Digital Built Environment – From Challenges to Breakthrough Impacts

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he Joint Conference CIB W78 - LDAC 2021 will take place in Lovembourg between 11-15 October 20

1-15 October 2021



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What I hope to share with you

- Who I am and what I do... (video)
- Challenges of global significance
- There is still hope
- Reimagining innovation
- The European Construction Technology Platform (ECTP)
 - Digital Built Environment (DBE) Committee
- Transition towards a digital built environment trends & priorities
- Examples of some systemic innovations
- Some key takeaways …

Video Sami Kazi (Intro)





Challenges of Global Significance

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The Opportunity or the Challenge!

- More than 50% of the global population lives in cities
- More than 75% of Europeans live in cities
- 70% of global GDP is created in cities
- 85% of Europe's GDP is created in cities
- 90% of all innovations are done in cities
- The Built Environment represents 13% of global GDP
- Buildings account for 40% of all total energy consumption
- 75% of buildings are energy inefficient

97% of the EU's building stock, amounting to over 30 billion m², is not considered energy efficient, and 75 to 85 % of it will still be in use in 2050



There is still hope and here's why

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Video VTT (Amazing Time)

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Where can we (built environment community) make a direct difference

SUSTAINABLE G ALS



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Reimagining

Innovation

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To address challenges of global significance we need to radically rethink how we innovate



Rethinking Innovation and Impact



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Towards a digital built environment to support the physical built environment and smart society

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The European Construction Technology Platform (ECTP)



www.ectp.org

Digital Built Environment (DBE) Committee

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ECTP European Construction ENVIRONMENT Technology Platform

- The ECTP drives innovation and change through research and innovation, to help create a better future for the built environment in Europe (and beyond)
 - 140 members from 26 countries
 - large enterprises, SME's, universities, research organisations and professional associations
- Current focus areas:
 - Active Ageing & Design (AA&D)
 - Digital Built Environment (DBE)
 - Energy Efficient Buildings (E2B)
 - Heritage & Regeneration (H&R)
 - Infrastructure & Mobility (I&M)
 - Materials & Sustainability (M&S)

Connecting key stakeholders to address societal, industrial, and technological problems in the Built Environment www.ectp.org





DIGITAL BUILT ENVIRONMENT

AN ECTP COMMITTEE FOR INNOVATIVE BUILT ENVIRONMENT

- The Digital Built Environment (DBE) Committee aims to:
 - Establish the foundations of the European digitalization strategy towards a digital built environment.
 - Deliver a European-wide consensus around the Digital Transformation of the Construction sector and the needed actions to achieve it.
- Key actions:
 - barriers and limitations to adoption of digital technologies
 - measures and interventions to overcome identified barriers
 - "best practices" from different sectors, institutions and member states.
 - European SRIA and roadmap to support the sector's transition and digital transformation.
 - challenges in different national strategic plans related to the digital transformation of the construction sector.



Transition towards a Digital Built Environment



The Construction Ecosystem Towards Systemic Innovations





Source: ECTP Position Paper (2018), The high-tech building industry in support of the EU energy, climate and sustainability objectives. Towards a generalised European Low-Carbon & Resilient Built Environment

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Trends and Priorities (2021-2027) Application of Digital Technologies

- Governance models for secure data and information delivery across lifecycle and supply chains
- Design technologies / tools
- Transition from IoT to Semantic Construction Web of Things
- IoT integration with BIM enabled platforms
- From building information to urban intelligence using AI
- BIM and digital infrastructures
- Digital tools for data and knowledge management
- Common (European) digital platform and collaboration networks
- End-to-end process digitalization
- New open standards

(e.g. CEN/TC 442 - Standardization in the field of structured semantic life-cycle information for the built environment)



Trends and Priorities (2021-2027) Twin Transition

- Smart operation and maintenance of Buildings and Infrastructures
- Digitalization in support of massive renovation of the building stock
- Integration in the Energy system energy efficiency
- Value Chain integration
- The Built Environment as part of the sustainable urban transition
- Multi-modal transport hubs and urban mobility infrastructures
- Intelligent and highly customised Industrialised construction
- Digital construction site
- Digital Deconstruction



Trends and Priorities (2021-2027) Stakeholder Engagement

- Skills, Training & Digital Capabilities
- Public Administrations Role & Priorities
- Citizen engagement
- Business and financial models
- Pre-commercial procurement
- New (European) Smart Regulations for the Construction Sector

Some examples of Systemic innovations

Energy Efficiency The Home as an Energy Bank

What if:

- your home was an energy bank
- you had more energy than you could consume
- you did not need to pay for energy
- you could actually profit from your excess energy
- Enabling technologies:
 - Automated energy optimisation
 - Plug & play building components
 - Renewable energy sources
 - Energy storage
 - Insulation materials
 - Energy trading stock exchange
 - Off-grid solutions
 - Smart metering
 - (Basic) energy allowancing

Energy Efficiency The Home as an Energy Bank



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Intelligent Buildings Smart Renovation

- Each year in Finland more than <u>7,000,000,000 Euros</u> are spent on renovating facilities and homes.
- Fixing problems <u>after damage</u> has been done (mould, water leakage, degrading structural elements, etc.) are a significant environmental and social cost with long term implications".

Intelligent Buildings Smart Renovation

What if:

- your "dumb" facility became smart?
- would would be energy efficient
- self-optimised based on usage
- configurable based on need offered
- reductions in operational & maintenance costs

Enabling technologies:

- New energy efficient materials
- Embedded sensors
- Interchangeable & modular "plug & use" elements
- Energy storage
- Demand supply optimisation
- Home "health check" platform & service
- Proactive renovation & maintenance

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Smart Cities

From Performance Metrics to Actionable Intelligence

What if:

- you could see how your buildings, districts, and city are performing
- you could check the smartness level of your city
- you could compare your city to other cities
- you could co-create, plan and simulate future scenarios with your stakeholders and determine impacts

Enabling technologies:

- Smart city indicators
- Building analytics
- Energy analytics
- System dynamics
- Digital logbooks
- Data security
- Al algorithms
- Co-creation

http://www.citykeys-project.eu/

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Smart Cities From Performance Metrics to Actionable Intelligence



KPI Visualisation and impact assessment







Global benchmarking

Trend analysis & forecasting

Warnings & alerts

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Smart Cities

Future proof,

co-created with stakeholders and

residents

sustainable, smart, and resilient city

From Performance Metrics to



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Closing Thoughts

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Closing Thoughts

- The built environment has many systems and sub systems that need to be seamlessly interlinked and interconnected in a holistic and systemic way
- Transition towards a digital built environment can help at the very least significantly minimise global challenges of significance that are impacted by the built environment
- A city is at best, as smart as the people who reside in it and who manage it
- Buildings (smart/intelligent & dumb) are part of cities



The Built Environment is an Ecosystem

It has many systems and subsystems that need to be seamlessly interlinked and connected in a holistic and systemic way!

Cites, their residents, buildings, infrastructure, and connected services are an integral part of the built environment













listen and learn from other sectors and stakeholders

observe, envision, plan and orchestrate change

Valorise, and co-create

<u>e</u>xecute and <u>e</u>njoy

Think about Impact & Take a Leap of Faith

Time to fall in love again!



Sami Kazi

Always ready to take a leap of faith #VTTbeyondtheobvious

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