



BUILDING INDUSTRY 4.0

URBAN DEVELOPMENT INITIATIVE
BRAINPORT EINDHOVEN

UDI

ACCELERATING URBAN SOLUTIONS

Urbanization is a global challenge accompanying population growth. While the world's urban areas are highly varied, all cities and towns face the environmental and social consequences of urbanization. They struggle with challenges that require smart combinations of innovative technologies, attractive and functional design and applied knowledge in order to get scalable solutions that add sustainable value with social impact.

The Urban Development Initiative (UDI) provides answers through continuous innovation in ecosystems for urban development & the building industry in order to solve the complex urban challenges of the 21st century. By quickly anticipating the worldwide changes and continuously forming new connections, we create new opportunities for everyone. This attracts talent and companies from all over the world. In the unique business climate of Brainport Eindhoven, we work together in finding solutions for societal challenges concerning health, mobility, energy, food, housing, special quality and safety. An international leading region should be a top-quality place to work, live and visit.

Brainport Eindhoven has become the world's smartest region because of the ability to cooperate within the Quadruple Helix: government, business, research and society. The region has the unique power and position to function as one large Living Lab by continuously creating, evaluating, validating, producing and scaling up innovative solutions for and with citizens and civil society in the 21st urban century. Thereby, making Brainport Eindhoven one of the global leaders in solving the challenges addressed in the urban agenda.

URBAN DEVELOPMENT INITIATIVE

The Urban Development Initiative (UDI) is an organization that aims to solve complex urban challenges. In collaboration we research and develop strategies on building-innovation, energy transition and digitalization in the built environment.

UDI consists of an innovation ecosystem that brings together an ingenious portfolio of living labs that collaborate to scale innovation. Founders of the UDI are City of Eindhoven, City of Helmond, Eindhoven University of Technology (TU/e), Brainport Development and the Fraunhofer Research Institute. Building this ecosystem, we are looking forward to expanding our network with your expertise!

The UDI community will represent the entire Quadruple Helix and stimulate collaboration and citizen involvement by setting up innovation partnerships through network activities, cutting-edge projects and business- and user impact labs. Together we will set the agenda, work on innovative challenges and help to put them into practice. UDI combines existing and new knowledge, testing and living labs, EU funding programs and upscaling possibilities.

UDI is a partner within the network of the European Digital Innovation Hubs and provides you with the opportunity to get connected to a relevant European network of experts in your field of work.

The Urban Development Initiative (UDI) addresses the complex urban challenges of the 21st century through the development of the following lines of focus:

- Digital City
- Energy Transition
- Building Industry 4.0

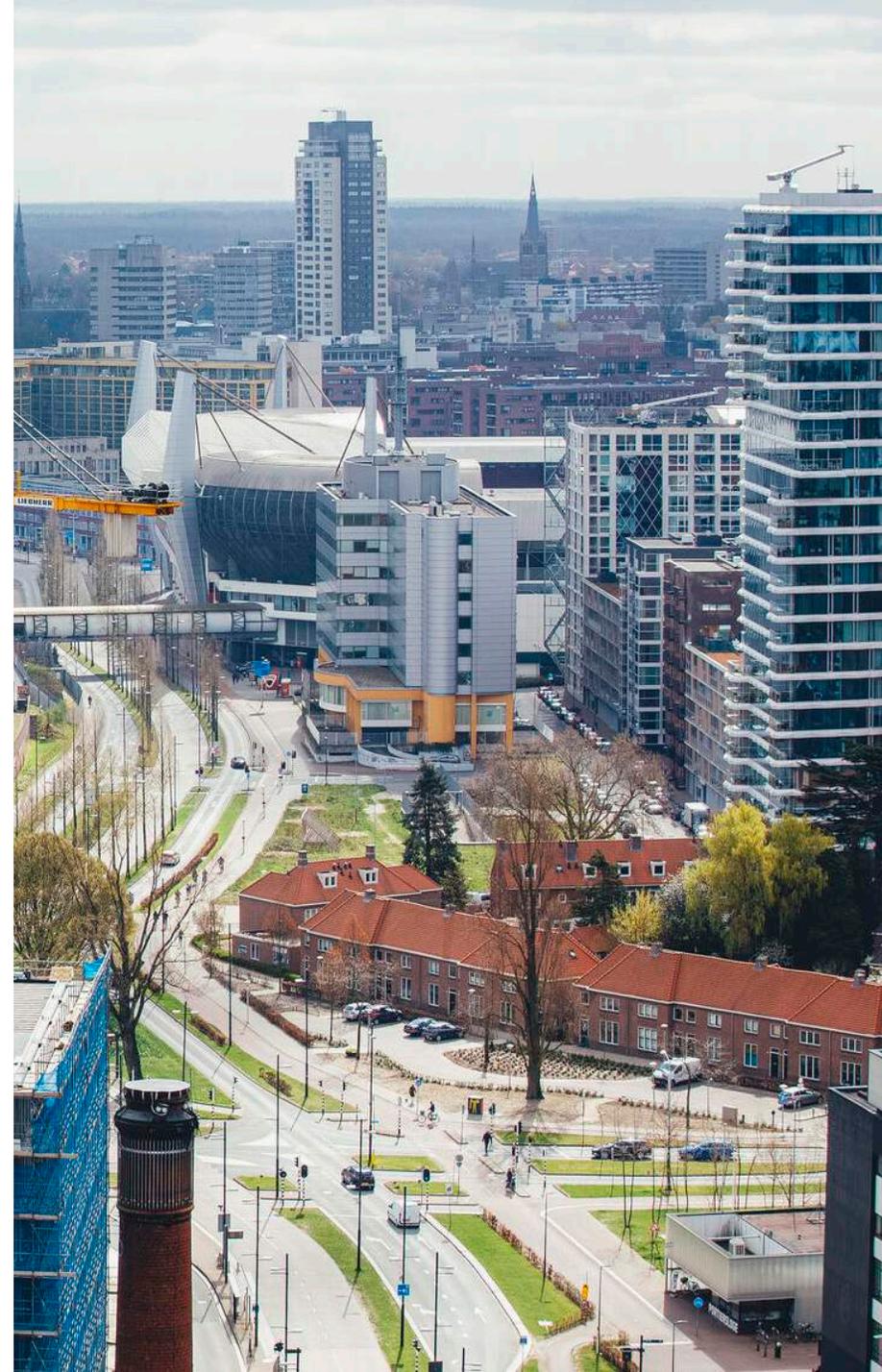
BUILDING INDUSTRY 4.0

‘a paradigm shift in construction is needed to enable a future proof housing industry’

Looking 15 years into the future, we see that a lot has changed in the Brainport region. More affordable, adequate, healthy and energy efficient homes, in attractive, green urban environments. All this will have been achieved while safeguarding biodiversity, reducing CO2 emissions and bringing resource use within the boundaries set by norms of international agreements. This vision is worth pursuing and therefore we need to take action, rather sooner than later.

Today, 80% of construction is residential. As the building industry is evolving, societal challenges and technological developments render a paradigm shift both necessary and possible. Social and technological innovation go hand in hand, as we approach the age of Industry 4.0.

The Brainport region will be, due to the Building Industry 4.0 program, a leader in this transition: Automation, robotization, computational design, additive manufacturing, affordable, healthy, energy efficient housing concepts, and the reduction of CO2 emissions, innovative materials and land use strategies, all according to parameters of international agreements.

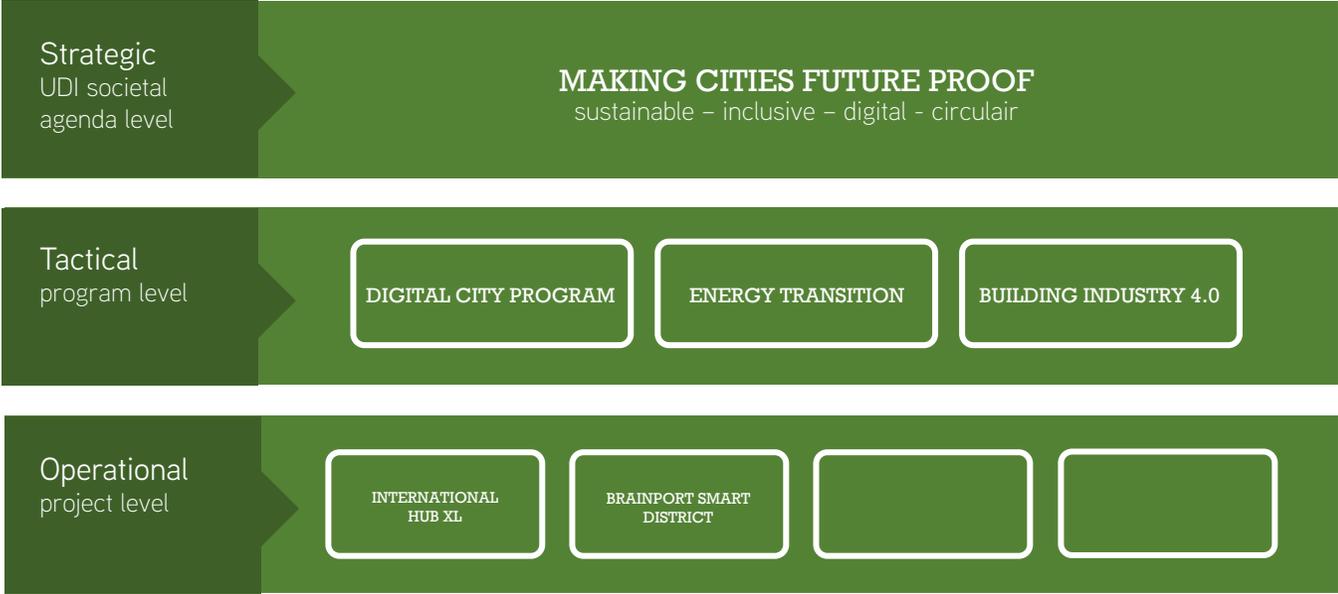


BUILDING INDUSTRY 4.0

The Building Industry 4.0 Program of UDI focuses on reshaping urbanization toward a sustainable and inclusive future in the Brainport Region aiming for global impact. The house building sector needs to advance to a point where it produces sufficient, affordable and sustainable dwellings to match demand. We aim to build a vibrant ecosystem on the region's existing digital backbone, developing companies, disruptive start-ups and research, combined with the major housing assignment in this region. Our goal is knowledge exchange amongst all players, developing cutting-edge technological strategies, while opening up new market - and business opportunities.

The Building Industry 4.0 Program:

1. Identifies and solves building challenges in urban / urbanization areas.
2. Brings added value to Eindhoven and Helmond, with International Hub XL and Brainport Smart District as exemplary pilot projects / case studies.
3. Builds an ecosystem that will drive innovation in the building industry and urbanization processes.



Building Industry 4.0 as part of UDI Framework



THREE FOCUS AREAS IN OUR URBAN SETTING:

1

TEMPORARY HOUSING

Innovation niche for technical innovation – 3D printing, robotization, on-site assembly, modular and parametric design – as well as social innovation – social programming, living environment, self-organization and sharing. How do we utilize temporary housing as a niche for innovation?

2

URBAN DENSIFICATION CHALLENGES

Urbanization challenge with technical aspects - building processes in already densely populated areas, energy system - and social challenge concerning acceptance social consensus for densification, scenarios for future living. What are the best scenarios concerning densification taking into account liveability, spatial qualities, planning parameters and construction? which scalable techniques and materials can both help to build low price and at the same time meet the demand of the end-user.

3

MASS CUSTOMIZATION AND AUTOMATION

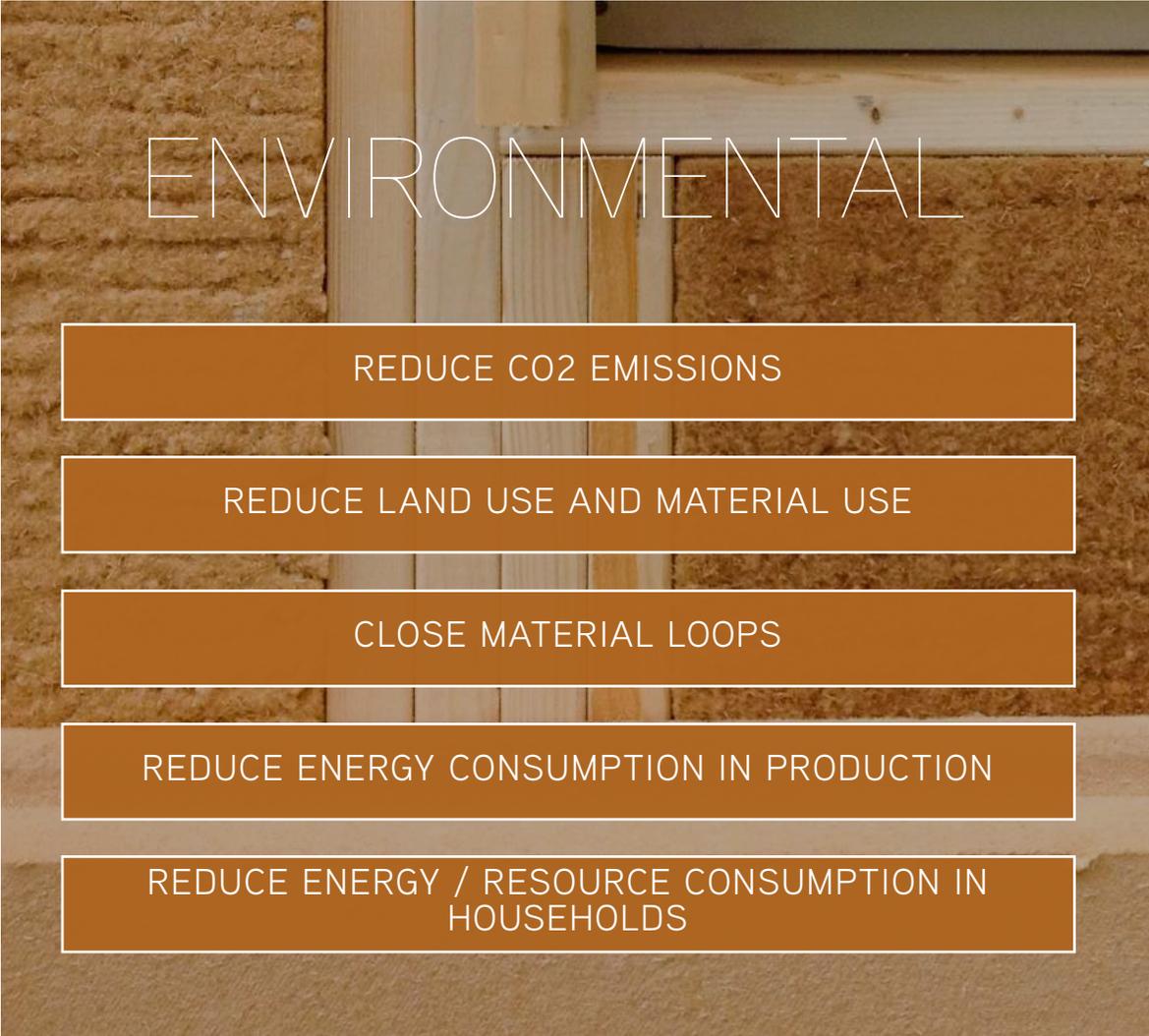
The fourth industrial revolution, Industry 4.0, is reshaping entire sectors, including architecture and construction through the implementation of cyber-physical systems, the internet of things and robotisation. Due to automation mass customization comes at no extra cost. How can we benefit from mass customization and develop new architectural expressions while elevating spatial qualities? How can we create numbers within a dense area, respecting quality and sustainability.

FUTURE PROOF HOUSE BUILDING INDUSTRY



SOCIAL

- AFFORDABLE HOUSING
- ACCESSIBLE HOUSING
- ADEQUATE HOUSING
- HEALTHY HOUSING
- SECURE HOUSING



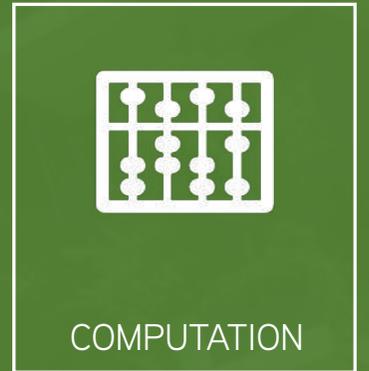
ENVIRONMENTAL

- REDUCE CO2 EMISSIONS
- REDUCE LAND USE AND MATERIAL USE
- CLOSE MATERIAL LOOPS
- REDUCE ENERGY CONSUMPTION IN PRODUCTION
- REDUCE ENERGY / RESOURCE CONSUMPTION IN HOUSEHOLDS

KEY ENABLING TECHNOLOGIES

With the Building Industry 4.0 program, the UDI aims to integrate advanced and emerging technologies in the building industry, addressing current and future challenges. This will help to bridge social and environmental aspects, and therefore offer and demand.

Key enabling technologies: robotization, additive manufacturing, 3D printing computational / parametric design, digital fabrication, circular materials.



KEY ENABLING METHODOLOGIES

Technology is available. However, a paradigm shift in the building industry requires a shift in system thinking. It starts with asking the right questions:

- *How do we want to live in the future?*
- *How do we plan for that future?*
- *How do we design future-proof housing ?*
- *How do we build future-proof housing?*
- *How do we govern future-proof housing?*

The building industry 4.0 program is set up to provide answers by applying key enabling methods, such as: scenario-based adaptive planning, value sensitive design, participatory action research and co-creation. Working in short cycles: *insight*, *foresight* and *application* to leverage shifts in design thinking for the right implementation.



INTERNATIONAL HUB XL

Over the next twenty years Eindhoven municipality is planning to expand the International Hub XL district north of the city's Central Station from a population of 200 residents to over 15,000. Decisions made at the planning stage will determine most of the environmental and social impact of the area over its lifetime.

35% extra trainpassengers
45% extra bus passengers
75% decrease in cars

7.000 extra housing units
More space for water and park
700.000 m2 Extra floor space
250.000 m2 Transformation



BRAINPORT SMART DISTRICT

Brainport Smart District will be a smart residential and working district where the urban development environment is designed in conjunction with new technologies for transport, health, energy generation and storage and circular construction. The residents also play an important role in the development of their own living environment. This new part of Helmond is being built north of the Helmond-Eindhoven railway line

1.500 Houses
4.500 Residents

27.000 m² Bio-intensive Farming
120.000 m² Business Park
125.000 m² Park

300 Autonomous Vehicles
1.5 km Smart Mobility Loop
73.000 Solar Panels



INNOVATION PARTNERSHIP

The UDI Building Industry 4.0 offers an innovation partnership with cities, academia, industries and citizens. By participating in UDI Building Industry 4.0, one can:

- Strengthen and accelerate their own R&D portfolio
- Participate in projects and living labs
- Validate building industry innovations through living labs in Brainport Eindhoven and use learnings for replicable models and verifying new product-market combinations in practice
- Develop standards, enhance frameworks and guidelines for the future of building
- Get connected to a relevant European network of experts in your field of work



TIMELINE

Aim is to have this manifest signed in June 2021 for commitment with the ecosystem partners to develop the program in depth throughout 2021

2021



2022

April - June 2021

Outreach to partners

Signing the Building Industry 4.0 manifest with the partners – ‘we believe’

July – September 2021

Developing the full program for Building Industry 4.0 – ‘we do’

October 2021

★ Go/No-Go moment for UDI Building Industry 4.0 Program – ‘we commit’

BUILDING INDUSTRY 4.0 TEAM

The Building Industry 4.0 team consists of representatives from the City of Eindhoven, City of Helmond, Eindhoven University of Technology (TU/e), Brainport Development and the Fraunhofer Research Institute.

For more information feel free to reach out to:

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