15: coffee break

16:15 - 17:30: **industry track session 1** (Pieter Pauwels)

20:00 – 23:00: LDAC dinner at Ristorante Oi Marì

# Friday 16 June

09:00 - 10:00: Keynote session

- **Data-driven AI vs. Model-driven AI: Which one should we trust more?**  
Francesca A. Lisi, Università degli Studi di Bari "Aldo Moro"



10:00 - 10:30: coffee break

10:30 - 12:30: **plenary session 3** – Compliance Checking (Jeroen Werbrouck)

12:30 - 13:45: lunch break

13:45 - 14:30: **industry track session 2** (Alex Donkers)

14:30 – 15:00: Closing and Awards session

# 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

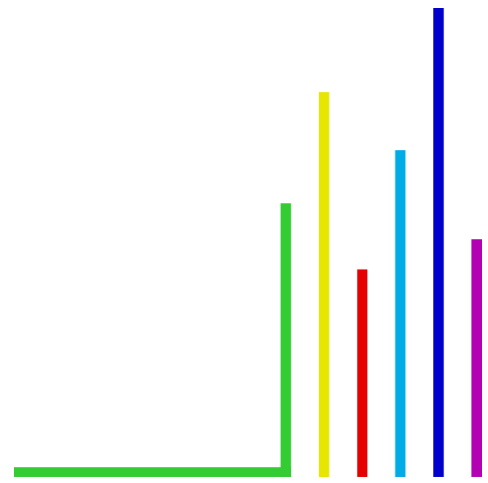
**Danh Le Phuoc**  
Technical University Berlin

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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15-16 June 2023

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Matera, Italy*

