



# INTEGRATING SUSTAINABILITY AND HEALTH IN BUILDINGS THROUGH RENEWABLE MATERIALS



INNORENEW CoE INTERNATIONAL CONFERENCE  
2020



## **INNORENEW CoE**

Livade 6, 6310 Izola, Slovenia

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# WELCOME



As we open the second InnoRenew CoE International Conference, it's hard not to think of all that has changed in the year and a half that has passed since our debut conference.

Although the pandemic has dramatically changed our day-to-day lives, it has not changed society's need to address the rapidly changing climate, reconsider our economic priorities, and refocus our attention on important social issues. Buildings remain part of the solution to many problems, and I think it is becoming clear that we need to consider much more about buildings than the basics of shelter.

As the pandemic kept us indoors, many of us may have realised that our indoor environment plays an even more important role in our well-being and happiness than we previously acknowledged. Likewise, we may have considered more carefully how buildings affect the well-being of those who live in different circumstances. Access to safe, comfortable, and healthy living and working spaces is (and should be) a priority in a just society.

Another major change that will affect our work in the years to come is the introduction of the European Green Deal, which will be a major driver of sustainable development in Europe. The European Green Deal prioritises investment and innovation in building renovation solutions for energy performance and attempts to ensure these solutions reach all members of society. The European Green Deal recognizes the need to establish high-performance housing for all and will support renovation in social housing, schools, and other facilities that are often left behind. This is a step in the right direction for inclusive, high-performing buildings.

I rarely find proclamations of success convincing when it comes to sustainability – especially about buildings. We must continue to drive change through research, development, and innovation to make our built environment a beacon of sustainable development. We cannot be satisfied with the environmental performance of our products or buildings; we cannot allow people to be excluded from our advancements; and we cannot forget that buildings impact the well-being and happiness of their occupants.

At this year's InnoRenew CoE International Conference, we wanted to showcase how renewable materials play an integral role in sustainable construction by highlighting environmental performance, safety, and health as well as the economic, digital, and social links that bind us to the materials in the built environment. Conference presenters will discuss advances in design, material development, health research, retrofitting, environmental assessment, and many other topics that increase the efficiency and performance of the building and renewable materials sectors.

Carlo Battisti, President of Living Future Europe, will weave together these complementary threads in his keynote address, "Healthy, living transparent. The quiet revolution of materials". He works to push for change and supports researchers, architects, engineers, and other construction professionals to achieve it. His efforts have expanded knowledge and acceptance of restorative sustainability and regenerative design within Europe's construction community. We are excited and grateful for his participation in our conference.

Together, the contributions paint a hopeful picture. But we must continue to push the science forward, embed these innovations in normal construction practices, and ensure inclusion of all who can benefit from our hard work.

While I wish these matters could have been discussed in person in Izola, we must embrace new options for discourse on these topics. I hope the conference inspires you to reach out to one another and continue sharing, collaborating, and building communities that embrace the challenge of creating a sustainable and just built environment. You may also consider our new open access and peer-reviewed journal, *Interdisciplinary Perspectives on the Built Environment*, as a place to share the insights your work provides.

Thank you,

Dr Michael Burnard  
Deputy Director, InnoRenew CoE  
Assist. Prof., University of Primorska

# SCHEDULE AT A GLANCE

## MORNING

**WELCOME**  
9:00–9:05

**KEYNOTE**  
9:05–9:35

**FLASH TALKS**  
9:35–10:35

**COFFEE BREAK**  
10:35–11:00

**HUMAN HEALTH IN THE  
BUILT ENVIRONMENT**  
11:00–12:30

**LUNCH**  
12:30–14:00

## AFTERNOON

**COMPLEMENTARY TOPICS**  
14:00–15:30

**COFFEE BREAK**  
15:30–15:55

**SUSTAINABLE CONSTRUCTION  
WITH RENEWABLE MATERIALS**  
15:55–17:25

**CLOSING**  
17:25–17:30

# KEYNOTE ADDRESS



**CARLO BATTISTI**  
**PRESIDENT, LIVING FUTURE EUROPE**

*Healthy, living, transparent.  
The quiet revolution of materials.*

Carlo Battisti has a degree in civil engineering from the Politecnico of Milan, nearly twenty years of experience in construction companies and a master's in management and organizational development from MIP International Business School. His certifications include Certified Project Manager IPMA®; LEED®, Living Future and WELL Accredited Professional; GBC Home AP, GBC Historic Building AP; USGBC® and WELL Faculty™.

Since 2009, he has been working with IDM South Tyrol (Italy) as an innovation manager in the Business Development department, Construction. From 2010 to 2011, he worked with the Energy and Environment Cluster of Trentino as manager of the business unit for sustainable products. From 2015 to 2016, he was the co-owner of a startup focused on LEED consulting. In 2015, he co-founded the Living Future Italy Collaborative.

Since 2017, he has been working with Eurac Research as Chair and Project Manager of COST Action 16114 RESTORE (REthinking Sustainability TOwards a Regenerative Economy). The RESTORE COST Action (2017–2021) will affect a paradigm shift towards restorative sustainability for new and existing buildings and space design across Europe through the collaboration of 160+ researchers from 40 European countries.

Since 2018, he is European Executive Director for the International Living Future Institute and current President of Living Future Europe. The Institute's mission will hasten the change and provide needed direction towards a regenerative design transition in Europe. It is actively pursuing European market alignment and adaptations of the Living Building Challenge (LBC).

# AGENDA

## WELCOME | 9:00-9:05

Dr Michael Burnard, InnoRenew CoE

## KEYNOTE | 9:05-9:35

Carlo Battisti, Living Future Europe

## FLASH TALKS | 9:35-10:35

Balázs Dávid, InnoRenew CoE / UP FAMNIT  
*Using discrete optimization methods in decision support for structural design*

.....10

Dóra Zetz, Breuer Marcell Doctoral School,  
Faculty of Engineering and Information  
Technology, University of Pécs  
*Office Building Optimisation Using the Energia  
Design Synthesis Method*

.....11

Eva Prelovšek Niemelä, InnoRenew CoE  
*Developing temporary housing solutions for  
displaced persons – a study of user needs*

.....12

Faksawat Poohphajai, InnoRenew CoE  
*Evaluation of Biofinish for Wood Protection*

.....13

Hajnalka Juhász, University of Pécs, Faculty  
of Engineering and Information Technology  
*HUNGARIAN NEST+ New type energy spaces in  
sustainable architecture\**

.....14

Hana Remešová, InnoRenew CoE  
*Testing the Thermal Properties of Loose-Fill  
Straw Insulation*

.....15

Jaka Pečnik, InnoRenew CoE  
*Thermo-Hydro-Mechanical Treatment of  
Australian Sawlog and Pulplog Hardwood  
Resources*

.....16

Marko Kovačević, Kompetenzzentrum Holz  
GmbH  
*VOC-emission optimized Cross Laminated Timber*  
.....17

Nežka Sajinčič, InnoRenew CoE  
*Sustainability, health, and renewable materials –  
Trends in scientific publications*  
.....18

Olena Myronycheva, Luleå University of  
Technology  
*The Influence of Four Commercial Wood-surface  
Treatments on Mould-fungi Growth in a Pure  
Culture*  
.....19

René Herrera, InnoRenew CoE / University of  
the Basque Country  
*Improving hydrophobicity and thermal stability  
of wood by esterification with fatty acids*  
.....20

Urška Smrke, University of Ljubljana, Faculty  
of Arts / University of Maribor, Faculty of  
Electrical Engineering and Computer Science  
*Aspects of Residential Environment Included  
in Residential Satisfaction Questionnaires: A  
Systematic Review*  
.....21

Veerapandian Ponnuchamy, InnoRenew CoE  
*Molecular Dynamics Investigation of Capturing  
Paracrystalline Cellulose Phase from mixed  
Crystalline and Amorphous Cellulose under  
Constant Load*  
.....22

Zsolt Benkó, University of Szeged,  
Department of Technology  
*Practical education of Smart Home Systems  
emphasizing sustainability*  
.....23

## COFFEE BREAK | 10:35-11:00

\*Unable to present



## HUMAN HEALTH IN THE BUILT ENVIRONMENT | 11:00-12:30

Aarne Johannes Niemelä, InnoRenew CoE <i>Development of outdoor environment in schools with natural materials – a response of future users</i>	26
Anja Jutraz, National Institute of Public Health <i>Ensuring the health of users with the integrated approach to the renovation of school buildings</i>	27
Anna Sandak, InnoRenew CoE <i>Bioinspired building materials – lesson from nature</i>	28
Dean Lipovac, InnoRenew CoE / UP IAM <i>Psychophysiological and attention restoration in a wooden office: A pilot study</i>	29
Nastja Podrekar, InnoRenew CoE / UP <i>School Furniture as a Risk Factor for Musculoskeletal Pain among Slovenian Students</i>	30
Veronika Kotradyová, Faculty of Architecture, Slovak University of Technology in Bratislava <i>Appreciation/acceptance of traditional and modern appearance of materials and products by users</i>	31

## LUNCH | 12:30-14:00

## COMPLEMENTARY TOPICS | 14:00-15:30

Benedikt Neyses, Luleå University of Technology <i>Continuous densification of solid wood – the band press approach</i>	34
Dennis Jones, Luleå University of Technology <i>A Review of Wood Modification globally – Findings from COST FP1407 and 2019 updates</i>	35
Gregor Lavrič, Pulp and Paper Institute <i>Optical and abrasion properties of plasma treated and UV LED printed wood samples</i>	36
Laetitia Marrot, InnoRenew CoE <i>Towards Smart Textiles for Civil Engineering Application</i>	37
Marco Fellin, CNR-IVALSA (former) <i>Cross Laminated Timber furniture providing shelter during earthquakes. Lifeshell public domain release.</i>	38
Michael Mrissa, InnoRenew CoE <i>Distributed Ledgers and Decentralized WoT Architectures</i>	39
Stefania Fortino, VTT Technical Research Centre of Finland LTD <i>Numerical simulation of moisture transport in thermally modified wood exposed to rain</i>	40

## COFFEE BREAK | 15:30-15:55

IRIC2020 AGENDA CONTINUES ON THE NEXT PAGE

# AGENDA

## SUSTAINABLE CONSTRUCTION WITH RENEWABLE MATERIALS | 15:55-17:25

Erwin M. Schau, InnoRenew CoE  
*A European reference house for Life Cycle  
Assessment of wooden residential buildings*  
.....42

Giulia Pelliccia, Università degli Studi di  
Perugia, Dipartimento di Ingegneria Civile ed  
Ambientale (DICA)  
*HYGROSCOPIC COFFER. Digital parametrization  
and realization of timber bilayer composites for  
passive dehumidification in built environments*  
.....43

Kristóf Roland Horváth, Marcel Breuer  
Doctoral School, University of Pécs, Faculty  
of Engineering and Information Technology  
*Residential Building Optimisation Using Passive  
Design Strategies*  
.....44

Tim Mavrič, InnoRenew CoE  
*Energy Efficient Retrofitting – A comparative  
analysis of implemented strategies in Bosnia-  
Herzegovina and Slovenia*  
.....45

## CLOSING | 17:25-17:30

**THANK YOU FOR ATTENDING IRIC2020!**

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# *Complementary Topics*

## ***Distributed Ledgers and Decentralized WoT Architectures***

Michael Mrissa<sup>1</sup>, Aleksandar Tošić<sup>2</sup>, Jernej Vičič<sup>3</sup>, Michael Burnard<sup>4</sup>

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Collecting sensor data in buildings raises several challenges, such as handling sensor hardware and platform heterogeneity, the distributed nature of sensors, network vulnerability to disconnections, and optimization of resource usage (network, processing power, etc.).

Typical solutions rely on container management tools like Docker (Anderson, 2015) to abstract the heterogeneity of IoT devices and run applications on the edge, harvesting the processing power that recent sensors and middleware devices offer. In such a distributed setup, optimization of device usage becomes a major concern. Existing solutions use orchestration tools like Kubernetes (Hightower, 2017) to allocate applications to the most relevant device on the network. However, these orchestrated solutions remain centralized, which means that they create a single point of failure (SPOF), thus reducing the reliability and security of the whole architecture.

In our work, we designed a fully decentralized architecture that features choreography (Peltz, 2003), rather than orchestration, capabilities while remaining free from SPOF. To do so, we jointly exploit the advantages of consensus algorithms, distributed ledgers, and the Docker API to implement a choreographed solution. Our experiments have demonstrated the effectiveness of optimizing computing resources on the edge. Using a distributed ledger presents the advantage to make the choreography verifiable, which means that anyone can go back in time and observe that the behavior of the solution was optimal.

We validated and evaluated our solution with a proof-of-concept implementation in a national cultural heritage building. Our prototype provides optimal application migration at run-time and tolerates device disconnection. These advances open research opportunities to improve fault tolerance in a distributed system.

**Keywords:** edge computing, distributed ledger, consensus algorithms, sensor networks

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Peltz, C.: Web services orchestration and choreography. Computer 36 (10), 46–52 (Oct 2003)



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