

ripple





# “Together we can make sustainable living fun and easy for everyone, everywhere”

VIRTUe is multidisciplinary international team from Eindhoven University of Technology (TUE) and will be participating in the Solar Decathlon Europe 21 (SDE 21). With the support from the TUE and various respectable partners we believe that we can inspire sustainable behaviour by bringing people together and creating a ripple of change.



○ — **our vision**

**Supporting the transition  
to sustainable cities  
worldwide**

○ — **our mission**

**Encourage a communal,  
sustainable mindset of  
people through the building  
industry**

○ Solar Decathlon Europe 2021

**07** ○ **CHALLENGES** | Challenges and Goal

*ripple* ○ **08**

**09** ○ **DESIGN** | AAA  
Fixed  
Flexible  
Free  
HDU

Team Members  
Events  
Online Presence | **TEAM** ○ **19**

**23** ○ **NETWORK** | Partners  
Board of Recommendation





Architecture



Engineering & Construction



Energy Performance



Affordability & Viability



Communication, Education, & Social Awareness



Sustainability



Comfort



House Functioning



Urban Mobility



Innovation

The Solar Decathlon is an international competition that challenges university teams to design and build highly efficient and innovative houses powered by renewable energy. The main goal is to tackle energy transition by blending architectural design and engineering knowledge with innovation, market potential and building efficiency. Initiated in 2002 by the United States Department of Energy, the Solar Decathlon takes place every year in a different city in the world. The houses are operated, demonstrated to the public, and evaluated by a jury in a campus of exposition and interaction. The competition involves a broad scope of expertise by challenging teams on 10 contests- recalling the deca (ten) contests of the Olympic decathlon.

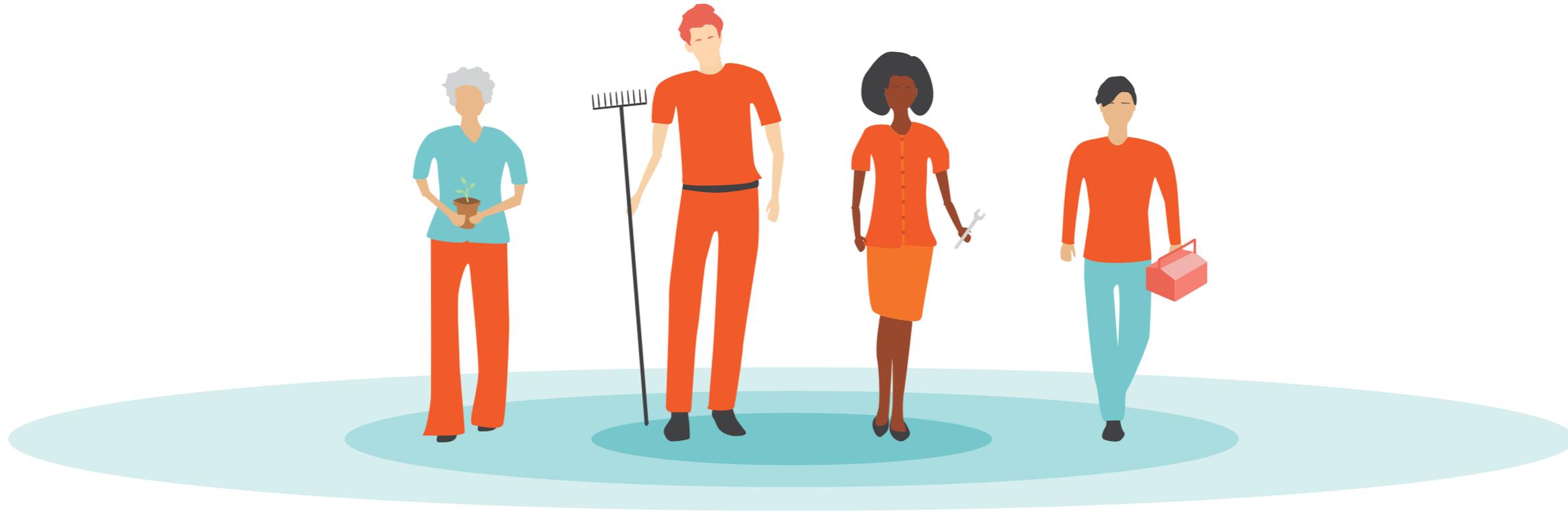
Today, it is clear that energy transition cannot be successfully achieved if it is not tackled in an urban perspective. The built environment is responsible for 40% of EU's energy consumption, and 75% of the building stock in the EU is energetically inefficient (SDE). Cities are the hotspots of these issues, and it is by revitalising the urban building stock and innovating the urban mobility that densifying cities can be transformed and become resilient.

### Wuppertal, Germany

Wuppertal lies in a valley in the middle of North Rhine-Westphalia, in Germany. Its proximity to the river Wupper and the access to wood and metal deposits facilitated the development of the textile industry in the city during the 20th century. After suffering from the global financial crisis and a loss of attractiveness, Wuppertal is now experiencing a wave of changes initiated by bottom-up actions of citizens. The Mirke Quarter, hosting neighborhood of SDE21, best reveals these purposes and vibrates of a diverse, dynamic, innovative and creative



# SDE 21



Climate change is a **complex** problem. On a personal level, many people find it challenging to live a sustainable lifestyle because it is perceived as **expensive, inconvenient or not their responsibility**. VIRTUe, however, believes in the huge potential of **human actions** especially in combination with technology.

As people are affected by their living environment, designers have the power to **stimulate sustainable behaviour**. However, we are stuck in a status quo where the industry is not guiding a sustainable mindset and therefore does not receive incentive back from the people to change.

VIRTUe aims to break this loop by introducing an integrated design approach to both sustainable building and living. **Our goals** are to:

1. **Activate** people to adopt an environmentally-friendly mindset
2. **Normalise** sustainable living
3. **Future-proof** the design approach for the built environment

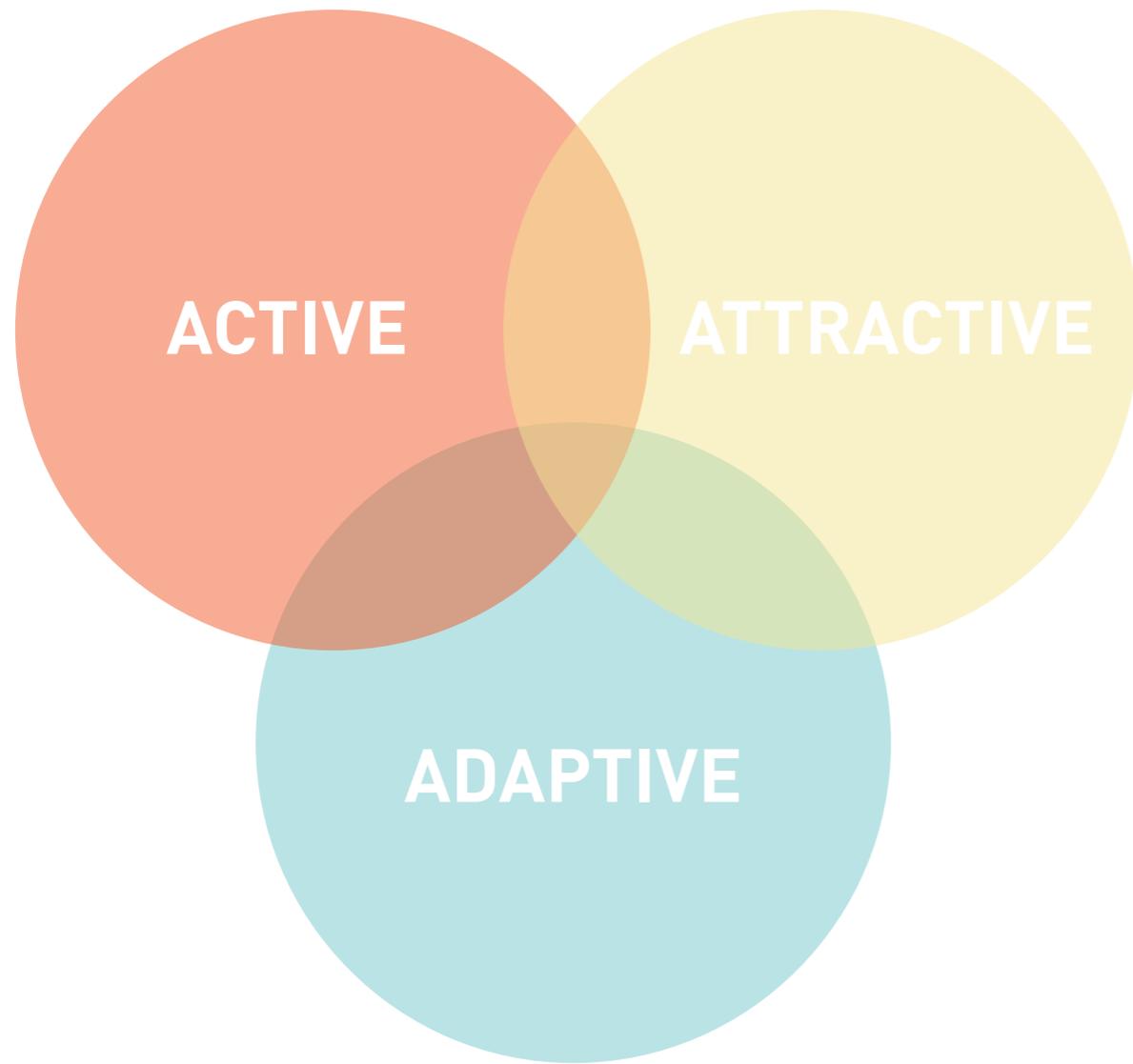
# ripple

With our concept *ripple*, we propose an improved **design solution** for the built environment, encouraging a sustainable mindset in the process, as well as in the result.

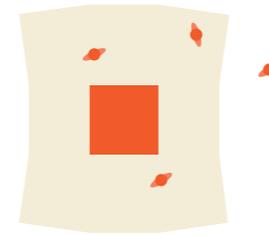
*ripple* is inspired by the Ripple Effect. Like a **drop** in water, our project creates a **ripple of influence**. Starting from an ambitious transformation in Wuppertal, we aim to spread our approach to different places around the world. By showing that urban areas influence the eco-friendly lifestyle of people we hope to set an example for the **new norm**. As we reach more people, the general mindset of people will change and the industry will realize their responsibility as well. Together we can make sustainable living **fun and easy for everyone, everywhere**.



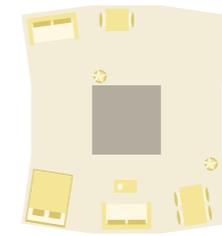
design



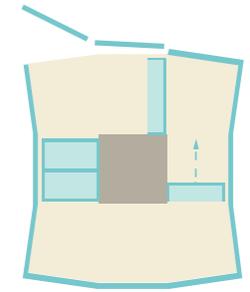
Our initial drop starts with three principles in mind, to create a design that is **Active, Attractive, and Adaptive.**



Active



Attractive



Adaptive

### Active

Stimulating technologies and initiatives are introduced, which **activate** people to progressively **change their mindset** and lower their environmental footprint through their habits.

### Attractive

By making an aesthetically pleasing design, and making sustainability **attractive**, it becomes more exciting to everyone. We aim to **integrate** technologies and building features that make sustainable living **simple and fun** without compromising on **comfort or price.**

### Adaptive

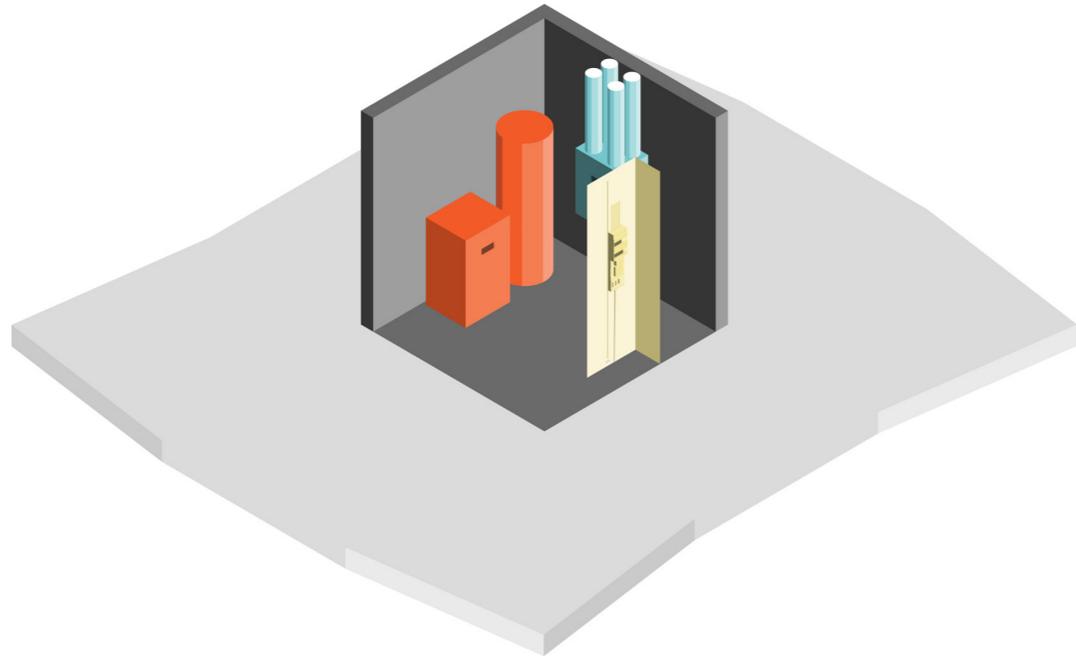
Our design is built to be **adaptable** to different places and different times. Components can be **demounted** at the end of their lifespan without affecting the rest of the building, ensuring a future-proof design that could serve **multiple functions.**



This is our **building design**. It is the first embodiment of *ripple* in the specific context of the Mirke neighbourhood in Wuppertal. Our building is placed upon the renovated café ADA, representing a **central** location of **cultural** and **social** importance in the area. This is just an example of how *ripple* could be applied to a urban context.

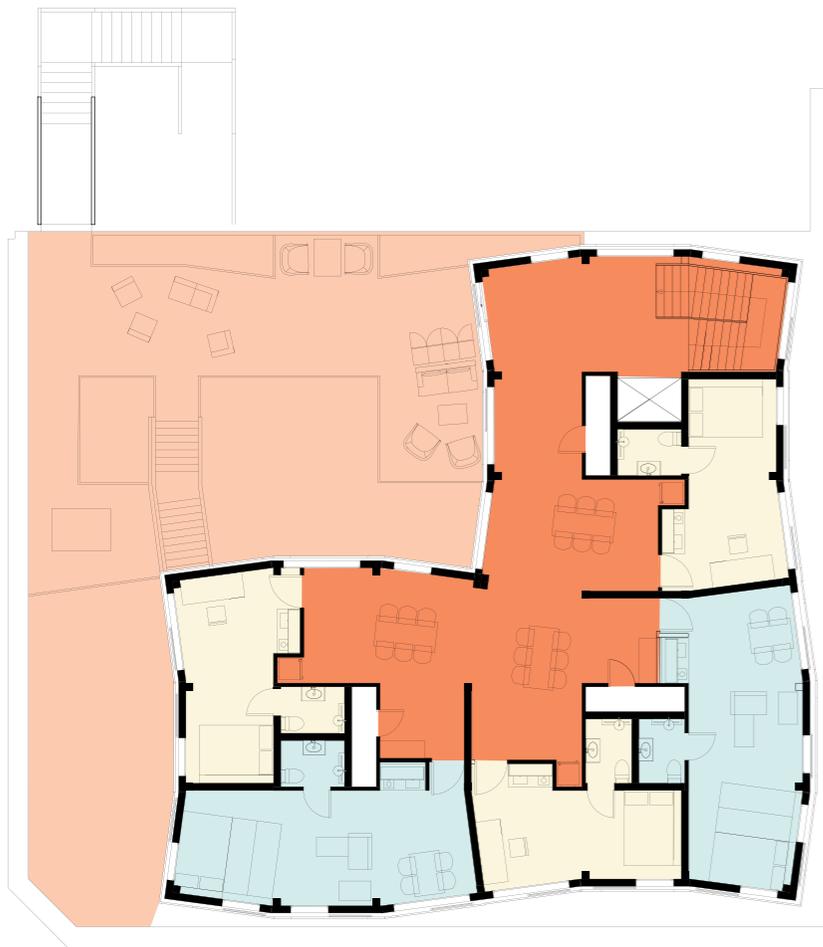


The building consists of rotating modules. These are centred around a fixed **technical core**, wherein all systems are located and 2 apartments and part of the common room are built around. The systems consist of the hot water system, powered by a solar boiler and modulating heatpump, the ventilation, slightly over dimensioned to keep CO2 levels to a minimum and finally, the smart systems.



In the common room, our smart display **EQUI** stimulates sharing appliances and matches the processes with the peak energy production

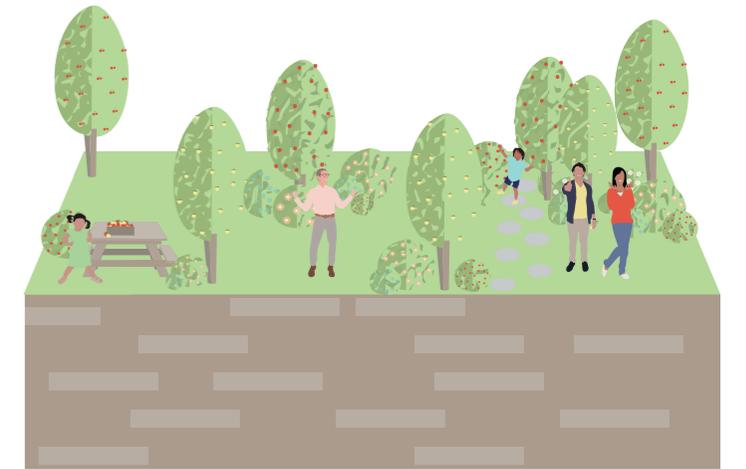




The lay-out of the building is **flexible** to be adaptable to different scenarios and places. The walls are used as extensions of the technical core and in this specific building, the hallways are replaced by common rooms with shared utilities. These **social spaces** allow neighbours to interact, share knowledge and tools.

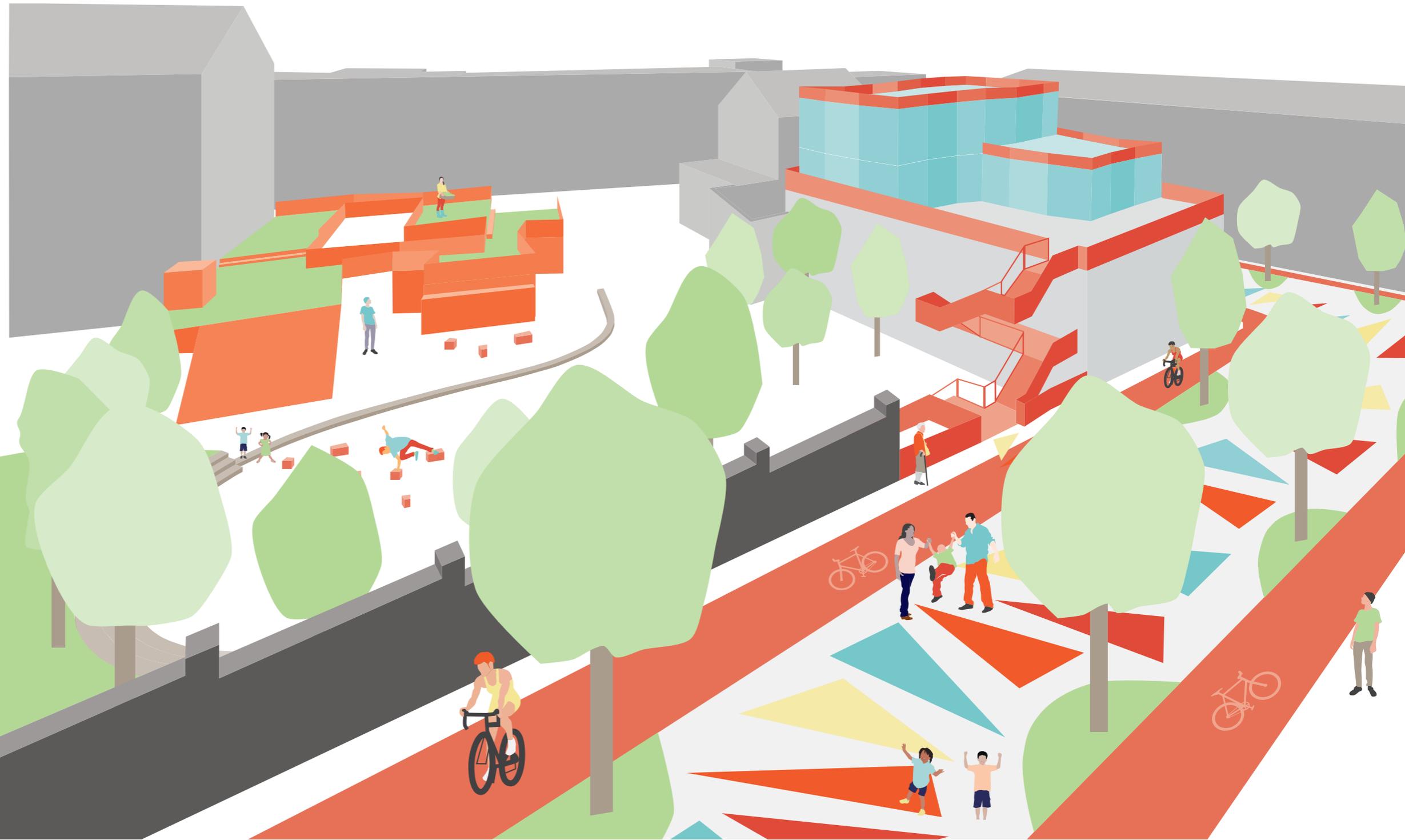
The flexibility in the furniture allows for the adaptability of one's personal space, and allows





The roof plan and the interior are completely free and can be arranged according to preference. The roof creates space for **biodiversity** and **urban farming** practises. This creates a healthy and attractive living environments for the residents and species of the city.

Beyond the building, on an urban level, **shared mobility, flexible street furniture and urban farming** showcase our vision for **collective sustainable living**. Our app, called **Recapp**, can connect to systems in the house and facilities in the city to set sustainable goals and share them with friends through a social platform, **spreading** the sustainable lifestyle beyond city borders.



Our *ripple* Demonstration Unit (RDU) embodies our vision of collective and attractive sustainable living in a **demonstration** and an **experience**, which can be visited during the Solar Decathlon Europe 21 in Wuppertal or during our test building in October in Eindhoven.







team

TITLE	NAME	DEGREE	UNIVERSITY COURSE/RESEARCH FIELD	EMAIL
Faculty Advisor	Wouter Hilhorst	Faculty	Built Environment	w.hilhorst@tue.nl
Project Manager	Peter Friso van den Boogert	Master	Built Environment - Urban Systems & Real Estate	peterfriso@teamvirtue.nl
Project Architect	Karim Jaspers	Master	Architecture, Building and Planning	karim.jaspers@teamvirtue.nl
Project Engineer	Ruben van Wuijtswinkel	Bachelor	Built Environment - Structural Design	ruben.van.wuijtswinkel@teamvirtue.nl
Structural Engineer	Julie Kirsch	Bachelor	Built Environment - Structural Design	julie.kirsch@teamvirtue.nl
Electrical Engineer	Jim Blom	Bachelor	Industrial Design	jim.blom@teamvirtue.nl
Student Team Leader	Hanne Potters	Bachelor	Built Environment	hanne.potters@teamvirtue.nl
Health & Safety Team Coordinator	Peter Friso van den Boogert	Master	Built Environment - Urban Systems & Real Estate	peterfriso@teamvirtue.nl
Safety Officer	Bregje Schulten	Master	Built Environment	bregje.schulten@teamvirtue.nl
Site Operations Coordinator	Peter Friso van den Boogert	Master	Built Environment - Urban Systems & Real Estate	peterfriso@teamvirtue.nl
Contest Captain	Karim Jaspers	Master	Architecture, Building and Planning	karim.jaspers@teamvirtue.nl
Instrumentation Captain	Jim Blom	Bachelor	Industrial Design	jim.blom@teamvirtue.nl
Communications Coordinator	Marianna Angelini	Bachelor	Built Environment - Architecture	marianna.angelini@teamvirtue.nl
Sponsorship Manager	Jeffrey Tsang	Master	Architecture, Building and Planning   Urban Systems & Real Estate	jeffrey.tsang@teamvirtue.nl



**Flore Luyk**  
Lead Urban Designer



**Lotte Roefs**  
Urban Designer



**Krista van Zandwijk**  
Urban Designer



**Rebeca Barbu**  
Urban Designer



**Ruben van Wuijtswinkel**  
Technical Lead



**Xueying Guan**  
Building Physics Engineer



**Hanne Potters**  
Team Manager



**Jeffrey Tsang**  
External Relations Manager



**Marianna Angelini**  
Communication Manager-  
Spokesperson



**Peter Friso van den Boogaart**  
Construction Manager



**Lena Blomert**  
Financial Manager



**Annique Laurens Janse**  
External Relations



**Jaap de Lange**  
Mechanical Engineer



**Thomas Pannekeet**  
Building Physics Engineer



**Guido van Laar**  
Architectural Designer



**Jasmijn Braakhuis**  
Energy Systems Engineer



**Meril Liis Kütt**  
Energy Systems Engineer



**Joris van Zandbergen**  
Smart Systems Engineer



**Sanaa Maskitou**  
External Relations



**Yang Chiang**  
External Relations



**Karim Jaspers**  
Lead Architectural designer



**Aron den Otter**  
Human Resources



**Willem Arts**  
Communication-Spokesperson



**Leah van der Sanden**  
Communication



**Kiara Pattipeilohy**  
Smart Systems Engineer



**Julie Kirsch**  
Lead Structural Designer



**Bowie Steutel**  
Structural Designer



**Pim van Rijsbergen**  
Structural Designer



**Kars Raymakers**  
Structural Designer



**Naeem Kantawala**  
Structural Designer



**Nathan Dupas**  
Communication



**Vandhana Kannan**  
Sustainability Coordinator and  
Communication



**Hyeji Joh**  
Sustainability and  
Communication



**Lisan Warfemius**  
Architectural Designer



**Max van Gemert**  
Architectural Designer



**Erwin Ketelaars**  
Architectural Designer



**Bregje Schulten**  
Affordability and Viability  
Coordinator



**Nadine Schellekens**  
Affordability and Viability  
Coordinator

**NOT PICTURED:**

My Ha Do-HR Manager  
Leonie Meenderink-External Relations  
Tom van Well-Graphic Designer  
Joris Jorna-Communication  
Noah Duister-Architectural Designer  
Erik Visser-Electrical Systems Advisor  
Myrthe van Geest-Smart Systems Engineer  
Marco Cardillo-Smart Systems Engineer

Almo Alrahbi-Smart Systems Intern  
Aqil Altoubi-Smart Systems Intern  
Jonas Fleischer-Construction  
Ramona Buia-Architectural Designer  
Bas Buurman-Logistics  
Marc Palmer-Building Systems  
Ha Ngoc Nguyen-Communication

# EVENTS

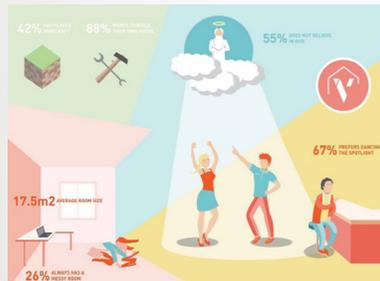


## Brainstorm Session 1.0

**What:** Event to gain insight on SDE problems/topics

**Who:** Team VIRTUe, partners, advisory board

**When:** 7th of March, 2020

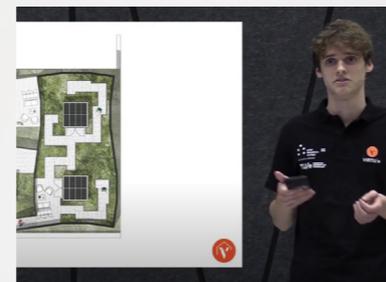


## VIRTUe Olympics

**What:** Team bonding activity

**Who:** Team VIRTUe

**When:** 22nd of February, 2021



## Final Design Reveal

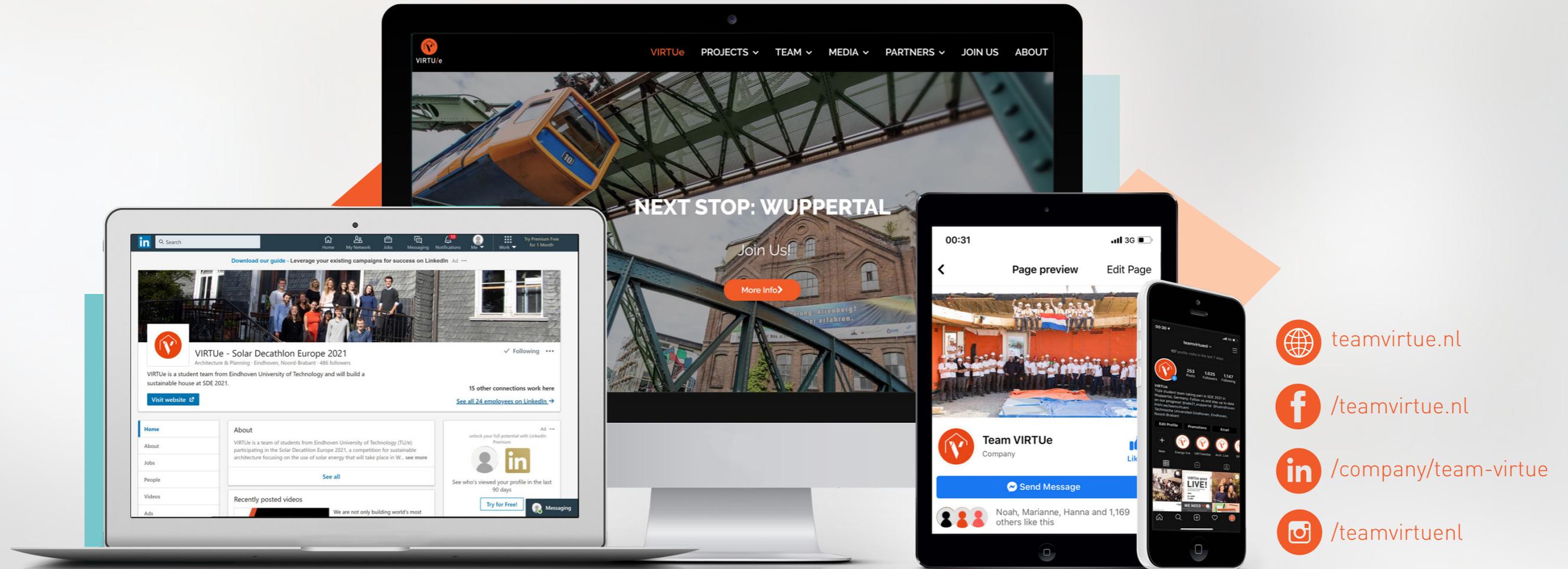
**What:** Presentation to reveal final design

**Who:** VIRTUe, partners, friends, and family

**When:** 29th of January, 2021

# ONLINE PRESENCE

The current COVID-19 situation has led to a strong prioritisation of online communication. Therefore our efforts have been addressed to developing and improving our online strategy, with the main priority of keeping people actively involved, and thereby also maintaining visibility.



## Current Status

In this part you can find an overview of our partners. Our network is still expanding and we hope to add many more partners to this!

The partners are categorised to give you an idea of how they are contributing to the project.



Eindhoven University of  
Technology



Stam + de Koning Bouw  
bv



Jongen Bouwpartners



Count & Cooper



Holland Innovative

## Main Partner

## Construction Partners

## Project Consultants

### Architectural Design Consultants



BiermanHenket  
Architects



RoosRos Architects



Paul de Ruijter  
Architects



Interior for Tomorrow



Bernhagen  
Natuurkeukens

### Structural Design Consultants



Sweco Netherlands



Lüning



Royal Haskoning DHV

### Sustainability Consultant



Except  
Integrated Sustainability

## Building Envelope Production Partners



WEBO



DE MORS  
makkelijker bouwen

De Mors



Rothoblaas



EkoFLin B.V.



Isovlas



## Building Physics Consultants



Buro Bartosz

## Exterior/Interior Element Partners



Kameleon Solar



Steinfort glas B.V.



Binder Groenprojecten



Optigrün



Karin van der Lee



Inhout



Gebruiktebouwmaterialen.com

Gebruikte  
Bouwmaterialen



Reynaers



Sunshield Global

## Technical Element Partners



VanBeers Installaties



Technea



Jupiter Vloerverwarming



VolkerWessels  
iCity



Lyv



Stiebel Eltron



Orange Climate

## Logistics Partner



Rhenus Logistics

## Subsidy Program Partners



OPZuid



European Union



Province Noord-Brabant



Technobroker



Omnes



Team Casa



Brainport Smart District

# BOARD OF RECOMMENDATION



**MAXIME VERHAGEN**  
Chair Bouwend Nederland



**THEO SALET**  
Dean of Department of Built Environment



**JOHN JORRITSM**  
Mayor of Eindhoven



**MARJAN MINNESMA**  
Director of Urgenda



**CLAUDIA REINER**  
Vice Chairwoman



