# Curriculum Vita for Thomas Bednar 1.1.2023


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| Date of birth: | 07/06/1971 |
| Place of Birth: | Vienna, Austria |
| Nationality: | Austria |
| Position: | Full Professor<br>Head of Research Unit of Building Physics<br>Head of Institute of Material Technology, Building Physics and Building Ecology<br>Faculty of Civil and Environmental Engineering<br>TU Wien |
| | A-1040 Vienna; Karlsplatz 13/207-02 |
| Languages: | German, English |


## Academic qualifications

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|---|---|
| Since 2016 | Full Professor for Building Physics at TU Wien |
| 2006 - 2016 | Associate Professor at TU Wien. |
| 12/2005 | Habilitation (Venia Docendi) at TU Wien in the field of "Building Physics" |
| 04/2000 | Ph.D. (Doctor of Technical Sciences)<br>Graduation with distinction at the TU Wien<br>Thesis: Assessment of Hygrothermal Behaviour of Building Elements and Buildings – Development of Measurement and Calculation Methods (Beurteilung des feuchte- und wärmetechnischen Verhaltens von Bauteilen und Gebäuden - Weiterentwicklung der Meß- und Rechenverfahren) |
| 06/1995 | M.Sc. Technical Physics<br>Master thesis:<br>Influence of Spin fluctuations on the temperature dependence of electronic transport coefficients (Einfluss von Spinfluktuationen auf die Temperaturabhängigkeit der elektronischen Transportkoeffizienten) |

## Employments and international experiences

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|---|---|
| Since 1.1.2019 | Head of Institute of Material Technology, Building Physics, and Building Ecology<br>Head of Research Unit Building Physics |
| Since 2008 | Head of the Research Centre for Building Physics and Sound Protection<br>Institute for Building Constructions and Technology, TU Wien |
| 10/2014 | Visiting Researcher at Chalmers University of Technology, Göteborg<br>Probabilistic Assessment of Hygrothermal building performance (IEA Annex 55) |
| 02/2013 | Visiting Researcher; University of Technology Turin, Italy<br>Total energy use in buildings (IEA Annex53) |
| 02 /2008 | Guest lecture, Chalmers University of Technology, Göteborg, Sweden |
| 03/2002 | Visiting Researcher at Chalmers University of Technology, Göteborg<br>Hygrothermal building simulations. |
| 2000-2006 | Assistant Professor<br>Institute for Building Materials, Building Physics and Fire Protection, TU Wien. |
| 08/1999 | Visiting Researcher at the University of Strathclyde (Scotland)<br>Building simulation |
| 1996-2000 | University Assistant<br>Institute for Building Materials, Building Physics and Fire Protection, TU Wien |
| 1990,1991,1992,1995 | Employment at Consulting and Engineering Company for Technical Physics<br>Field of work: Nuclear Radiation, Particle Dynamics in Water flows, Air quality measurements, Sound Propagation |
| 1993, 1994 | Employment at SIEMENS Austria<br>Computer Tomography, System for handling telephone calls |

## National Committees or Scientific Advisor

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|---|---|
| Since 2021 | Member of Innovation Lab “renowave.at” |
| 2009-2022 | Member of the scientific advisory board for the<br>Research Centre "Energy and Environment" at TU Wien |
| Austrian Standards | Head of AG 175-01: Calculation and measurement methods<br>on thermal performance and energy use in the built environment |
| Austrian Standards | Member of<br>ASI 175 “Thermal performance in buildings and building components”<br>ASI 208 “Acoustic properties of building products and buildings”<br>ASI 235 “Economic use of energy in buildings”<br>ASI 006 “Fire safety ” |
| Since 2009 | Permanent member of the Federal Advisory Committee for Monuments of the Federal Ministry of Education, Arts and Culture |

## International Committees and Scientific Advisor

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|---|---|
| Since 2016 | Coordinator of CIB W040 “Heat and moisture Transfer in Buildings”<br>https://www.buildingphysics4all.org/ |
| Since 2007 | Nordic Building Physics Symposium<br>Member of the Scientific Committee |
| 2015-2019 | Member of Scientific Reviewing Board Panel “Built Environment” for the Swedish Research Council for Sustainable Development |
| 2010-2015 | Austrian delegate to IEA Annex 55<br>„Reliability of Energy Efficient Building Retrofitting – Probability Assessment of Performance & Cost” |
| 2012 | Member of the international Advisory Board for the<br>Research Assessment Exercise 2012 of KTH/Stockholm / Schweden<br>https://www.kth.se/en/forskning/research-evaluation/rae-2012-1.582169 |
| 2008-2013 | Austrian delegate to IEA Annex 53<br>„Total Energy Use in Buildings: Analysis & Evaluation Methods “ |
| 2010 | Member of the International Scientific Advisory Boards for the development of the Swedish University of Building Engineering Sciences<br>CHALMERS, KTH, LTH, LTU in collaboration |
| 2003-2007 | Austrian delegate to IEA Annex 41<br>„Whole Building Heat, Air and Moisture Response” |
| CEN | Austrian representative to<br>CEN TC 371 “Project Committee - Energy Performance of Building project group”<br>CEN TC 89 “Thermal performance of buildings and building components” |
| ISO | Austrian representative to<br>ISO TC 163 “Thermal performance and energy use in the built environment”<br>ISO TC 205 “Building environment design” |

## Scientific rewards

Sustainability Award 2014 – Field of action: Research
First Place for Doctoral School URBEM

Austrian State Prize 2015 „Clean Technology Austria“
Winner Main category “Research and Innovation”
Plus-Energy Office Tower of TU Wien at Getreidemarkt

# Research Supervision

## Doctoral Schools

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|---|---|
| 2013-2016 | URBEM Head of Doctoral School, Supervisor<br>http://urbem.tuwien.ac.at |
| 2011-2013 | ENSYS2030 Supervisor<br>http://ensys2030.tuwien.ac.at |

## Ph.D.-Projects

David, Alexander:2022
Developing the basic method for quality assurance and accelerated commissioning of energy monitoring systems
Entwicklung der grundlegenden Methode zur Qualitätssicherung und beschleunigten Inbetriebnahme von Energiemonitoringsystemen

Markus Leeb:2020
Entwicklung einer Methodik zur Zielerreichung bei der Planung von energieeffizienten Bürogebäuden
Development of a methodology for archievement of objectives in planning energy efficient office buildings

Ehrlich Florian:2018
Entwicklung eines stockwerkübergreifenden Querlüftungsmodells unter Berücksichtigung von Insekten- und Pollenschutzgittern für Einfamilienhäuser zur Prognose der sommerlichen Überwärmung
Development of a cross ventilation model between floors taking account of Insect- and Pollen screens for single family houses to predict the summer overheating

Neusser, Maximilian: 2017
Analyse des Einflusses von Verbindungsmitteln auf das Schalldämmmaß von leichten Trennwandkonstruktionen durch realitätsnahe Modellierung von Schraub- und Klebeverbindungen
Sound transmission loss analysis of fastening methods of lightweight partition walls by realistic modeling of screw and glue connections

Eder, Katharina; 2017
Interaction of building envelope and cooling ceilings - system analysis and system modeling

Ziegler, Manuel; 2016
Method for establishing scalable load profiles for residential and office buildings to run an urban simulation environment considering construction and mechanical engineering technologies as well as the impact of social differentiation :
Methode zur Erstellung skalierbarer Lastprofile für Wohn- und Bürogebäude in Abhängigkeit der Bau- und Haustechnik sowie der Einfluss sozialer Differenzierung für eine urbane Simulationsumgebung

Gladt, Matthias; 2014
An algorithm for the automatic reduction of multi-zone models for thermal building simulation

Handler, Simon 2014
Steigerung der Energieeffizienz von kleinvolumigen Wohnbauten durch solarthermische Aktivierung von Betondecken : simulationsbasierte Entwicklung eines Gebäudekonzepts und einer neuen Methode zur Vordimensionierung

Nusser, Bernd; 2012
Flachgeneigte hölzerne Dachkonstruktionen : Systemanalysen und neue Ansätze zur Planung hygrisch robuster flachgeneigter hölzerner Dachkonstruktionen unter Beachtung konvektiver Feuchteeinträge und temporärer Beschattungssituationen

Holzer, Tamara; 2011;
Entwicklung eines Anlagensystems zur optimierten Wärme- und Feuchterückgewinnung in Wohnraumlüftungsgeräten

Sofic, Mario; 2009
Erhöhung der Anwendbarkeit vereinfachter Berechnungsverfahren zur Bestimmung des Heizwärme- und Kühlbedarfs von Gebäuden : als Basis für ein Sicherheitskonzept

Dolezal, Franz; 2009
Trittschall-Flankenübertragung bei Massivholzkonstruktionen

Jachan, Christian; 2003
Hygienischer Tauglichkeitsnachweis und Optimierung der bauphysikalischen Performance von Gebäuden in Passivbauweise

## Ph.D.-projects advisory committee

Kukk, Vilu; 2022 (Opponent)
Hygrothermal Criteria for Design of Cross-Laminated Timber External Walls with Ventilated Facades
Tallinn University of Technology

Charlotte Svensson Tengberg; 2022 (Opponent)
A design-build contractor risk assessment framework for new technical solutions in the construction industry
Chalmers University of Technology

Kaufmann, Thomas; 2016
Modellierung und Simulation von urbanen Stromversorgungsnetzen in einem multiskalaren Gesamtmodell

Bothe, Dominik; 2016
Modellierung und Simulation von weit verzweigten, vermaschten Netzen für thermische Energie und Gas

Forster, Julia; 2016
Strategische raumbezogene Visualisierung im Kontext der Innenentwicklung urbaner Siedlungs-, Energie- und Mobilitätssysteme am Beispiel der Stadt Wien

Danilo Schulter; 2013
Nachhaltige Gebäudesanierung durch lebenszyklusorientierte Bauproduktauswahl
TU Graz

Max Funk; 2011
Hysteresis der Feuchtespeicherung in porösen Materialien
TU Dresden

## M.Sc-Projects

72 since 2000

https://catalogplus.tuwien.at/primo-explore/search?query=lsr13,contains,bednar%20diplomarbeit,AND&tab=default_tab&search_scope=UTW&sortby=date&vid=UTW&facet=local13,include,HS-DIPLMASTER,lk&lang=de_DE&mode=advanced&offset=0&came_from=sort

## Important contributions to Demonstration buildings for new methods for design, construction and commissioning of buildings

1140 Wien, Multifamily building Utendorfgasse

http://www.hausderzukunft.at/results.html/id2822


**Rewards:**

Frist passive-house in social housing

Sustainability rating
klima:aktiv 1000 von 1000 Punkten

3400 Kierling, Multifamily building
Renovation and new building without a conventional heating system

http://www.hausderzukunft.at/results.html/id6231

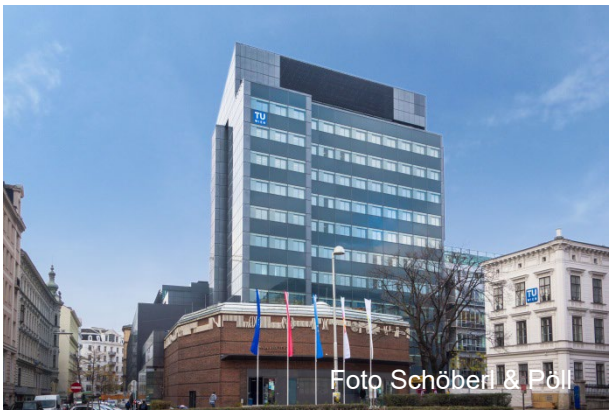

**Rewards:**

First renovation with sustainability rating
klimaaktiv Gold Standard

ETHOUSE Award 2013

1040 Wien, Plus-Energy-High-rise Office building of TU Wien

http://www.hausderzukunft.at/results.html/id6475



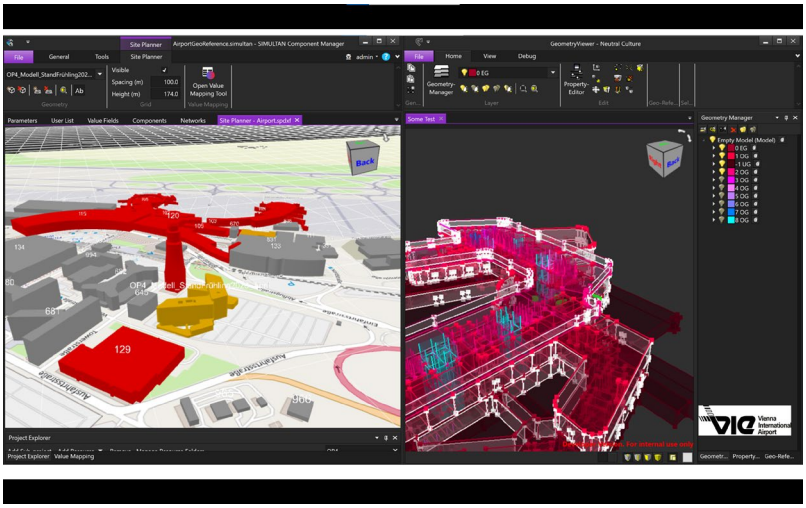

**Rewards:**
Sustainability rating:
klima:aktiv 1000 von 1000 Punkten
ÖGNB TQB 986 von 1000 Punkten

Das innovative Gebäude 2015

Eurosolarpreis 2015

Austrian State Prize 2015 „Clean Technology Austria“
Category Research and Innovation

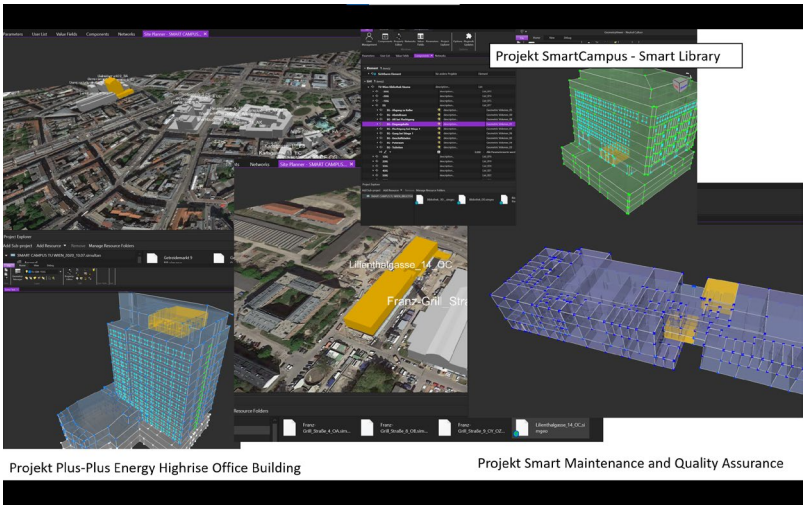
Virtuelle Flughafenstadt Wien – Virtual Airport City Vienna



Siehe auch:

David, A., Sint, S., & Bednar, T. (2022). DATA-DRIVEN MODELLING OF THE ENERGY CONSUMPTION OF AIRPORT CITIES. In *Proceedings of BauSim Conference 2022*. BauSIM 2022 - 9th Conference of IBPSA-Germany and Austria, Weimar, Germany. https://doi.org/10.34726/3621

SmartCampus TU Wien



## Open Source Projects:

https://github.com/bph-tuwien/SIMULTAN

First release 27.10.2022

The SIMULTAN data model for BIM and GIS data offers an Open-Source way to store information about buildings and infrastructure. The main goal is to offer a holistic, open and flexible way to store information for building and infrastructure analyses.

Siehe auch: Bühler, M., Steiner, B., & Bednar, T. (2022). Digital Twin applications using the SIMULTAN data model and Python. In *2022 IOP Conference Series: Earth and Environmental Science*. World Building Congress 2022, Melbourne, Australia. https://doi.org/10.1088/1755-1315/1101/8/082015

## 2000-2019

317 Publications

81 Peer Reviewed

28 SCI Publications

## 2020-2022

20 Peer Reviewed

7 SCI Publications

## Selected Publications:

### Development of virtual environments (physical modeling, numerical solution methods and prototype implementations in IT solutions) for the planning of renovations and new building

P. Wegerer, C. Deseyve, T. Bednar: "In-situ-Bestimmung thermischer Eigenschaften von Baukonstruktionen"; in: "Bauphysikkalender 2012", herausgegeben von: Ernst & Sohn; Bauphysik Kalender, Ernst & Sohn, Deutschland, 2012, ISBN: 978-3-433-60123-5, S. 273 - 296.

P. Wegerer, T. Bednar: "Risikoabschätzung von Innendämmsystemen und Beurteilung der Zuverlässigkeit hygrothermischer Simulationen am Beispiel einer Innendämmung aus Schilfdämmplatten"; "ökosan´11 Internationale Konferenz für hochwertige energetische Sanierung von großvolumigen Gebäuden", 2011, 10 S.

C. Harreither, B. Nusser, T. Bednar: "Decision Support Method for Flat Roofs using Probabilistic Tools to calculate Life Cycle Costs and Energy Efficiency";5th International Building Physics Conference (IBPC), Kyoto, Japan; 2012, P 481-488, 8 S.

Bednar, Hanisch, Holzer, Grüner: Strategische Optimierung der Luftfeuchteregulation
bei Lüftungsanlagen zur Reduktion des Energieeinsatzes für Be- und Entfeuchtungsanlagen
Berichte aus der Energie- und Umweltforschung 1/2013 Herausgeber: bmvit

M. Gladt, T. Bednar: "Fully Automated Calculation Of Shadow Casting With Matrix-Based Coordinate Transformations And Polygon Clipping"; 13th International Conference of the International Building Performance Simulation Association, Chambery, France (2013), 8 S.

F. Friembichler, T. Bednar, S. Handler, et al.: Thermische Bauteilaktivierung. Entwicklung eines Rechenkerns; Schriftenreihe 11/2014 Herausgeber: bmvit; Deutsch, 249 Seiten

K.Eder, Th.Bednar: Effect of façade systems on the performance of cooling ceilings: In situ measurements; Frontiers of Architectural Research; Volume 4, Issue 1, March 2015, Pages 68–78

## Development of sustainable and energy-efficient building concepts

U. Schneider, T. Bednar, J. Sima, H. Liebich: "Baudenkmale im Spannungsfeld von Energieeffizienz und Risikovermeidung" ;in: "Bauphysik Kalender 2010", herausgegeben von: Ernst & Sohn; Bauphysik Kalender, Ernst & Sohn, Ernst & Sohn, 2010, (eingeladen), ISBN: 978-3-433-02938-1, S. 341 - 368.

M. Sofic, A. Korjenic, T. Bednar: "Quantification of safety factors for simplified heating and cooling demand calculation methods for Vienna"; Building Simulation, Volume 4 (2011), Number 3; S. 189 - 204.

M. Dörn, N. Morishita, A. Korjenic, T. Bednar: "The combined impact of thermal renovations and user behaviour on predicting residential heating energy use"; 5th International Building Physics Conference (IBPC), Kyoto, Japan; 28.05.2012 - 31.05.2012; (2012), 8 S.

H. Schöberl, R. Hofer, M. Leeb, T. Bednar, G. Kratochwil; Österreichs größtes Plus- Energie-Bürogebäude am Standort Getreidemarkt der TU Wien; Schriftenreihe 47/2014, Herausgeber: bmvit Deutsch, 160 Seiten

M. Neusser, A. Lederer, C. Harreither, T. Bednar: "Identification of the user Behavior Related Influence on the Estimated Energy Performance"; Energy procedia, 78 (2015), S. 597 - 602.

P. Wegerer, T. Bednar: "Hygrothermal performance of wooden beam heads in inside insulated walls considering air flows"; Energy procedia, 132 (2017), S. 652 - 657.

A. David, M. Leeb, T. Bednar: "Comparison of the planned and the real energy consumption of the world´s first (Plus-)Plus-Energy Office High-Rise Building"; Energy procedia, 132 (2017), S. 543 - 548.

A. David, Th. Bednar, M. Leeb, H. Schöberl Planung: „Ausführung und Betriebserfahrung eines Plus-Energie-Bürohochhauses“; Bauphysik Kalender 2023; Ernst&Sohn; 2023

## Optimization of engineering structures regarding building acoustics and noise emissions

Wolfgang Winter, Helmut Schöberl, Thomas Bednar*;* Holzbauweisen im verdichteten Wohnungsbau Konstruktion - Bauphysik **–** Kosten*;* 2005, 195 S., zahlr. Abb. u. Tab., Gebunden*;* Fraunhofer IRB Verlag

F. Dolezal, T. Bednar, M. Teibinger: "Flankenübertragung bei Massivholzkonstruktionen; Teil 1: Verbesserung der Flankendämmung durch Einbau elastischer Zwischenschichten und Verifizierung der Anwendbarkeit von EN 12354"; Bauphysik, Bauphysik 30, Heft 3 (2008), S. 143 - 151.

F. Dolezal, T. Bednar, M. Teibinger: "Flankenübertragung bei Massivholzkonstruktionen; Teil 2: Einfluss von Befestigungsmitteln auf die Verbesserung durch den Einbau elastischer Zwischenschichten"; Bauphysik, Bauphysik 30, Heft 5 (2008), S. 314 - 319.

M. Neusser, H. Konder, Th. Bednar; Sound pressure fields in two coupled rooms - Comparison of a finite element approach and an analytic solution; Euronoise 2015

M. Neusser, T. Bednar: "Sound radiation efficiency of lightweight building constructions-Study on the influence of panel fastening by numerical calculations and laser scanning vibrometry measurements"; Journal of the Acoustical Society of America, 141 (2017).

## Urban energy systems and optimal building concepts regarding cross building exchange

A. Korjenic, T. Bednar: "Validation and Evaluation of Energy Use in Office Buildings - A Case Study"; Automation in Construction, 23 (2012), S. 64 - 70.

T. Bednar, J. Eberhardsteiner, R. Fritzenwallner, M. Neusser, H. Weinhardt (Hrg.):
"Zur Energieträgerverbrauchsprognose großer, heterogener Gebäudebestände. Grundlagen - Potentiale - Vorgehensweisen"; Verlag der Österreichischen Akademie der Wissenschaften, Wien, 2015, ISBN: 978-3-7001-7838-5; 124 S.

Pollak et.al. Finale Präsentation Aspern+ Subprojekt 2 Gebäudeübergreifenden Modellierung

N. Haufe, M. Ziegler, T. Bednar: "Modelling Load Profiles For The Residential Consumption Of Electricity Based On A Milieu-Orintied Approach"; Vortrag: Sustainable Built Environment (SBE) Regional Conference Zurich 2016, Zürich, Schweiz; 13.06.2016 - 17.06.2016; in: "Expanding Boundaries Systems Thinking in the Built Environment", vdf Hochschulverlag, (2016), ISBN: 978-3-7281-3774-6; S. 184 - 188.

David, A., Sint, S., & Bednar, T. (2022). DATA-DRIVEN MODELLING OF THE ENERGY CONSUMPTION OF AIRPORT CITIES. In Proceedings of BauSim Conference 2022. BauSIM 2022 - 9th Conference of IBPSA-Germany and Austria, Weimar, Germany. https://doi.org/10.34726/3621

## Building and City Information Modelling and Analyses

G. Paskaleva, T. Lewis, S. Wolny, T. Bednar:
"SIMULTAN as a Big-Open-Real-BIM Data Model - Evolution of Virtual Building from Design through Construction into Operation Phase";Poster: CIB WBC 2019 - CIB World Building Congress 2019 'Constructing Smart Cities', Hongkong; 17.06.2019 - 21.06.2019; in: "CIB World Building Congress 2019 Constructing Smart Cities", (2019), ISBN: 978-962-367-821-6; 10 S.

G. Paskaleva, T. Lewis, S. Wolny, B. Steiner, T. Bednar:"SIMULTAN as a Big-Open-Real-BIM Data Model - Proof of Concept for the Design Phase"; Vortrag: CIB WBC 2019 - CIB World Building Congress 2019 'Constructing Smart Cities', Hongkong; 17.06.2019 - 21.06.2019; in: "CIB World Building Congress 2019 Constructing Smart Cities", (2019), ISBN: 978-962-367-821-6; 10 S.

G. Paskaleva, S. Wolny, T. Bednar:"Big-open-real-BIM Data Model - Proof of Concept";Vortrag: 7th International Building Physics Conference, IBPC2018, Syracuse, NY, USA; 23.09.2018 - 26.09.2018; in: "IBPC2018 - Healthy, Intelligent and Resilient Buildings and Urban Environments", (2018), S. 1083 - 1088.

Bühler, M., Steiner, B., & Bednar, T. (2022). Digital Twin applications using the SIMULTAN data model and Python. In 2022 IOP Conference Series: Earth and Environmental Science. World Building Congress 2022, Melbourne, Australia. https://doi.org/10.1088/1755-1315/1101/8/082015