



Delft University of Technology

Transferring Innovation Best Practices

An Open Access Book on the Results of the DigiNEB Project

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Transferring Innovation Best Practices

An Open Access Book on the
Results of the DigiNEB Project



The Digital Ecosystem
for the New European Bauhaus



The digital ecosystem for the New European Bauhaus (NEB)

www.DigiNEB.eu

Project

DigiNEB

(1 October 2022 - 30 December 2024)

Project Coordinator

Frank van der Hoeven, Delft University of Technology

Work Package 3

Pan-EU capacity building

European Association of Architectural Education - EAAE (lead beneficiary)

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Transferring Innovation Best Practices in the New European Bauhaus

An Open Access Book on the results of the DigiNEB project



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Credits

This document aims to summarise the process and outcomes achieved by the DigiNEB project in creating a digital ecosystem for the New European Bauhaus (NEB) initiative. Through the collection of innovative practices, the development of digital tools, and the promotion of collaborative networks, this report documents innovation transfer strategies that reflect the values of sustainability, inclusion, and aesthetics.

The DigiNEB project team deeply appreciates the active participation and commitment of all the entities, organisations, and individuals who contributed with their time, knowledge, and experience in workshops, webinars, and collaborative activities. We especially acknowledge the contributions of the Digital Focus Groups (DFGs) and the Early Adopters Network, who have been instrumental in identifying and evaluating digital solutions applicable in diverse contexts.

We have worked to capture the ideas, experiences, and lessons learned throughout the project, integrating them into the strategies and tools presented in this document. Special thanks go to all participants for their invaluable contributions and for helping us build a digital ecosystem that will enable the implementation and reproducibility of innovative solutions across Europe and beyond.

Abstract

The DigiNEB initiative successfully established a dynamic pan-European network to advance innovation within the New European Bauhaus (NEB) framework. It brought together designers, architects, artists, and business actors—including start-ups and SMEs from sectors such as building, mobility, and health—alongside technology providers, policymakers, investors, and NGOs. This network was effectively connected to existing European networks, fostering synergies and enabling the exchange of expertise. Through a series of strategically implemented activities—workshops, meetings, webinars, and events—DigiNEB mapped and engaged transdisciplinary NEB stakeholders, facilitating the exchange of best practices, insights into digital innovations, and strategies for market adoption.

The project identified and supported cooperative efforts within NEB communities, successfully exploring applications of digital technologies and assessing their societal and economic impacts. The plan ensured active participation, incentivising stakeholders to utilise the initiative's tools and services. The programme of activities included annual events, thematic workshops, and webinars, which served as effective platforms for knowledge dissemination and capacity building.

The broader impact of DigiNEB aligned with the global commitment to carbon neutrality by 2050, as agreed upon at COP26. By leveraging the expertise of architects, urban planners, researchers, digital technology companies, civil society organisations, and policymakers, the initiative delivered transformative solutions. It contributed significantly to the New European Bauhaus's vision of creating sustainable, inclusive, and aesthetically innovative living spaces across Europe. Through its efforts, DigiNEB laid a strong foundation for future collaboration and innovation in NEB-related fields.

Keywords

#New European Bauhaus #Digital technology #Sustainable #Beautiful #Together

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01

Introduction

1.1 Context

The New European Bauhaus (NEB) aims to connect **art, science, and technology, fostering a more just and sustainable living environment**. Additionally, it promotes collaboration across traditionally separated disciplines that jointly contribute creating inhabited spaces. This involves strengthening the built environment's collaborative dimension and value in designing and building greener and more inclusive living spaces for a better quality of life. The creation of liveable spaces involves not only attending to their physical dimension but also their digital facet. Such a digital and transdisciplinary vision aligns with the strategy goals of the European Green Deal. This is also at the core of the DigiNEB project and this book: to **facilitate the transfer of innovative and excellent practices** from the ecosystem of initiatives, projects, and tools gathered by DigiNEB to the NEB community and beyond.

The Role of Digital in NEB

Because of its decentralized nature, the digital dimension plays an important role in the New European Bauhaus (NEB), supporting the exchange of local knowledge in a territory as diverse as Europe. Digital tools and systems enable the sharing of knowledge and experiences connecting to local contexts and cultures by enhancing awareness and knowledge of the different European realities.

Transferring innovation best practices

In the European context, transferring innovation best practices implies:

- ▶ **Adapting** best practices **to different contexts**, creating opportunities for innovation.
- ▶ **Facilitating access** to sustainable and effective digital solutions across regions.
- ▶ Promoting **knowledge exchange among communities and sectors**, strengthening territorial and disciplinary collaboration.
- ▶ Empowering local communities with digital tools to tackle **global challenges**, while respecting their cultural particularities.

DigiNEB aims to facilitate the transfer of knowledge and innovative practices, overcoming sectoral fragmentation and addressing challenges such as sustainability and social inclusion through a Digital Ecosystem for the NEB covering areas of the NEB, such as:

- ▶ **Acceleration of Sustainable Solutions:** The use of digital and smart technologies such as cloud computing and IoT enhances efficiency and sustainability in cities and infrastructure.
- ▶ **Inclusion and Co-creation:** Promoting citizen participation through digital platforms, such as virtual simulations and AR, facilitates the collaborative design of public spaces.
- ▶ **Transdisciplinary Design:** art, science, and technology to create liveable spaces that reflect current cultural values, promoting both aesthetic and functional solutions.

Pan-European Multi-stakeholder Engagement

The NEB aims to bring together a diverse community of professionals, citizens, policymakers, activists, industry, and academia, all working together to share best practices through pan-European initiatives. In contrast with traditional policy initiatives, the NEB is characterized by a bottom-up approach with a pan-European and multi-stakeholder engagement including citizens. A great example of such initiatives is the NEB Awards which have demonstrated the diversity of initiatives around the NEB ranging from anonymous citizens to large-scale governmental initiatives.

DigiNEB has actively participated and organised initiatives, activities and events to engage with diverse stakeholders around Europe. Such engagements have highlighted the best practices in digital innovation and laid the base for the current report.

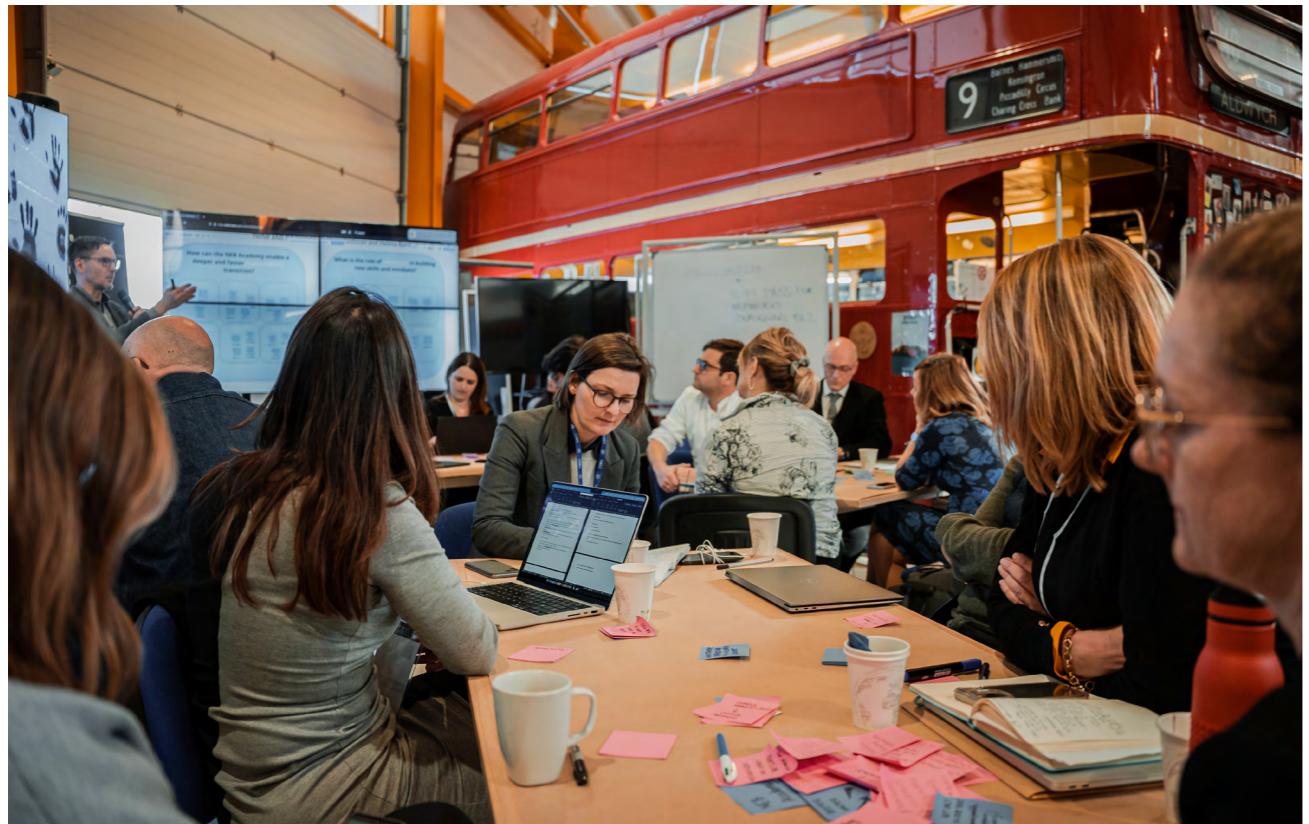


Image: NEB@CERN workshop ©Francisca Siza

1.2 DigiNEB

This report shows DigiNEB's contribution to strengthening the digital capacity of the NEB and promoting a pan-European collaboration framework in which best innovation practices are transferred and replicated for the benefit of communities, institutions, and professionals across Europe. To achieve this, DigiNEB had the following **objectives**:

- ▶ **Digital Toolkit:** A digital toolkit with useful solutions for the NEB community documenting the most notable tools supporting the NEB values providing concrete digital application examples and fostering interaction between solution providers and end users.
- ▶ **Project and Initiative Mapping:** Collecting best practices corresponding to the NEB values and mapping relevant research and industry initiatives for the NEB as a foundation for transferring innovation to different regions of Europe with special attention to the NEB Prizes.
- ▶ **Creating a Digital Ecosystem:** Establishing an exchange network that facilitates the adoption of digital innovations. Through workshops, working groups, and other collaborative encounters, experiences and practices were shared, promoting dialogue and synergies among the various actors interested in the NEB. This includes a network of Early Adopters or actors relevant to the NEB

community.

- ▶ **Learning and Knowledge Transfer:** Focusing on materials and resources that strengthen digital training and upskilling within the NEB, ensuring that transferred practices remain sustainable and effective over time. This will stimulate mutual learning and knowledge transfer throughout Europe.

1.3 Open Access Book

This Open Access Book aims to showcase the **process and results of the DigiNEB initiative** in collecting innovative digital practices supporting the principles of the NEB, encompassing the values of sustainability, inclusion, and aesthetics. It focuses on **facilitating mutual learning and knowledge transfer** among NEB stakeholders, offering a reference framework for the effective adoption and transfer of digital solutions. The current book highlights some **successful practices to serve as models** that could be adapted or spread to different European contexts.

The focus is placed on knowledge transfer to maximise the impact of the NEB and connect the diverse local solutions, projects and tools implemented throughout a decentralised and constantly evolving European context. The current European environment demands integrated approaches that allow NEB communities to access advanced digital solutions and adapt them to their specific needs. DigiNEB facilitates **accessibility and replicability** of best practices in different contexts

and environments, promoting cohesion and interoperability of digital solutions across Europe.

DigiNEB makes these innovative solutions more accessible to different users, helping to equip them with the necessary skills in the most equitable way possible to effectively implement these innovations. Such an approach is crucial for **building a network of skilled actors who will lead the digital transformation** in their respective communities and sectors, fostering a built environment that properly addresses the social, cultural, and environmental challenges of the 21st century.

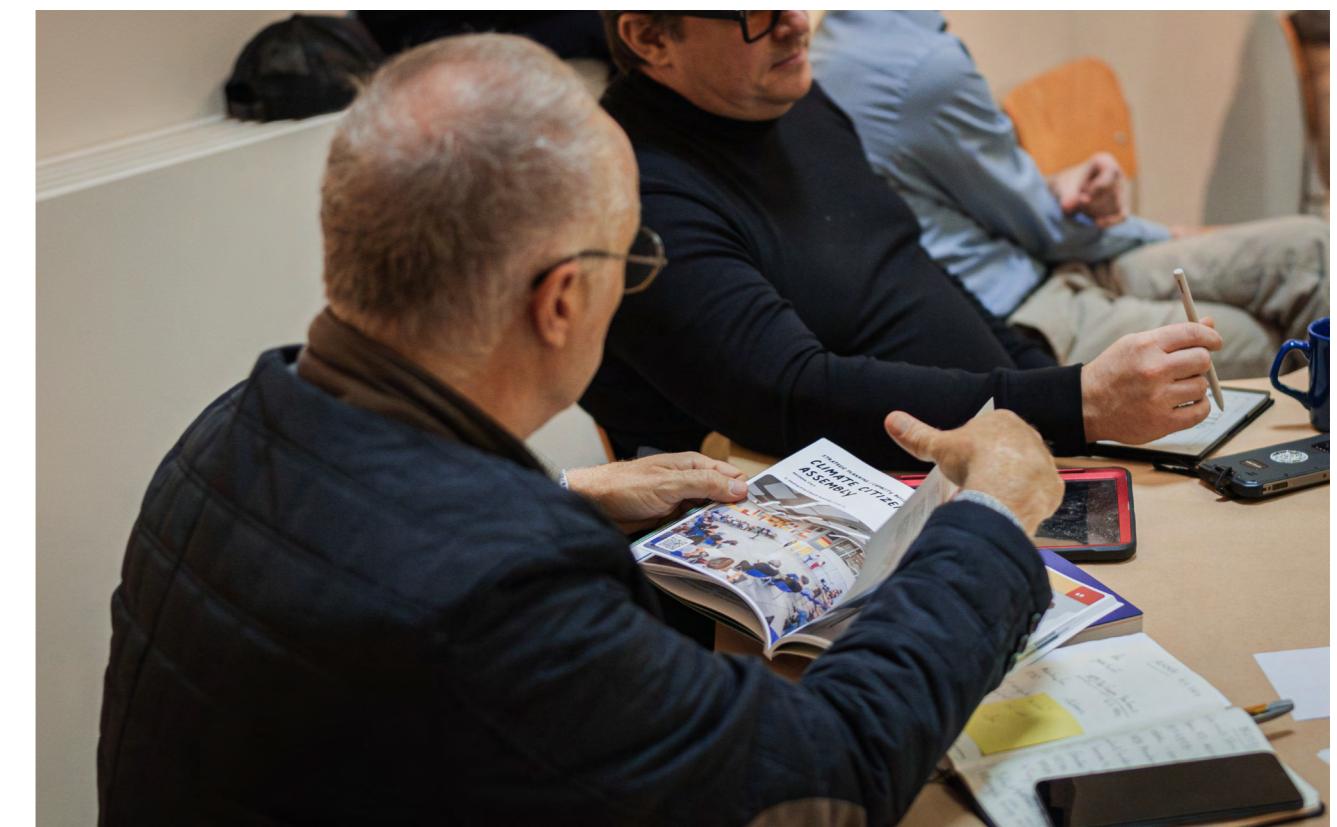


Image: DigiNEB final event ©Francisca Siza

1.4 Methodology



Image: NEB@CERN workshop ©Francisca Siza

To identify and document best practices at the European level, a comprehensive methodology was designed, combining various activities aimed at promoting the active participation of key stakeholders. This methodology included:

- ▶ Identification and mapping of different **stakeholder groups**.
- ▶ Adaptation of actions to **different scales**, covering local, regional, national, and European scales.
- ▶ Organisation of **workshops, events, and activities** aimed at promoting the exchange of knowledge and collaboration among stakeholder groups (SG)
- ▶ Implementation of a strategy for **transferability and adaptation** of the knowledge generated to various European contexts.

Engaging with the NEB Community

Seven key stakeholder groups were identified for knowledge exchange and synergy-creation as well as for facilitating collaboration among them.

The SGs could be individuals, professionals, or entities that have knowledge, experience, or interest in the subject. They ranged from professionals in design, architecture, and urban planning to policymakers, researchers, and ordinary citizens. The identified groups are:

SG1 - NEB Community Professionals: Architects, designers, artists and engineers in the NEB.

SG2 - Construction Industry and Suppliers: Material and technology providers in construction, mobility, and health, with a focus on SMEs and start-ups.

SG3 - Research and Academia: Universities and research centres developing digital and sustainable solutions.

SG4 - Digital Technology Stakeholders: Tech companies developing digital tools and solutions for Smart Cities and AI.

SG5 - Policymakers: Authorities creating policies aligned with the NEB values.

SG6 - National, Regional, and Local Authorities: Entities responsible for executing and coordinating NEB projects.

SG7 - Civil Society and Citizens: Beneficiaries and active collaborators in the co-creation of urban spaces that improve quality of life.

Working at Different Scales

Work was carried out at various scales to ensure both global and context-specific knowledge. These scales were:

Local Level: Collaboration with local authorities, urban planners, and architects to tailor solutions to the specific needs of communities.

Regional Level: Cooperation with regional development agencies, governments, and sector-specific organisations to strengthen policies and projects within each region.

National Level: Collaboration with government entities and public authorities to align solutions with national policies.

European Level: Participation in pan-European networks, through the EAB, DFGs, and the European Commission, to promote the exchange of best practices and foster cooperation at the continental level.



Image: NEB@CERN workshop ©Francisca Siza

Transferring innovation through Stakeholder Engagement

A set of specific formats was designed, tailored to the needs of the project, to promote knowledge exchange and foster collaboration among Stakeholder Groups:



Research and Tracking: Conducting online research and tracking digital tools, solutions, and projects related to the NEB. By exploring existing resources, databases, and ongoing initiatives, we collected relevant examples and documented digital solutions that could be scaled and adapted to different regions. Continuous online tracking enabled the identification of innovations, Early Adopters and best practices aligned with the values of the NEB.



Events and Activities: Digital and physical actions designed to promote stakeholder engagement, synergies and network creation. Webinars, Workshops, Digital Focus Groups and Events aimed to reach a wide audience of pan-European actors. The topics, locations and tools selected were as diverse as possible to increase accessibility and inclusion.



Networks and Synergies: Enhancing collaboration between entities, disciplines, and individuals from different sectors and regions through activities to drive greater cooperation, mutual learning, resource optimisation, and the enhancement of collective intelligence within the NEB community. Relying on existing networks in industry, practice and academy to multiply the effects.



Best practices: Extracting high-potential projects and actors from the engagement with stakeholders. These cases help identify key success and failure factors, also studying their replicability and adaptation to other European contexts and providing a framework for similar implementation.



DigiNEB.eu is an ecosystem, a collective platform documenting and showcasing the best practices for digital tools, projects and actors supporting the NEB. The ecosystem allows key stakeholders to access a wealth of resources and learn from the experiences of others, supporting the growth of a pan-European digital community focused on the NEB.

02

Highlights from Pan-European Workshops and Events

Workshops & Events

16

Workshops

6

Webinars

5

Digital Focus Groups

2

Annual Showcase Events

From the extensive array of events in the DigiNEB initiative, we selected some in-person workshops to showcase how **physical events support the digital platform** and contribute to creating a NEB ecosystem for knowledge transfer.

The workshops were organised for and with the NEB Community in a **continuous dialogue** with the digital platform. For example, Early Adopters were invited to events in which tools and projects were detected and brought over to the website. The idea is that only by creating a strong decentralised and pan-European physical presence, can the digital platform be representative of the diverse and spread NEB Community.

Workshop

- ▶ NEB@CERN
- ▶ Digital Built Environment: Tools, Projects, and Future Directions in Practice, Research, and Education
- ▶ CAAD Futures: Digital Tools in Assisted Design
- ▶ Sharing Experimentation: New European Bauhaus and Digital Interplays - Experiences in Southern Europe
- ▶ JUST Industry Data Week, including dedicated Early Adopter Event – AI for Social Good: JUST Living Environments
- ▶ Circular Education: Assessing Our Present and Shaping the Future

Final Event

- ▶ NEB | Celebrating the Lessons Learnt



Early Adopter Event Workshops #1-8

NEB @ CERN

Type DigiNEB Workshops

Date 27.02.2023 - 01.03.2023

Location Geneva | Switzerland

Hosting Event CERN IdeaSquare



SG1 SG2 **SG3** **SG4** **SG5** SG6 SG7

The NEB@CERN 3-day event was conceived to achieve an early milestone, 4 months earlier than planned, to bring together NEB and smart communities thought leaders and stakeholders around future directions for learning, digital and strategies for EU regions. As a high-level co-creation series of Think and Do Tanks, it provided recommendations for establishing the future NEB Academy, Thematic Working Groups (now Digital Focus Groups), and the Regional Innovation Model Handbook. The NEB Academy was a key theme at NEB@CERN, where dedicated sessions brought together key stakeholders to explore interdisciplinary approaches to education, sustainability, and digital integration in the construction industry. Several new collaborations started as a result of synergies between the NEB and digital communities. As an event designed to onboard Early Adopters, it is described in more detail in deliverable D3.4.

Speakers

- ▶ **Aase Højlund Nielsen**, DESIRE and Project Manager, BLOXHUB
- ▶ **Amanda Brandellero**, CULTUURCAMPUS and Associate Professor, Erasmus University Rotterdam
- ▶ **Andreas Rudenå**, CEO, Paramountric, senior researcher BASAJAUN and DigiNEB ICF
- ▶ **Angel Navarro**, MAtchUP and Mobility programme Officer, Las Naves
- ▶ **Anke Schluensen-Rico**, The HuT Project and Scientific Coordinator, Climate Service Center Germany (GERICS)
- ▶ **Anna Sandak**, leader in Wood Modification at the InnoRenew CoE and Associate Professor at University of Primorska
- ▶ **Carlo Battisti**, Eyes Hearts Hands and President, Living Future Europe
- ▶ **Dan Hill**, Director, Melbourne School of Design and Professor in Built Environment, Faculty of Architecture, Building and Planning, University of Melbourne
- ▶ **Davor Meersman**, The Maximal Impact Foundation
- ▶ **Dirk Ahlers**, NEB-STAR and Senior Researcher and Project Manager +CityxChange at Norwegian University of Science and Technology (NTNU)
- ▶ **Faezeh Abbasi**, CERN
- ▶ **Florence Kuijl**, Communication Manager, InnovaWood
- ▶ **Frank van der Hoeven**, Director of Research of the Faculty of Architecture and the Built Environment, programme manager Open Science at TU Delft and Coordinator of DigiNEB
- ▶ **Gert de Tant**, CEO - Sirus NV / CTO The Maximal Impact Foundation
- ▶ **Heather Bergsland**, NEB-STAR and Project Leader, New European Bauhaus Stavanger
- ▶ **Helena Bjarnegård**, Swedish National Architect, Swedish National Board for Housing, Building and Planning (remotely)
- ▶ **Jan Åman**, Author Duved and Norrlands Model
- ▶ **Jan Bunge**, Director, Squint/Opera and contributor New European Bauhaus High Level Round Table
- ▶ **José Pedro Sousa**, Member of the New European Bauhaus High Level Round Table and Associate Professor at Faculty of Architecture (FAUP), University Of Porto
- ▶ **Jurgen de Jonghe**, CERN
- ▶ **Mar Capeáns Garrido**, CERN Green Village
- ▶ **Markus Nordberg**, CERN IdeaSquare
- ▶ **Markus Reymann**, Bauhaus of the Seas & Director, TBA21 Academy, Ocean Space Venice
- ▶ **Martin Luce**, NEBourhoods and Director, TUM School of Engineering and Design, Technical University of Munich
- ▶ **Matti Kuittinen**, Senior Ministerial Advisor at

Transferring Innovation Best Practices

the Ministry of the Environment of Finland

- ▶ **Mia Roth-Čerina**, Council Member of the European Association for Architectural Education and Vice-Dean for International Relations, Faculty of Architecture, University of Zagreb
- ▶ **Michela Magas**, NEB@CERN curator, New European Bauhaus High Level Round Table and Advisory Board CERN ISAB-g
- ▶ **Natalie Samovich**, CoFounder Resilient-Group / Chair WG Energy AIOTI
- ▶ **Nicole Arthur Cabrera**, Bauhaus of the Seas and TBA21 Academy, Ocean Space Venice
- ▶ **Oya Atalay Franck**, President, European Association of Architectural Education (EAAE)
- ▶ **Pablo Garcia Tello**, CERN
- ▶ **René Ranger**, Max Planck Digital Library
- ▶ **Ruth Reichstein**, New European Bauhaus, European Commission
- ▶ **Ruth Schagemann**, President, Architects' Council of Europe (ACE)
- ▶ **Sandra Vengadasalam**, Max Planck Digital Library
- ▶ **Silvana Muscella**, CEO Trust-IT
- ▶ **Tom Minderhoud**, Architect and Associate Director, UN Studio

The NEB@CERN series of workshops was a milestone in facilitating knowledge transfer and best practices in innovation for the New European Bauhaus (NEB). By bringing together actors from NEB Lighthouse projects, Smart Communities, and NEB Labs, the event facilitated cross-disciplinary collaboration to advance the common goals based on sustainable, inclusive, and beautiful living spaces. Interactive “think and do” sessions gathered input from participants through digital and physical means, emphasising mission-oriented and interdisciplinary learning. These discussions underscored the need for co-created solutions that integrate policy, engineering, design, art and technology.

A highlight was the launch of the **DigiNEB Early Adopter Network**, which connects actors from NEB-aligned initiatives in a digital realm. During the event, participants identified synergies between projects, creating a foundation for ongoing partnerships and the cross-dissemination of best practices.

The event also provided a springboard for the **NEB Academy**, an initiative to upskill stakeholders in the built environment. Participants co-created preliminary concepts for the Academy, focusing on real-world applications such as closed-loop material cycles and region-specific education strategies. This collaborative effort set the stage for a global educational initiative rooted in European values.

NEB@CERN exemplified the impact of community engagement in transferring knowledge and fostering innovation by connecting diverse stakeholders to generate actionable ideas, advancing replicable models for collaboration and education.



Workshop #9

CAAD Futures: Digital Tools in Assisted Design

Type DigiNEB Workshop
Date 05.07.2023
Location Delft | Netherlands
Hosting Event CAAD Futures



SG1 SG2 SG3 SG4 SG5 SG6 SG7

CAAD futures: CAAD Futures is a biannual International Conference on Computer-aided Architectural Design. The CAAD Futures Foundation plays a major global role in advancing and documenting research with its biennial Conference, in collaboration with a richly diverse community in several regionally focused groups. Over recent years, CAAD Futures took place in Los Angeles (2021), Daejeon (2019), Istanbul (2017), São Paulo (2015), Shanghai (2013), and many more before. The first edition took place in Delft in 1985. For its 20th edition, the conference returned to Delft, in The Netherlands. The 2023 conference took place on 5-7 July 2023 and ran in Hybrid mode.

During the three day event the DigiNEB consortium held presentations on Open Science (Frank van der Hoeven) and the New European Bauhaus initiative (Michela Magas) while organising two workshops (Frank van der Hoeven & Mar Munoz Aparici) on the subject of digital tools and projects.



Image: CAAD futures by Frank van der Hoeven

Program & Speakers

July 4th 2023 – WELCOME DAY

- DigiNEB Workshop – **Frank van der Hoeven & Mar Muñoz**

July 5th 2023 – SESSIONS

Invited Talks and Panel Discussion

- **Michela Magas** - Chair, Industry Commons Foundation
- **Cristiano Ceccato** - Director at Zaha Hadid Architects
- **Mathew Vola** - Director Arup, The Netherlands
- **Kean Walmsley** - Software Architect & Senior Manager Autodesk
- **Maxime Cunin & Thomas Krall** - Superworld, The Netherlands

July 6th 2023 – CO-CREATION DAY

Welcome and Invited Talks

- Introduction and Vision - **dr. Michela Turrin and dr. Mariana Popescu**
- Open Science Principles and Meaning - **dr. Frank van der Hoeven**
- The New Open - **Prof. Georg Vrachliotis**
- Reproducibility in (digital) Science - **dr. Rob Lemmens**

DigiNEB Workshop – **Frank van der Hoeven & Mar Muñoz**



Image: CAAD futures by Frank van der Hoeven

Transferring Innovation Best Practices

The workshops at CAAD Futures provided a platform for discussing the role of **digital tools in assisted design** and their connection to the **New European Bauhaus (NEB)** initiative. Through workshops and discussions, experts explored how methodologies such as **coding, statistics, AI-driven processes, and open data frameworks** enhance design, sustainability, and collaboration.

One key **challenge** identified was data overload—while digital tools generate vast amounts of information, their effective use requires abstraction and filtering to extract meaningful insights. AI was explored as not just a computational tool but a way to facilitate design conversations and generate new possibilities. The role of digital archiving was also debated, questioning whether archives should be ever-expanding, generative repositories rather than static records.

Legal and liability concerns were another barrier, leading to compartmentalization of knowledge. To counter this, participants proposed flexible standards that encourage originality while maintaining interoperability, aligning with the NEB's vision for open, participatory design. Sustainability was also a major topic, particularly the hidden costs of innovation. Experts discussed how outdated material subsidies skew the economic viability of sustainable design, calling for policy shifts to incentivize greener practices.

The conference highlighted that while digital tools can **bridge disciplines, foster innovation, and enhance transparency**, they must be accompanied by **critical reflection, ethical frameworks, and supportive policies** to ensure their full potential in shaping architecture's future.

Workshops
#10 #11

Digital Built Environment: Tools, Projects, and Future Directions in Practice, Research, and Education

Type: digiNEB Workshop
Date: 20.09.2023
Location: Zagreb | Croatia
Hosting Event: Zagreb's Architects Association




SG1 SG2 SG3 SG4 SG5 SG6 SG7

The adoption of digital tools and solutions is imperative for the advancement of current and future professionals in the built environment. What tools, projects and applications have we seen so far? When considering the extent of their application and the types of users, what observations can be made regarding their scale? Do the funding opportunities match the needs and context in which researchers, educators and architects work? Furthermore, when examining the different scales of usage (large, medium, small), what conclusions can be drawn regarding their availability and operability? This includes considerations for Open Source as well as other licences.

The event delved into the critical importance of digital tools and solutions in advancing the skills and knowledge of professionals within the built environment. The goal was to foster discussions among the NEB community and extract insights during two workshops—one in the morning, dedicated to practice and research, and another in the afternoon, focused on education. By doing so, we aim to identify existing gaps and chart potential paths forward in the digital built environment. We explored the following key questions:

- ▶ What digital tools, projects, and applications have been developed and deployed thus far?
- ▶ How do these tools and projects align with different user groups and their needs?
- ▶ Are funding opportunities aligned with the demands and context in which researchers, educators, and architects operate?
- ▶ What insights can be drawn by examining usage across different scales (large, medium, small) and considering open-source and licensing aspects?

Program & Speakers

Workshop 1. Digitalisation in the Built Environment

- ▶ **Frank van der Hoeven** – TU Delft, DigiNEB coordinator
- ▶ **Michela Magaš** – Industry Commons, NEB High-level roundtable, DigiNEB EAB chair

Contributions:

- ▶ **Marko Dabrović** – 3LHD, VOLUM3
- ▶ **Uwe Kies** – Innovawood
- ▶ **Roberto Vdović** – Adriatic Green Lab

Discussion:

- ▶ **Roman Šilje** – Croatian Architects' Association
- ▶ **Dubravko Bačić** – Architects Council of Europe
- ▶ **Tihomil Matković** – Zagreb Architects' Association

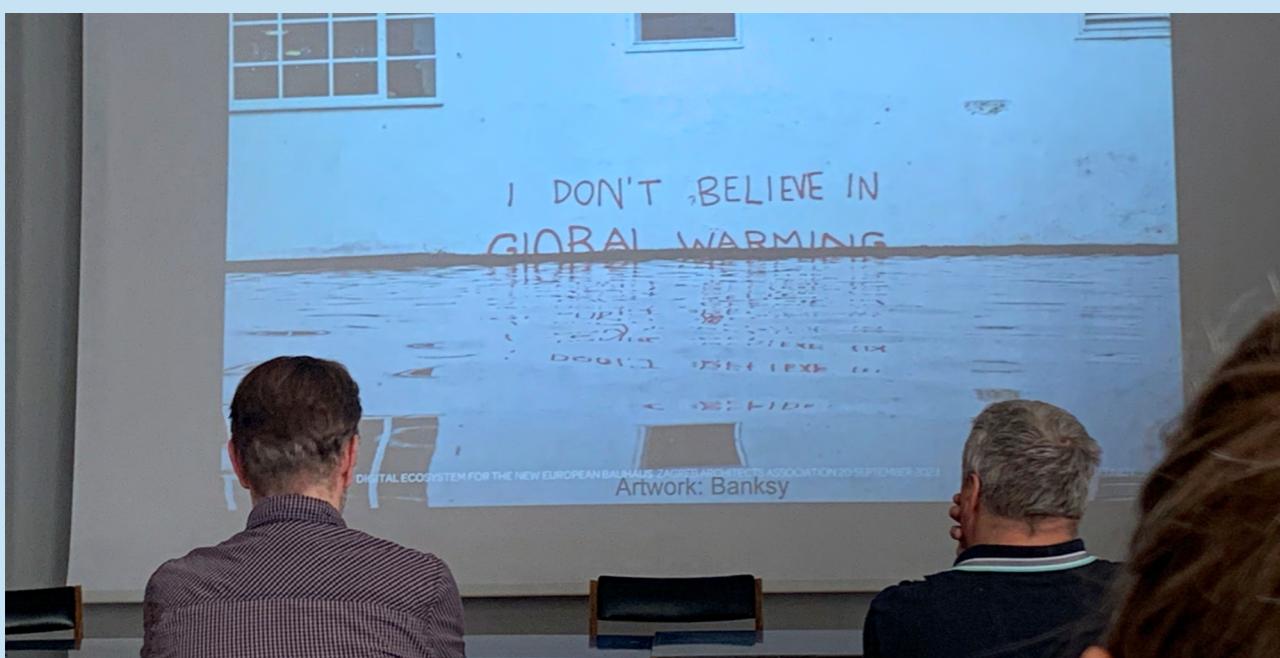


Image: Zagreb DigiNEB workshop by Mar Muñoz

Workshop 2. Digitalisation and education

- ▶ **Mia Roth-Čerina, Roberto Cavallo** – EAAE Remote teaching + SDG workshops
- ▶ **Jose Pedro Sousa** – NEB Goes South online conferences + BIPs

Contributions:

- ▶ **Robert Loher** – Chamber of Architects Continued Professional Development
- ▶ **Damir Mance** – Architectural Education and Practice in the Digital Age
- ▶ **Bojan Baletić** – CENTRINNO – Horizon
- ▶ **Roberto Vdović** – FabLab: Promoting digital literacy

Discussion:

- ▶ **Mia Roth-Čerina, Roberto Cavallo & Mar Muñoz Aparici**, EAAE



Image: Zagreb DigiNEB workshop by Mar Muñoz



Image: Zagreb DigiNEB workshop by Mar Muñoz

Transferring Innovation Best Practices

The workshops on digitalisation in the built environment workshop demonstrated innovative practices in research, education, and professional applications, emphasizing the **transformative potential of digital tools**. By uniting stakeholders from diverse fields, the event facilitated alignment between emerging methodologies, technologies, and the needs of architects, educators, and researchers.

In practice and research, discussions emphasised tools like VOLUM3, streamlining architectural workflows, and the Adriatic Green Lab, leveraging digital platforms for sustainability. Stakeholders claimed challenges in scaling, operability, and licensing, stressing the importance of **open-source frameworks** for democratising access while recognising the contributions of proprietary solutions.

Educational discussions bridged the gap between **digital proficiency and professional demands**. Initiatives like FabLab and CENTRINNO incorporated digital literacy into curricula, equipping future architects to integrate sustainability with advanced technologies. **Collaborative platforms**, such as NEB Goes South and EAAE's SDG workshops, connected academia and professional communities to foster knowledge exchange.

The workshops underscored the need for aligning funding and resources with stakeholder priorities while highlighting DigiNEB's role in **supporting collaborative learning ecosystems**. Ultimately, the event affirmed digital adoption as a cornerstone for systemic transformation in the built environment, towards sustainability, inclusivity, and aesthetic in the built environment.

Workshop #12 **Sharing Experimentation: New European Bauhaus and Digital Interplays - Experiences in Southern Europe**

Type DigiNEB Workshop

Date 12.04.2024

Location València | Spain

Hosting Event CA2RE Valencia | Universitat Politècnica de València



SG1 SG2 SG3 SG4 SG5 SG6 SG7

The New European Bauhaus is a creative and interdisciplinary initiative that connects the European Green Deal to our living spaces and experiences launched by the European Commission in 2020. As a bottom-up initiative, it grows from the active participation of its community of actors in the built environment. This workshop is part of the DigiNEB project which aims to foster a digital ecosystem for the New European Bauhaus initiative.

In this session we delved into the vibrant collective ecosystem of the New European Bauhaus in southern Europe, with special emphasis on the experiences of Spain and Portugal. Our objective is to analyse how digital tools, projects and collaborations are influencing the architectural landscape by promoting innovation within the region. As part of the workshop, participants engaged in discussions and share ideas on:

- ▶ Success stories in experimentation in the context of the New European Bauhaus.
- ▶ Challenges and opportunities encountered in architectural practice and education aligned with NEB values.
- ▶ Possible ways to improve experimentation and knowledge exchange in the digital sphere.

Program & Speakers

Linking the European Green Deal with aesthetics and inclusiveness

- ▶ Roberto Cavallo – Council member EAAE & Associate Professor, Faculty of Architecture & the Built Environment, Delft University of Technology

Regional experimentation in the NEB: NEB Goes South

- ▶ Mia Roth-Čerina – Council member EAAE & Professor Faculty of Architecture, University of Zagreb

Learning by living: advanced technologies supporting inclusive and regenerative education, design and spaces

- ▶ Mathilde Marengo – IAAC Head of Studies & MaCT Co-Director

València, a city for experimentation

- ▶ Mar Ferrer Sáez – Smart Cities, urban Innovation and sustainable development in Valencia Innovation Agency

DigiNEB: connecting the digital with the built environment

- ▶ Frank van der Hoeven – Director of Research, Faculty of Architecture and the Built Environment & Programme Manager Open Science, TU Delft

Transferring Innovation Best Practices

The workshop highlighted Southern Europe's distinctive approach to fostering innovation within the NEB, with particular attention to how digital tools and regional collaboration can support the innovative goals of the NEB. Building on the principles of NEB, the workshop highlighted the interconnected scales of experimentation and innovation. At the European level, discussions focused on how organisations like the EAAE facilitate **knowledge transfer** across borders, bridging academic and professional domains. This was complemented by insights from NEB Goes South, which emphasised the importance of interregional collaboration in addressing shared challenges through experimentation and co-creation.

Zooming in further, regional and local initiatives revealed practical applications of **NEB principles**. Participants examined how institutions like the Institute for Advanced Architecture of Catalonia (IAAC) are integrating advanced technologies to promote inclusive and regenerative education, design, and spaces. Meanwhile, Valencia's Las Naves showcased how local innovation ecosystems can serve as laboratories for urban transformation, blending smart city technologies with sustainable development goals.

The session underscored the role of digital platforms, exemplified by DigiNEB, in amplifying these efforts. By fostering a digital ecosystem that connects diverse stakeholders, DigiNEB enhances the ability to share best practices, tools, and methodologies across regions and scales. Participants agreed that such platforms are essential for sustaining the momentum of experimentation while addressing pressing societal challenges.

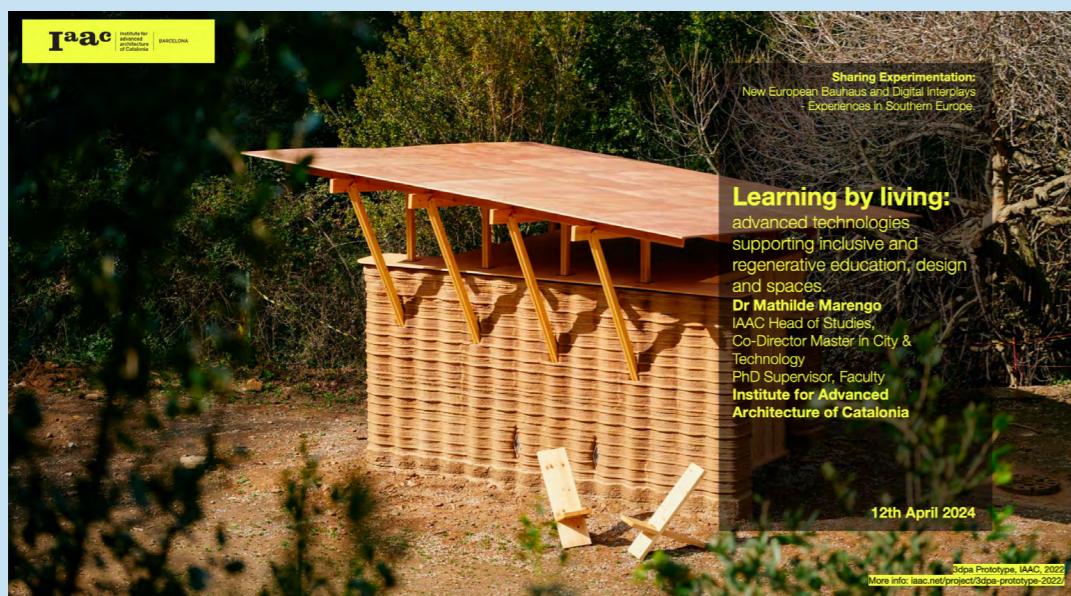


Image: Screenshots from workshop presentation



Image: Photos from DigiNEB CA2RE event by Florence Kuijil & Mar Muñoz

Workshops
#13 #14

AI for Social Good: JUST Living Environments

Type DigiNEB Workshop
Date 16-21.09.2024
Location Linköping | Sweden
Hosting Event JUST Industry Data Week | Linköping Science Park



SG1 SG2 SG3 SG4 SG5 SG6 SG7

The JUST (Judicious, Unbiased, Safe and Transparent) Industry Data Week at EDIH Linköping Science Park provided a full week of knowledge transfer, and included a full day dedicated to DigiNEB and AI for social good as part of the JUST Industry Data Week that connected the NEB community with the digital and industry at the European Digital Innovation Hub (EDIH) Linköping Science Park, located in the current European Capital of Innovation.

The week-long event featured high level keynote presentations, workshops and hands-on experimentation to jointly implement JUST Data practice across domains. The unifying challenge focused on the technological and cultural aspects of Sound for Urban Environments, exploring how to signal and interact in the era of AI, automation and IoT devices; how this affects personal space and culture; and how to ensure that technologies are implemented for social good.

Contributions looked at data-driven systems and technologies that enhance the quality of life in urban spaces (in person and online). The dedicated DigiNEB day included reflections on JUST Data practice as a key component of the hands-on, collaborative methods that allow for prototyping and experimentation across the built environment, primary industry, transportation, healthcare, and earth observation. As an event designed to onboard Early Adopters, it is described in more detail in deliverable D3.4.

Program & Speakers

Welcome to the JUST Data Day for Social Good and introductions to Linköping Science Park

- ▶ **Lena Miranda**, CEO Linköping Science Park and **Michela Magas**, NEB High Level Round Table
- ▶ **Robert Cailliau**, formerly of CERN, the European Laboratory for Particle Physics, and First WWW Pioneer: Benevolence and invention
- ▶ **Kat Austen**: Participatory ethical approaches to the generation of datasets for training AI agents
- ▶ **Petter Ericson**: Data Ethics and the AI Policy Lab
- ▶ **Michela Magas**: JUST Data Practice – judicious, unbiased, safe and transparent

JUST Living Environments

- ▶ Conversation moderated by **Frank van der Hoeven** (TU Delft) with **Francesca Rizzo** (POLIMI), **Kirsi Mustalahti** (ACCAC), **Diana Popa**, (TU Delft), **Stefan Holmlid** (Linköping University)
- ▶ **Ivo Emanuilov**, IP and ICT Law, Industry Commons Foundation: AI Act for social good?

Models for Ecosystemic Regional Innovation

- ▶ Launch of the DigiNEB Handbook for EU Ecosystemic Regional Innovation and lessons learned from Linköping EU Capital of Innovation.
- ▶ Conversation moderated by Andrew Dubber with **Laura Hagemann Arellano**, Joint Research Centre, European Commission; **Lena Miranda**, CEO Linköping Science Park; **Jan Åman**, The Norrlands Model and Prototype for an Ecosystemic Handbook, and **Michela Magas**, NEB High Level Round Table.

Roofs Over Our Heads: JUST Rooftops and Cognitive Cities.

- ▶ Conversation moderated by **Andrew Dubber**: **Sheela Patel** (NEB HLRT/Roof-Over-Our-Heads), **Tom Minderhoud** (UN Studio), **Nuno Nunes** (Bauhaus of the Seas/ITI Lisbon)

Preview of the JUST Data Week results: Experiments for Social Good

Inauguration of the Susan Lesley Bland Prize for Social Good

Transferring Innovation Best Practices

The JUST Industry Data Week brought together a diverse range of experts from the NEB community, industry and digital domains to exchange knowledge over the course of the whole week. The dedicated DigiNEB day on Friday 20th September focused on JUST Living Environments and AI for Social Good, and acted as the culmination of a week of intensive discussions, global brainstorming and interdisciplinary, collaborative hands-on prototyping with digital tools to address local and societal challenges. Working with artists, scientists, academics, industry representatives and digital technology experts provided a unique opportunity to share knowledge through 'learning by doing', by passing domain-specific jargon and coming together in a space of common understanding.



In addition to the Friday schedule above, the whole week of activities represented intensive knowledge exchange between the NEB community, industry and digital technology stakeholders. Keynotes on the first day included Playful Experimentation, Design for Healthcare, Data for Municipal and Regional Innovation, Enhancing Air Quality and Living Environments Through Data-Driven Research, Sonification, Sound and Social Impact, and Data Narratives. The Tuesday Global Brainstorming covered JUST uses of data in cities, values for trustworthy AI, and Sound for Urban Environments. The mid-week hands-on workshops included Deconstructing AI Literacy, Empowering Artists with Earth Observation Data, and Building a Better Sounding World, and a full day on Thursday engaging with the healthcare sector bridged topics of design, ethics and synthetic data. The Saturday showcase event at the Linköping Concert Hall provided a space for demonstration, performance, reflection and feedback on the knowledge shared and created over the course of the whole week.

Workshops
#15 #16

Circular Education: Assessing Our Present and Shaping the Future

Type DigiNEB Workshop
Date 28.11.2024
Location Delft | Netherlands
Hosting Event Circularity in Education | TU Delft



SG1 SG2 SG3 SG4 SG5 SG6 SG7

On November 28, 2024, Delft University of Technology hosted a hybrid event as part of the DigiNEB project, focusing on advancing circularity in education. The workshops convened academic professionals from across Europe, many of whom are involved in significant European research projects, to share insights, practices, and aspirations for embedding circularity into educational systems.

The program, comprising two workshops, explored the current state of circularity education and its envisioned future. By blending in-person and online participation, the workshops provided a platform for vibrant dialogue, collaborative exploration, and collective reflection. Through interactive discussions, participants shared practices, explored future directions, and reinforced the alignment of circularity education with the New European Bauhaus (NEB) values of sustainability, inclusivity, and community.

The discussions underscored the importance of systemic thinking, hands-on learning, and collaboration across sectors. Key themes included material literacy, interdisciplinary education, co-creation, and the challenges of embedding circular practices in various educational systems.

Program & Participants

WORKSHOP 1. Where do we currently stand with our circular education?

Interactive workshop presenting current practices per institution

- ▶ **Andrew Jenkins** – University of Salford, UK
Exploring resource synergies, building reuse, and co-creation in circular research.
- ▶ **Gunvor Marie Kirkelund** – DTU, Denmark
Integrating sustainability and circularity into the curriculum and final projects at DTU.
- ▶ **Ben Croxford & Teresa Domenech** – UCL Bartlett, UK
Expanding circularity initiatives through modules and academic research networks.
- ▶ **Mario Rinke** – University of Antwerp, Belgium
Advancing material literacy and integrating soil research into design studios.
- ▶ **Meryem Birgul Colakoglu** – Istanbul Technical University, Turkey
Supporting circular economy education with digital tools in architecture and urban design.
- ▶ **Arnoud Evrard** – ETH Zurich, Switzerland
Life cycle analysis and regenerative materials in lifelong learning programs.
- ▶ **Ana Besker** – University of Zagreb, Croatia
Bridging educational levels with sustainability through the GREENCO project.
- ▶ **Johannes Staudt** – TU Munich, Germany
Promoting interdisciplinary collaboration through projects like NEBourhoods.

- ▶ **Nuala Flood** – Queen's University Belfast, UK
Integrating circularity through event-based learning and adaptive reuse projects.
- ▶ **Eveline van Engelen** – Bauhaus Earth, Germany
Supporting circular principles through the initiatives of Bauhaus Earth.
- ▶ **Waldo Galle** – Vrije Universiteit Brussel, Belgium
Combining material literacy with systemic thinking in architectural education.
- ▶ **José Pedro Sousa** – University of Porto, Portugal (EAG DigiNEB)
Adapting to the evolving needs of the built environment through circularity, material literacy, and systemic understanding
- ▶ **Mark Kelly** – Atlantic Technological University, Ireland
Leading circularity education through the Build 360 initiative.
- ▶ **Mia Roth-Čerina** – Faculty of Architecture, University of Zagreb, Croatia (EAG DigiNEB)
Promoting circularity education through joint European programs and research projects.
- ▶ **Roberto Cavallo** – Delft University of Technology, Netherlands
The DigiNEB project to support circularity education.
- ▶ **Olga Ioannou** – Delft University of Technology, Netherlands
Developing digital tools and platforms to enhance circularity education.

WORKSHOP 2**How do we envision our circular education in the future?**

Discussion around joint research themes/ ambitions

The workshop on circular education in the future highlighted several key themes. Olga Ioannou presented bio-based materials, adaptive reuse, material literacy, and the importance of co-design and collaboration with industry. Mia Roth-Čerina raised the question of how to bring these resources together, with DigiNEB aiming to address this challenge. Waldo Galle noted the difficulties in establishing platforms for sharing materials, indicating the value of participation.

Mark Kelly and Roth-Cerina both stressed the importance of material literacy, linking it to craftsmanship. Jose Pedro Sousa pointed out the need to consider the entire lifecycle of materials, including where they come from and how they are processed. This aligned with Kelly's point about the concept of "material biographies." Johannes Staudt added that circularity must also be considered at the building scale, particularly regarding the reuse of spaces and components. Roberto Cavallo argued for holistic design thinking to address circularity in multiple ways, while Meryem Birgul Colakoglu highlighted the importance of dynamic design for multiple uses.

The discussion also covered the need to move away from linear learning paths. Roth-Cerina, Ioannou, and Nuala Flood agreed that management and leadership skills are essential for students dealing with unexpected situations. Eveline van Engelen reiterated the importance of thinking in systems or ecosystems. Sousa highlighted the disconnect between education and the building industry, arguing for expanded design tasks that bridge this gap. Waldo Galle added that

attempts to industrialise architecture often fail, and Jose Pedro pointed to the need for a new economic model.

The participants agreed that education needs to tackle circularity at larger scales, beyond small-scale experiments. Gunvar Marie Kirkelund suggested that making materials more available, durable, and findable is crucial. Cecilia Furlan noted that circular material platforms often keep knowledge to themselves, limiting access for educational purposes.

In terms of digital literacy, Colakoglu argued that it must go hand in hand with circularity, while Sousa pointed out the importance of properly storing data on processes. Roth-Cerina and Kelly agreed that situated learning is essential in these contexts. Roth-Cerina also highlighted the need for agile micro-credentials systems for lifelong learning and reskilling.

Finally, the group discussed the need for post-academic training and collaboration with societal bodies, with Roberto Cavallo and Waldo Galle stressing the value of joint efforts. Teresa Domenech noted that industry examples, although useful, often come from highly developed sectors and could present dilemmas for students to tackle. The session concluded with a consensus to establish a Circular Community of Practice, as presented by Sieger van der Aardweg from TU Delft.

miro Circular Educators Network

Please place your pdfs here:

Circularity in Education

Topics

Pedagogies

Platform / how to move on

Non-systemic updates in architectural education

DTU

Image: Collaborative MIRO board from the workshop session

Final Event **NEB | Celebrating the Lessons Learnt**

Type DigiNEB Event
Date 17-18.12.2024
Location Brussels | Belgium
Hosting Event A collaboration with CrAFt, NEBULA, NEB Lighthouses and NEB Labs



SG1 SG2 **SG3** **SG4** **SG5** **SG6** SG7

The final event of the DigiNEB project marked the culmination of the first generation of New European Bauhaus (NEB) projects, offering a moment to reflect on achievements, challenges, and future opportunities. During a two-day collaborative event with fellow NEB projects CrAFt, NEBULA, NEB Lighthouses and NEB Labs, participants shared key milestones and insights, concentrating on digital innovation, sustainability, and regional collaboration.

Through dynamic discussions and interactive workshops, participants explored the NEB project's lessons learned in fostering the NEB values of beauty, sustainability and inclusivity. Central to the event was the emphasis on digital innovation, knowledge transfer, regional collaboration to address pressing societal and environmental challenges. Participants engaged in collaborative dialogues to identify best practices for systemic change through cutting-edge technologies and co-creation taking into account ethical considerations to create a more sustainable and equitable future.

In a time of great transformation for the New European Bauhaus, the event celebrated the accomplishments of the past three years while setting the stage for the NEB's evolution, catalysing impactful initiatives that support the ambitious goals of the European Green Deal.

Program & Speakers

Day 1 – ACHIEVEMENTS

Welcome addresses

- ▶ Frank Van Der Hoeven, TU Delft, DigiNEB project coordinator
- ▶ Annemie Wyckmans, NTNU, CrAFT project coordinator
- ▶ Jacques Timmerman, Belgian Society of AH, Chair of the ACE NEB Work Group
- ▶ Solene Gautron, Joint Research Center, policy officer at New European Bauhaus Coordination Unit

DigiNEB: fostering digital solutions and synergies that boost the New European Bauhaus (NEB) movement | Frank Van der Hoeven

DigiNEB results | Galvanising the NEB community

- ▶ The New European Bauhaus Academy: Up- and re-skilling the sector workforce with innovative trainings | Oliver Jancke, InnovaWood
- ▶ NEB Concepts: Podcast education modules featuring NEB experts on Sustainability, Innovation, and Human-Centred Design in Urban Development | Andrew Dubber, Industry Commons Foundation.

Implementing the NEB in R&D: Challenges faced by EU projects | Clémentine Coujard, NEBULA, Dowel.

Think & Do Tank 1 – What have we learned from “learning by doing”?

Moderated by: Mia Roth-Čerina and José Pedro Sousa | Participation: ALL. The power of NEB for effective knowledge transfer and learning

DigiNEB results | NEB and the Regions

- ▶ Opening Statement by Kieran McCarthy, Cork City Councillor and Member, EU Committee of the Regions
- ▶ Statement by Orla Murphy, NEB HLRT

The Regional Innovation Model Handbook showcasing best practices from NEB projects

Moderator: Andrew Dubber, ICF

- ▶ Kieran McCarthy, Cork City Councillor and Member, EU Committee of the Regions
- ▶ Eszter Davida, member of the NEB HLRT
- ▶ Jan Åman, Author of the Prototype for an Ecosystemic Handbook
- ▶ Michela Magas, member of the NEB HLRT

Statements from the NEB HLRT

- ▶ Shigeru Ban
- ▶ Sheela Patel
- ▶ Hubert Trammer

Think & Do Tank 2 – What have we learnt from EU neighbourhoods?

Moderated by: Aase Højlund Nielsen and Annemie Wyckmans with all lighthouses

Day 2 – WHAT IS NEXT?

NEB and Digital impacts for industry

- ▶ Key digitalisation trends and AI in the NEB – Diana Popa
- ▶ JUST Data / AI for social good – results from the JUST Data Week, Michela Magas
- ▶ DigiPedia – Michela Turrin
- ▶ Wood construction, digitalisation and NEB: the Wood4Bauhaus alliance,
- ▶ Oliver Jancke, InnovaWood

Think & Do Tank 3 – What is NEB in the digital?

Moderated by: Indy Johar and Michela Magas

- ▶ NEB and digital principles, values, JUST Data, AI, ethical dimension, the line of Justice in the digital, AI applications for industry

The NEB Pocket Guide on Climate-Positive Cities and Communities (CrAFTCookbook vol.2) | Katherine Weir

Think & Do Tank 4 – NEB legacy: Impacts & Skills

Moderated by Annemie Wyckmans and Roberto Cavallo

- ▶ NEB Relay & NEB Alliance
- ▶ Future pathways for learning and learners (EAAE, Roberto Cavallo)

Taking results from the NEB legacy into the NEB roadmap: Policy recommendations – ALL projects

Wrap up – Looking forward: a glimpse into the future

Moderated by Frank van der Hoeven, Annemie Wyckmans

- ▶ Introducing “Shaping Sustainable Futures: Innovating for People-Centric Cities and Communities
- ▶ NEB Alliance goes forward



Images: DigiNEB Final Event ©Francisca Siza

Transferring Innovation Best Practices

The final event of the **DigiNEB** project marked a pivotal moment for the New European Bauhaus (NEB) initiative. Bringing together 70 thought leaders and representatives from projects like CrAFt, NEBULA, NEB Lighthouses, NEB Labs, and others, the event celebrated three years of collaborative progress in the NEB. Designed as both a **culmination and a spring-board** for future efforts, it affirmed the transfer of best practices in the NEB community.

The event also served as a platform for **open dialogue**. Think-and-Do Tank sessions encouraged participants to share insights from diverse contexts to identify pathways to learning from each other in collaborative efforts that extend beyond Europe, fostering global impact.

A key theme throughout the two days was the **power of collaboration and co-creation** among NEB projects. Participants reflected on the shared journey of cultivating the NEB's core values—beauty, sustainability, and inclusivity—through systemic innovation and regional cooperation. Interactive workshops and discussions explored how **digital tools and innovative training programs**, such as the New European Bauhaus Academy, transform the built environment.

Highlights included the presentation of **Regional Innovation Model (RIM) Handbook** and **NEB Pocket Guide on Climate-Positive Cities and Communities** which showcased exemplary practices and policies co-created by NEB projects to address societal and environmental challenges.

As the concluding chapter of DigiNEB, the event underscored its legacy as a common platform **supporting collaboration** among the NEB Community. While marking the project's conclusion, it set the stage for continued partnerships, laying the groundwork for ambitious initiatives aligned with the European Green Deal. This event reaffirmed the NEB community's role as a **beacon for sustainable and inclusive innovation**.



Images: DigiNEB Final Event ©Francisca Siza

In a time of great transformation for the New European Bauhaus, DigiNEB gathered the impactful initiatives supporting the ambitious goals of the European Green Deal.



03

Learning from the NEB Community

Digitalisation, Open Technology, and Sustainability



Alessandro Rancati. Exploring the space between policy and design. Experienced in management of complexity, strategic design, design management, visual design. Thinker & maker. Conceptually sound, academically challenged.

What has been your role in the DigiNEB project?

I have been an Early Adopter, essentially verifying the tools published on the website. Initially, I noticed a certain imbalance in the purpose of the tool collection: there was a wide variety of software but without a clear structure. The focus has since shifted to become more organised. My work has primarily focused on business and enterprise management, as I believe that's the foundation, rather than on specific tools like CAD, modelling, or rendering.

Regarding digital tools or “digitools,” which do you consider the most innovative?

I can't say for sure. In my case, I work more on communication and storytelling. However, I believe a significant shift was Adobe's acquisition of FIGMA. This turned a collaborative project into something aligned with a more corporate business model, disappointing those of us who value open tools created by the community.

On the other hand, AI tools have brought significant advancements but also pose challenges, particularly regarding attribution. Beyond economic models, I think recognising the sources of content is fundamental.

What criteria have been used to select digital tools for projects like DigiNEB?

We've focused on three main criteria: (1) open licenses—tools that are not “for profit” because this can be key for reducing costs in small businesses; (2) avoiding monthly subscriptions—many closed solutions work on subscriptions, and when these end, you can't access or modify your files; and (3) comparable functionality—many open tools today are as effective as commercial solutions.

This applies to graphic design, illustration, web design, and even content management systems like Drupal, which is open, free, and extremely powerful.

Do you think these tools are replicable and transferable across different European contexts?

I think the dissemination and scalability of these tools is a challenge, mainly because European institutions don't sufficiently promote local solutions. For example, I find it surprising that many institutions use systems like Microsoft when we have strong European alternatives like Linux.

There are foundations like Framasoft that have developed open tools to replace everything Google offers, yet they don't receive the recognition they deserve. Usability and technological inertia are also significant barriers, beyond just training. It has to be like voting—requiring a conscious effort to change systems and learn new tools. Additionally, the problem with much of today's software is that it simplifies everything, so there's no need to think or know techniques. Everything is possible easily and effortlessly—who competes with that?

What impact do you think digital tools have had on internal work structures at the European level, both on small and large scales?

The impact is significant at all levels. On a small scale, the choice of tools makes a big difference. For example, deciding between Google Maps and OpenStreetMap is not just a technical matter but also a question of values. Using open tools like OpenStreetMap contributes to collective knowledge, while opting for closed tools reinforces private corporate wealth. This also applies to other tools like Adobe or AutoCAD, where open alternatives could play a crucial role. If a publicly funded project develops a new feature, that improvement should be shared with the community, creating a more accessible and sustainable ecosystem.

The key question is whether we really need to reach a massive audience or a smaller, more engaged one.

On a larger scale, this logic should extend to how European projects are promoted. Many resources are allocated to private platforms like X (formerly Twitter) or Instagram, contradicting the val-

ues of transparency and sustainability we advocate. Institutions like the European Commission have the power to lead change and adopt ethical alternatives like Mastodon. These tools not only reinforce our principles but also highlight European leadership in building a digital ecosystem aligned with our goals.

Do you think Europe is losing technological sovereignty?

Without a doubt. We're supporting external structures instead of creating our own technological ecosystem. If we don't diversify the tools and platforms we use, we become entirely dependent on large corporations, which is dangerous for resilience. A clear example is what would happen if Amazon or Microsoft servers went down. We need more robust and sustainable alternatives.

In the realm of learning, how do you see the relationship between the digital and the real?

Platforms like Moodle are a good example of open licenses applied to learning. However, learning cannot be limited to knowledge formalised in texts and videos. In fields like construction or interior design, practical experience is fundamental. For instance, you can watch tutorials, but until you work directly with materials, you don't truly understand the timing, costs, or processes involved.

Our NEB-HUB project identified that local chapters are essential for creating immersive learning experiences. The relationship between the digital and the real should be fluid, allowing digital platforms to serve as a record and access point while staying connected to tangible reality.

How do you think the use of open licenses benefits digital tools and the dynamics NEB should promote?

The most evident benefit is cost: open licenses seem cheaper because they don't involve subscriptions, though they require investment in installation, maintenance, and updates. This fosters job creation and local capacity building, contrasting with centralised platform models that automate everything but foster dependency and fragility.

Publicly funded projects should ensure their impact aligns with ecological transition goals by assessing energy and material use and prioritising technologies that reduce their environmental footprint.

What basic step would you recommend to promote open technology?

Start with the operating system: use LINUX or UBUNTU. Developing even part of the project with an open, European-backed system fosters discovery of tools that are often free, accessible, and, in some cases, more efficient than commercial solutions.

What would you recommend for facilitating knowledge transfer?

The key is using open digital formats and accessible repositories. This means not only choosing open formats to share information but also strengthening distribution networks, which often pose barriers to accessing knowledge. Prioritise intermediaries who work openly and keep knowledge available to everyone.



Image: DigiNEB Final Event ©Francisca Siza

Massive Open Online Courses for Global Impact



Nelson Mota is the winner of the 2022 edX Prize for Exceptional Contributions in Online Teaching and Learning, for the online course Global Housing Design. The course, which focuses on the design of sustainable and inclusive housing, directly addresses the critical global need for urban development expertise, with close to a billion people worldwide currently living in inadequate housing.

What inspired the creation of the Global Housing Design MOOC on global housing design?

This MOOC was inspired by our group's (Global Housing) tradition of collaboration with colleagues and students from around the world, especially from the so-called Global South, or as we prefer to call it, the Majority World. Over the years we've engaged in these productive collaborations, we've consistently witnessed that the housing crisis is a global issue. It encompasses various aspects that are prevalent across different regions, while also having managerial and design approaches that are tailored to the specific socio-economic context or cultural background of a particular place. For us, the format of the MOOC became an opportunity to discuss those global issues, but also to become more aware of the specificity of each situation.

How does it align with the principles of the New European Bauhaus of sustainability, inclusivity, and aesthetics?

While we didn't use the NEB principles explicitly, they became indeed key aspects of our approach. As it is well known, in the coming decades we'll face a challenging increase of the urban population, bringing housing to the centre of the discussion on

sustainable urbanisation. We acknowledge, however, that many people affected by this issue don't have their voices heard or have been excluded from decision-making processes that will affect their everyday lives. Our MOOC aimed at contributing with knowledge and tools to make housing more inclusive, from the decision-making processes to the actual design and construction. We believe language and communication also play an important role in this mission. Hence, we have decided to explore a media format, the video animation, and a strong visual language to increase the engagement of the learners through aesthetics.

What is the audience of the MOOC?

The Global Housing Design MOOC has been designed to target four different types of audiences:

- ▶ Undergraduate and graduate students of architecture, urban design, real estate and housing policies who are interested in learning about innovative concepts in the design of affordable housing and their relationship with the city.
- ▶ Recent graduates & practitioners who are currently engaged in the design and building of affordable housing projects worldwide, or housing experts and consultants that advise government agencies, think-tanks, NGOs and real estate development companies on issues related to affordable housing design and delivery. And,
- ▶ Teachers & Researchers currently engaged in the research and education of low-income housing especially in the contexts undergoing a process of rapid urban growth.
- ▶ Social Scientists (e.g. urban sociologists, anthropologists and people from other non-design related fields) who are interested in how the built environment affects us and how we live.

What pedagogical approaches have you found most effective in fostering active learning and collaboration in a digital environment?

We used digital animations to illustrate and explain the case studies that embodied the core concepts of the course. We believe that was a significant contribution to engage the learners and encourage their active participation in the course activities. Furthermore, we made every effort to facilitate cross-cultural exchanges through discussion forums and peer review activities.

The course addresses global housing challenges. How do you balance regional specificity with universal design principles in the curriculum?

This was a delicate balancing act to achieve. In the course's gen-

eral lectures, we've tried to provide a comprehensive overview of the global housing challenges. On the other hand, each of the three main themes of the MOOC was illustrated with a specific case study, complete with its unique context. To complement each case's specificity, we've also included a dedicated module that focuses on global perspectives, aiming to showcase regional approaches to each course theme. Furthermore, we've designed a series of homework assignments that explicitly incorporate the learner's specific context into the themes explored in the course.

Do you think that the NEB values are global values?

I believe they are. However, the social relevance and importance of each of the three key values (sustainability, inclusivity, and aesthetics) will certainly be perceived and assessed differently, depending on your geographical location or the context in which you work. Regardless, I believe it's crucial to emphasise that any policy or design proposal should somehow consider and integrate these values.

Can you share any success stories where participants applied the knowledge gained in the MOOC to address housing issues in their local communities?

The final assignment of the MOOC was exactly that: the participants were challenged to apply the knowledge gained from the MOOC in a design proposal to address the housing issues in their community. Regardless of the depth and quality of the proposals developed by the participants the results revealed a multitude of different approaches, whose depth and quality were extremely varied. In any case, this assignment was mostly a prompt to make sense of everything that was discussed in the previous modules and reflect on their relevance in the learner's familiar environment. Overall, the feedback received from the participants was very positive and encouraging. Paradoxically, one of the most gratifying stories we learned in this process is about many learners who decided to explore Global Housing Design further, coming from different parts of the world to Delft to enrol in our Master programme and continue the conversation in person in the classroom.

What role does the digital tools and platform play in enhancing the learning experience for this course, and how do you leverage them? Is there an added value to the course being digital instead of classroom based?

The course was designed to foster an engaging learning experience for participants from diverse backgrounds, including various demographics, geographic locations, cultural differences, and educational levels. The digital platform edX played a pivotal role in significantly increasing the number of learners enrolled in the course. Over the four runs (one teacher-paced and three student-paced), the course has garnered an enrolment of over 14,000 learners. The diverse inputs

and perspectives provided by this vast number of participants are difficult to achieve in the traditional classroom setting. The digital platform serves as an effective vehicle for global dissemination and exchange of knowledge, which we highly valued and appreciated.

How do you see digital tools evolving in the context of eLearning for architecture and design, and how might they shape future MOOCs?

Design education demands iterative processes that often require one-on-one discussions and in-person knowledge sharing. eLearning platforms for design education (including architectural education) such as MOOCs have the potential to be optimally used to engage large communities of learners in expanding their understanding of design precedents, the disciplinary conceptual framework, global and local societal issues. Moreover, eLearning platforms can be an excellent medium to establish connections that foster interdisciplinary exchange, identify common ground between different disciplines, and contribute expert knowledge to address global challenges.

What lessons from this MOOC can be transferred to other educational initiatives focusing on digital innovation in the built environment?

The most important lesson we learned while producing and running the Global Housing Design MOOC is that complex concepts can and should be unpacked in ways that can be communicated and understood by communities of learners coming from different geographies, walks of life, and cultural backgrounds. In one word, learning environments should promote an inclusive exchange of knowledge. In this MOOC, we implemented this goal using visual communication to create an inclusive environment for knowledge exchange and dissemination. eLearning formats, such as MOOCs, can be an excellent vehicle to explore the potential of visual communication and reach out to communities of learners that otherwise would be excluded. Another strategy we used was bringing everyday life and the learner's own context to the discussion. Rather than using only obscure references and exquisite examples, we tried as much as possible to show how the concepts we were discussing were part of the learner's social and physical environment and their everyday practices.

Podcast as Knowledge Transfer Tool



The DigiNEB project has produced a modular podcast series hosted by Andrew Dubber that features conversations about sustainability, innovation, and human-centred design with leading architects, educators, and project leaders from the NEB community.

NEB Concepts allows listeners to explore themes by topic tags such as climate adaptation, technology integration, and interdisciplinary collaboration – or continue with the wide-ranging thoughts of a single interviewee. Each short episode provides a collection of ideas and practices, projects and reflections, highlighting the transitions and the transformative potential of the New European Bauhaus for a more inclusive and sustainable future.

Why did you choose a podcast to share knowledge about the New European Bauhaus (NEB)? What unique value does it offer?

There are three main reasons: depth, durability and repeatability. Unlike a publication, you get the richness of the experts expressing their ideas with the space and the scope for the interviewer to explore further, ask deeper questions and respond to the answers with more questions that provide a fuller understanding of a topic, usually without jargon. The podcast also has permanence. Unlike social media posts that are ephemeral and fleeting, podcasts can serve as a durable resource where you can return to hear - in the speaker's own words - what they said and, importantly, how they said it. And unlike a workshop, you don't have to rely on your memory or your notes - you can listen again at any time. In that respect, it represents an ideal form of 'masterclass' - with direct access to the expert that you can replay - and in a format that is conversational, informal and personal.

How does the podcast format compare to other methods like workshops or publications in fostering innovation?

One of the primary keys to fostering innovation is the understanding that making an impact is possible. That knowledge unlocks so much innovation potential. What a podcast does is to humanise the communication. It makes the person speaking relatable, and the listener can imagine that the kinds of innovation they describe might also be possible for them. Publications, in particular, tend to be one-way communication: expertise being presented in the formal style of the discipline. This distances the reader from the author. Despite interactive elements, workshops also tend to have a similar 'presenter and audience' power dynamic. A podcast is conversational, and the interviewer stands in for the listener, able to ask questions that elicit further information and interrogate the premises and conclusions of the information being presented while creating a rapport that ensures the facts presented have a more personal and emotional impact.

How does the podcast support DigiNEB's goal of creating a unified digital ecosystem?

It's important to realise that unity is not monolithic, and a digital ecosystem is not a megaphone or just a collection of practical tools. A NEB digital ecosystem needs to reflect the community's diversity of voices and perspectives. A podcast provides the opportunity to reflect that diversity, reveal the very human ways in which we converge, and share knowledge in a personal and approachable way. The human voice, especially when speaking about something that deeply matters, is a powerful communication tool. The podcast leverages aspects of digital technology to provide a powerful means of knowledge exchange within the community. It is complementary to other methods, adding richness rather than replacing other

forms of content or distribution methods.

How do you showcase innovation best practices through the podcast, and what themes resonate most?

As an interviewer, the best way to showcase innovation best practices is to lean into the expert's enthusiasms. People are animated by the things they do that have meaning and impact. By asking them to speak about what they find important and meaningful about their work, you will inevitably come to best practices. There is a wide range of topics that come up in the series, but the NEB values shine through - not as adherence to policy, but as shared (or significantly overlapping) personal value systems that prioritise sustainability, inclusion and aesthetics. The recurring themes throughout the series are about the value of community engagement and participation, the far-reaching impact of NEB thinking and action - even at a small and local scale - and technology's affordances, opportunities and challenges we need to consider, not only from a technical perspective but also from a cultural and ecosystemic one.

What have been the podcast's most significant results so far?

How do you measure its impact?

I would say that the podcast's biggest potential impact is its integration into curricula and the pedagogical material for the NEB Academy, so that these expert voices can reach the next generation of architects, designers and planners whose work will shape the world and our experience of it. That said, one of the more significant impacts is the NEB community getting to know itself better. The podcast helps people learn about the human beings behind the ideas and feel like they get to know that expert as a person. This is what builds the NEB ecosystem as a community and not just a group of individuals independently working on the same sorts of problems.

What tips would you give to others using podcasts for knowledge sharing and innovation transfer?

As a broadcaster, I would want my advice here to be technical or professional in nature. While it's true that anyone can start a podcast and that far more projects should include them for knowledge exchange, dissemination and community building, it is - like all other communication forms - also a skill with technical and performative dimensions that are learned and practised. Anyone can start a podcast, but nobody should have to listen to bad ones. Good sound matters. Editing matters. Being interesting matters. Asking open questions is essential, as is listening to the answers and asking further questions based on them. Far too many people go into an interview with just a list of questions they tick off when asked. Still more simply say whatever comes into their head with-

out any preparation, and the interview has no shape, destination or purpose. The most important thing, perhaps, is positioning. You need to assume your listener has a level of intelligence but not that they have deep specialist knowledge. And then you need not to be afraid to ask what might seem to be stupid questions to get the kinds of answers that genuinely convey the lessons that you are there to uncover.

What lessons have you learned about the role of podcasts in advancing NEB's goals?

What these podcasts have revealed is precisely what you might expect: that the NEB community is full of intelligent, creative and interesting people who have good ideas and incredibly strong values. I believe the best way to advance NEB's goals is to bring that community together and work collectively. Getting to know each other, and listening to a podcast that makes you think, "I really like what this person is saying, and they sound like someone I would love to work with" - that's a fantastic start.



Images: podcast recording by Andrew Dubber ©Andrew Dubber

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DigiNEB Deployment Roadmap



Image: DigiNEB Final Event ©Francisca Siza

The New European Bauhaus (NEB) is a European Union initiative aimed at transforming the design, planning, and construction of living environments to make the green transition enjoyable, attractive, and accessible for all. The DigiNEB project supports this vision by bridging the digital and NEB communities, creating a pan-European digital ecosystem to promote EU digital solutions for greener, more inclusive living spaces. DigiNEB focuses on raising awareness, fostering collaboration, and ensuring the long-term sustainability of digital tools and methods within the architecture, engineering, and construction (AEC) sector.

DigiNEB outlines in this context a roadmap to ensure the long-term impact of its initiatives, emphasizing the transfer of methods and tools to stakeholders. The roadmap aligns with the NEB Academy, which aims to upskill and reskill the construction ecosystem for a regenerative, bio-based, and circular economy.

DigiNEB's **digital literacy and digitalisation roadmaps** aim to create a cohesive, sustainable, and inclusive ecosystem for the AEC sector. By addressing gaps in funding, accessibility, interoperability, and digital skills, these roadmaps will support the EU's Green Deal and ensure the long-term success of the NEB initiative through the continuation in the NEB Academy. The integration of open education, micro-credentials, and open-source solutions will empower stakeholders to drive the green transition effectively.

Digital Literacy

Timeline

- ▶ **2020–2025:** Launch the NEB Academy Alliance and pilot micro-credentials.
- ▶ **2025–2030:** Develop the NEB course base, EU dataspace for OER, and Open Badges/EuroPass system.
- ▶ **2030–2035:** Implement EU-wide micro-credentials and funding mechanisms for lifelong learning

Roadmap

1. **NEB Course Base:** Establish a certified repository of courses and training options to unify offerings across the EU.
2. **EU Dataspace for Open Educational Resources (OER):** Create a centralized infrastructure to share, mix, and reuse OER, integrating them into local Learning Management Systems.
3. **Integration of Digital and AI Literacy:** Integrate digital and AI literacy into professional titles like “architect,” pushing higher education institutions to include these skills in their curricula.
4. **EU Micro-Credentials:** Implement a standardized system for micro-credentials (3–30 ECTS) to certify lifelong learning, ensuring recognition across EU member states.
5. **Open Badges / EuroPass:** Develop a standardized system for digital badges or certifications to validate micro-credentials and skills acquired through lifelong learning.
6. **Financing Mechanism for Lifelong Learning:** Establish funding mechanisms similar to those for traditional education to support lifelong learning initiatives.
7. **Course Localization:** Support the translation and adaptation of courses to local languages and regional specifications to ensure accessibility across the EU.

Digitalization

Timeline

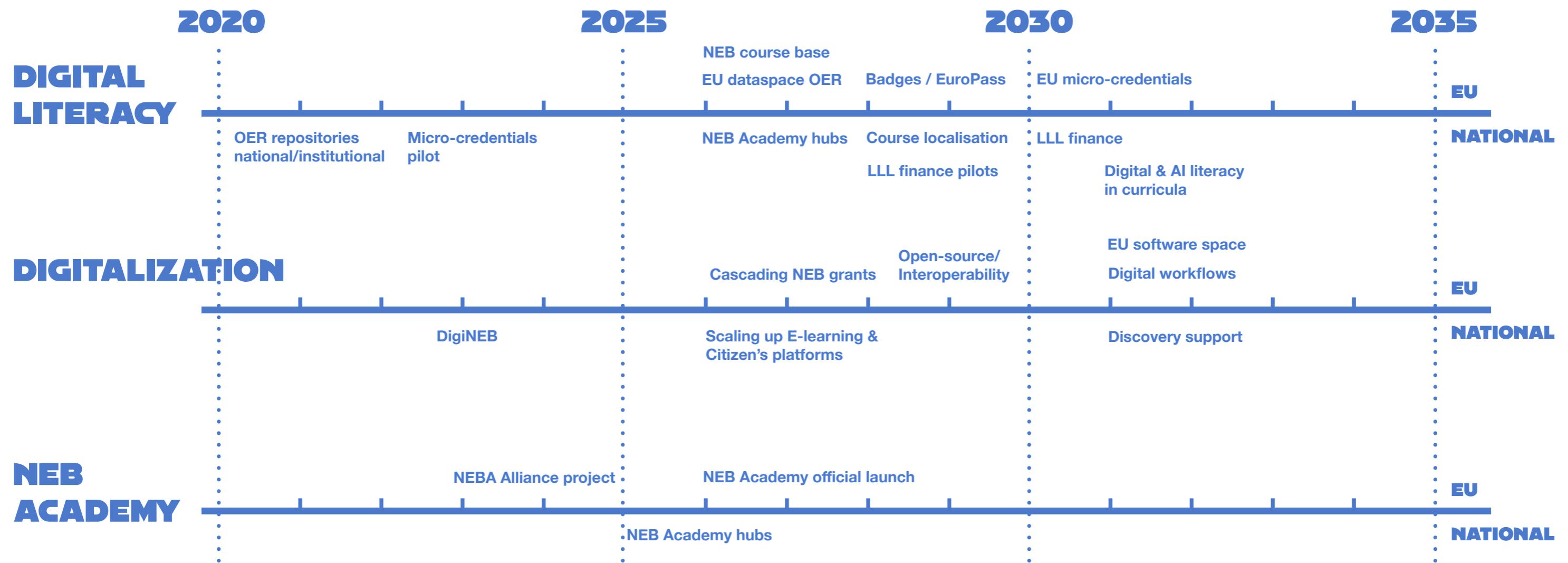
- ▶ **2020–2025:** Launch DigiNEB and initiate cascading grants.
- ▶ **2025–2030:** Develop open-source e-learning and citizen platforms, enforce open-source and interoperability requirements for EU-funded projects.
- ▶ **2030–2035:** Focus on digital workflows and establish the Horizon software space.

Roadmap

1. **Cascading NEB Grants:** Allocate funding to smaller NEB stakeholders through cascading grants, enabling them to participate in EU-funded projects.
2. **Open-Source Requirement:** Mandate that digital tools developed through EU funding be open-source, unless restricted by knowledge security concerns.
3. **E-Learning and Citizen Platforms:** Fast-track the development of open-source platforms for e-learning and citizen engagement (e.g., co-planning and local democracy tools).
4. **Digital Workflows:** Focus on developing and teaching workflows how multiple tools sequentially can meet specific objectives, alongside separate tool development.
5. **Discovery Support:** Enhance the dissemination of EU-funded projects by training participants in (digital) outreach and networking with local governments, NGOs, and market players.
6. **Horizon Software Space:** Establish a Git repository for hosting and developing digital solutions from EU-funded projects.
7. **Interoperability:** Require EU-funded projects to address the full complexity of NEB principles (beauty, sustainability, inclusion) and ensure interoperability between tools recognition across EU member states.

DIGINEB

ROADMAP



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Conclusions

The DigiNEB project, aligned with the New European Bauhaus (NEB) initiative, is a crucial step in bridging the digital and green transitions within the built environment. By fostering a pan-European digital ecosystem, DigiNEB aims to make the green transition enjoyable, attractive, and accessible for all stakeholders. The project identifies key challenges, including funding mismatches, accessibility issues, and the need for interoperability and long-term sustainability of digital solutions, particularly for smaller enterprises and micro-developers struggling to align with large-scale EU funding programmes.

A key component of DigiNEB's framework is the integration of the NEB Academy, emphasising the importance of digital and AI literacy in achieving the ambitions of the Green Deal. By addressing educational gaps and promoting lifelong learning through micro-credentials and open educational resources, the NEB Academy seeks to empower the architecture, engineering, and construction (AEC) sector to adopt sustainable practices. However, challenges such as fragmented course offerings, national barriers to open education, and the need for robust funding mechanisms must be overcome to ensure success.

To tackle these challenges, DigiNEB has proposed roadmaps for digital literacy and digitalisation, providing structured approaches to bridging these gaps. Recommendations such as cascading NEB grants, open-source requirements, and the development of digital workflows and discovery support systems are essential for fostering innovation and collaboration. By addressing issues in funding, accessibility, interoperability, and digital skills, these roadmaps will support the EU's Green Deal and ensure the long-term success

of the NEB initiative.

DigiNEB has established a strong framework to support the NEB vision of creating sustainable, inclusive, and aesthetically enriching living spaces. Through its innovative approach to integrating digital tools, fostering collaboration, and bridging gaps across disciplines and geographies, DigiNEB has demonstrated how best practices in innovation can be effectively transferred across Europe's diverse contexts, aligning closely with the European Green Deal.

By creating a collaborative digital ecosystem that consolidates tools, projects, and knowledge aligned with NEB values, DigiNEB facilitates shared learning and mutual growth. This ecosystem empowers stakeholders with resources to address the challenges of sustainability, social inclusion, and digital transformation. By offering practical solutions and showcasing replicable models, DigiNEB contributes to the creation of more liveable and resilient environments.

Combining digital and physical experiences, DigiNEB demonstrates that supporting the digital platform with a strong actor-network and multi-format activities is key to creating a sustainable ecosystem for the NEB. The future of DigiNEB lies in transforming its digital platform into a living ecosystem that fosters ongoing learning, active collaboration, and seamless knowledge transfer. This requires strengthening partnerships, integrating advanced digital technologies, and maintaining a robust support structure for its diverse user base.

Beyond its successes, the journey towards a fully realised Digital Ecosystem for NEB is ongoing. Challenges

related to platform evolution, repository interconnectivity, accessibility, collaboration, and sustainability remain for future initiatives. Overcoming these hurdles will require deeper collaboration among stakeholders, continued investment in platform development, and a sustained focus on equitable access to resources.

As DigiNEB moves forward beyond this project, it calls on all NEB stakeholders—policymakers, researchers, industry leaders, and citizens—to contribute to and benefit from this growing digital ecosystem. By working together, they can amplify the transfer of innovation, empower communities, and inspire transformative change. This collective effort will ensure that the principles of sustainability, inclusion, and aesthetics resonate across Europe, setting a global example of collaborative innovation in creating better living spaces for all.



Image: Group pictures at the DigiNEB Final Event ©Francisca Siza

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Annexes

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