

WOI congres 26-03-25

Het belang van de wetenschap voor de installatie- techniek

*Atze Boerstra,
TU Delft*



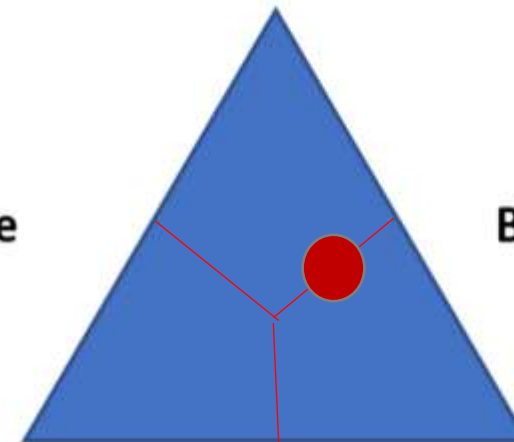
Achtergrond



Passie voor:

Architecture

Building Technology



People

- master mechanical engineering TUD & PhD building sciences TUE
- directeur bba binnenmilieu & partner DGMR
- ISSO RVB, lid div. NEN/CEN commissies, voorheen bestuur TVVL & REHVA, (vice) president Healthy Buildings 2015 & CLIMA 2022

'Chairs' BK Department Architectural Engineering & Technology

Environmental & Climate Design

- Climate Design & Sustainability
Prof. Andy vd Dobbelsteen
- Building Physics
Prof. Martin Tenpierik
- Building Services Innovation
Prof. Atze Boerstra
- Building Energy Epidemiology
Prof. Laure Itard
- Indoor Environment
Prof. Philomena Bluyssen

Architectural Technologies

- Design of Construction
Prof. Ulrich Knaack
- Building Product Innovation
vacature
- Architectural Engineering
Prof. Thijs Asselbergs
- Structural Design & Mechanics
Prof. Mauro Overend
- Architectural Glass
Prof. James O'Callaghan

Digital Technologies

- Design Informatics
Prof. Sevil Sariyildiz
- GIS
Prof. Peter van Oosterom

Heritage & Architecture

- Heritage & Technology
Prof. Uta Pottgieser
- Heritage & Values
Prof. Ana Pereira Roders
- Heritage & Design
Prof. Wessel de Jonge

Universiteiten en hogescholen relevant?



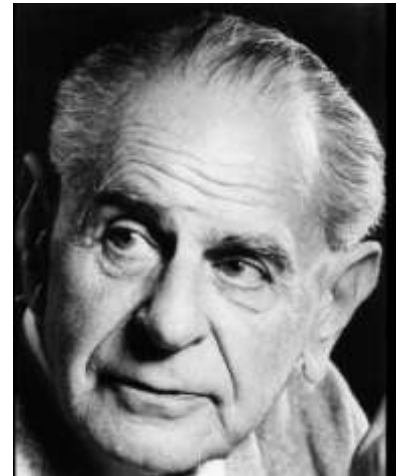
1. Wie van u heeft ooit opleiding genoten aan universiteit of hogeschool?
2. Wat gaat u doen om bovenstaand tij te keren?

Waarom wetenschap?

Wetenschap is het systematisch vergaren, ordenen en controleren van kennis; wetenschap leidt tot..... waarheidsvinding

Een TU richt zich op wetenschap van techniek en technologie

Karl Popper: *'The way of science is paved with discarded theories which were once declared self-evidenced'*



TU Delft, faculteit Bouwkunde & installatie-onderwijs

Bachelor onderwijs vernieuwing TE vakken (bouwtechnologie), e.e.a. i.v.m. behoefte om beter aan te sluiten bij nieuwe maatschappelijke thema's, noodzaak introductie nieuwe onderwijsvormen, gewenste verhoging academisch gehalte.

Basiscollege's in m.n. 1e en 2e jaar over warmte & vocht, energietechnieken, BENG, ventilatiesystemen, klimaatbeheersing, binnenmilieu, thermisch comfort, circulariteit & installaties,

Ontwerpopdrachten & integratie van gebouwinstallaties (bv. rond ON6/IOP2, architectuur afstudeerateliërs)

Gastcollege's bv over innovaties & gebouwinstallaties

Voorbeelden (bachelor)

Typen gebouwinstallaties

Beeld #1

Warmtepomp - werking (verwarmingsmodus)

Zie voor verdere uitleg filmpje Prof. Laure Itard, [Brightspace](#)

verdamper

compressor

condensor

Warme onttrekking

verwarmen

Expansieventiel

BUITEN

BINNEN

TU Delft

26 maart 2025

BK2TE3 - Klimaatontwerp

50

Voorbeeld wetenschap <> praktijk (1)

**Why, when and how do HVAC-systems pollute the indoor environment
and what to do about it?
The European AIRLESS project**

Dr. Philomena M. Bluysen^{1*}, Christian Cox¹, Olli Seppänen², Eduardo de Oliveira
Fernandes³, Geo Clausen⁴, Birgit Müller⁵, Claude-Alain Roulet⁶

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²Helsinki University of Technology, Laboratory of Heating and Air Conditioning, Finland

³University of Porto, Faculdade de Engenharia, Portugal

⁴Technical University of Denmark, International Centre for Indoor Environment and Energy,
Denmark

⁵Technical University of Berlin, Hermann-Rietschel-Institute, Germany

⁶Swiss Federal Institute of Technology Lausanne, Solar Energy and Building Physics
Research laboratory, Switzerland

Wat je moet weten over klimaatinstallaties

Het hoe en waarom van klimaatinstallaties
in een notendop



Philomena M. Bluysen

Voorbeeld wetenschap <=> praktijk (2)

Building and Environment

Journal homepage: www.elsevier.com/locate/buildenv

Thermal comfort and use of thermostats in Finnish homes and offices

Sami Karjalainen*

ARTICLE INFO

ABSTRACT

1. Introduction

The adaptive approach to thermal comfort pays attention to the interaction between people and their thermal environments [1–6]. The occupants are not seen as passive recipients of thermal environments but play an active role in making themselves comfortable in different thermal environments, for example, by using adjustable thermostats. The fundamental assumption of the adaptive approach is that “if a change occurs such as to produce discomfort, people react in ways which tend to restore their comfort” [8]. Adaptive opportunities include the following:

- clothing adjustment when felt cold and hot,
- occupant control of heating and cooling systems, i.e. use of thermostats (or putting more blankets in bedplaces),
- occupant use of operable windows,
- occupant use of window blinds or curtains to control solar lighting,
- occupant use of personal fans,
- drinking cold or hot liquids,
- taking a walk inside or outside,
- moving to another location inside.

The present study gives an overview of thermal comfort in homes and offices in Finland, in a country in which a large climate performance. The key idea of the paper is to compare thermal comfort and personal control over room temperature in two different environments, home and office rooms in which adaptive opportunities are very different. The work concentrates especially on the use of thermostats.


2. Method and material

Thermal comfort and the use of thermostats were studied by a quantitative telephone survey. The interviews were carried out on the telephone (computer assisted telephone interviews, CATI). A well-known Finnish data collection agency (Tutkimuskeskus Oy) was responsible for the practical realization of the telephone interviews according to its quality system.

2.1. Respondents

The material concerning both the home environment and the office environment was gathered in the same interviews. The first part of the interview concerned the home environment and the last part concerned the office environment. The latter part of the questions was only asked of persons working in an office (in a work environment away from the home). The sample size in questions concerning the office environment was about one-third of the total: 3084 persons (1576 females and 1508 males) answered the questions concerning the home environment and 3000 persons (1520 females and 1480 males) the questions concerning the office environment.

The target group of the study was the population of Finland. A random sample of the Finnish population aged between 15 and 74 was selected with quotas set according to gender, age and



Personal Control over Indoor Climate in Offices

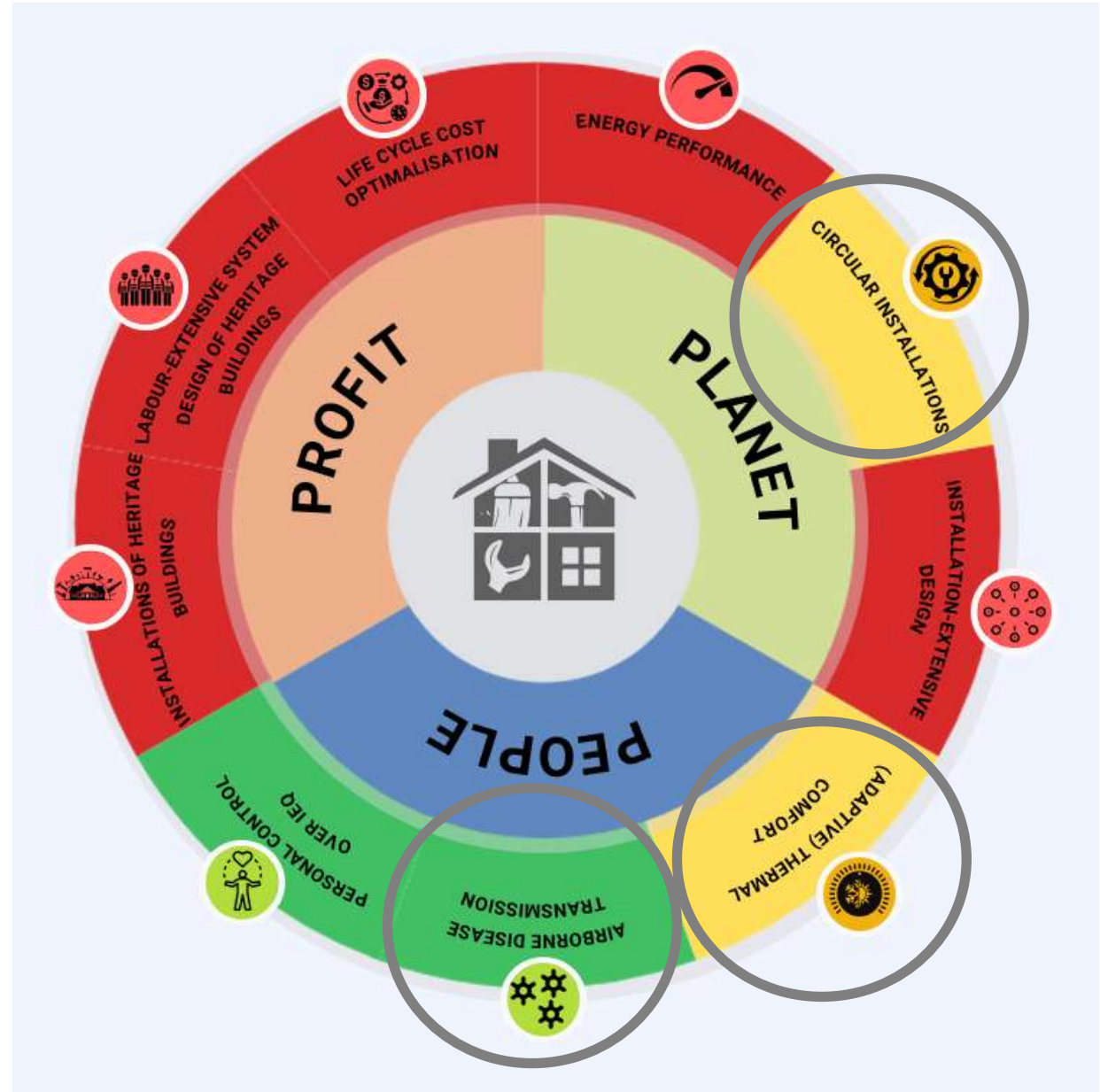
Impact on Comfort, Health & Productivity

Atze Christiaan Boerstra

Department of the Built Environment

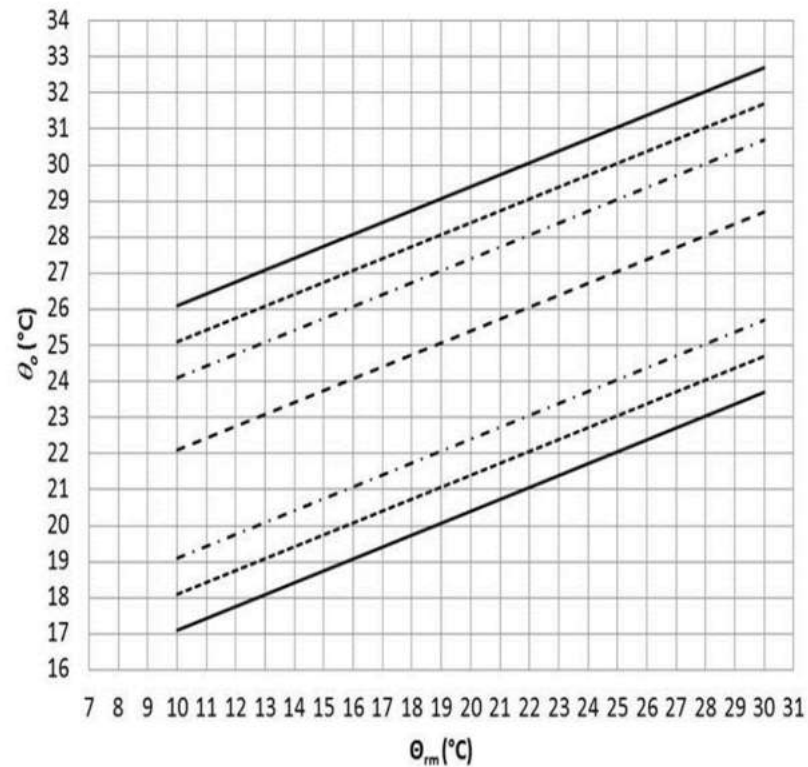
bouwstenen 222

My focus areas @ TU Delft



Voorbeeld acties i.r.t. (adaptief) thermisch comfort

Nieuwe versie EN 16798-1 (adaptieve temperatuurgrenswaardes) (under construction) & nieuwe versie van ISSO 74:



Innovative ceiling fan project (BT graduation project Wei Wei, 24/25)




Core hypothesis: "Moving air ($v=0,6-0,8$ m/s) of 28 °C feels same as still air of 25 °C; energy use of fans is about 5% of energy use airconditioners"



IEA Annex 87: PECS

PECS – Personal Environmental Control Systems

TU Delft involvement Atze Boerstra & Alessandra Luna Navarro



EBC-LOGIN

EBC
Energy in Buildings and
Communities Programme

IEA EBC - Annex 87 - Energy and Indoor Environmental Quality Performance of Personalised Environmental Control Systems

Previous studies have shown that 'personalised environmental control systems' (PECS) improve occupants' satisfaction with the indoor environment substantially. However, most of those studies were carried out under controlled conditions and long-term performance studies from real buildings are lacking. There is also a gap in the knowledge and tools necessary to make these systems widely-applicable in buildings. Based on this need, the objective of this project is to establish design criteria and operation guidelines for PECS



Voorbeeld acties i.r.t. 'airborne disease transmission'

MIST project, zie www.mist-project.nl & deel nieuwe [AWARENESS VIDEO](#)



The screenshot shows the NWO website for the MIST project. At the top, there are navigation links for 'Find funding', 'Research policy NWO', and 'Research & results'. The main heading is 'Mitigation Strategies for Airborne Infection Control (MIST)'. Below this is a sub-heading 'Preventing airborne transmissions of viruses'. The text describes the project's goal: 'Since the global impact of COVID-19, we are acutely aware of the risk of diseases dispersed through the air. Virologists, epidemiologists, fluid mechanics and engineers will join forces in the MIST programme to better understand and prevent airborne viral transmission. Under various conditions, the researchers will study the infectiousness of viruses, the spread of fluid droplets in the air, and the influence of ventilation and the purification of air on the transfer of viruses. They will subsequently translate this knowledge into practical recommendations about which measures can be deployed in the most efficient, cost-effective and sustainable manner in various environments ranging from people at home to hospitals, schools and trains.'





MIST Webinar 7 april

Speakers



Dr. ir. Marcel Loomans

Eindhoven University of
Technology



Mohamed Zayed

Eindhoven University of
Technology



Dr. Mariëtte Lokate

University Medical Center
Groningen



Kirsten Lassing

Radboud University Medical Center

Join MIST webinar series

5 YEARS SINCE THE COVID-19 OUTBREAK

Date
Monday, 07 April, 2025 | 15:00 - 16.00

Lessons learned
Summarizing public health responses, healthcare system adaptations, and community resilience strategies that emerged during the pandemic

Latest scientific insights
To prevent airborne viral transmission and promote the use of ventilation and air-cleaning technologies

Path forward
Exploring preparedness frameworks, emerging research priorities, and global collaboration models for future pandemic prevention

Please register before 02 April 2025.

15:00 - 15:05
Introduction
Prof.dr.ir. Atze Boerstra /
Dr. Elham Maghsoudi Nia
(Delft University of Technology)

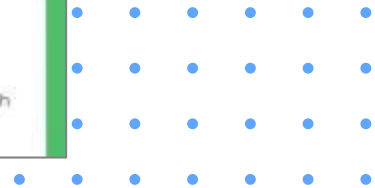
15:05 - 15:30 (INCLUDING Q&A)
Infection Prevention: General Perspective
Dr. Mariëtte Lokate
(University Medical Center Groningen)

Airborne Virus Exposure Mitigation by Advancing Respiratory Protective Equipment
Kirsten Lassing
(Radboud University)

15:30 - 16:00 (INCLUDING Q&A)
Local ventilation/air cleaning options
Mohamed Zayed
(Eindhoven University of Technology)

Insights from MIST, CLAIRE, and P3Venti
Dr.ir. Marcel Loomans
(Eindhoven University of Technology)

The webinar is part of the MIST project funded by the Dutch Research Council (NWO). For more information please visit www.mist-project.nl





MIST Webinar



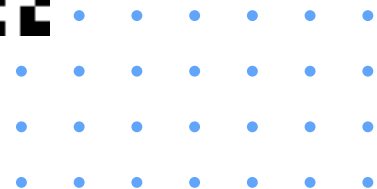
MIST Webinar:
5 years since the Covid-19 outbreak

07 April 2025

Register now



Registration link: <https://www.aanmelder.nl/mistwebinar/subscribe>



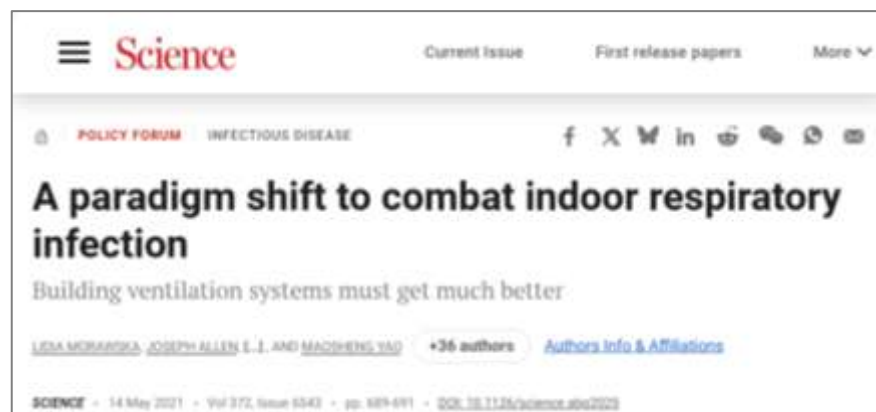


MIST Live Event 2 juni

Keynote Speaker

Prof. Lidia Morawska

Professor in air quality and health,
Queensland University of Technology (QUT)





MIST Event



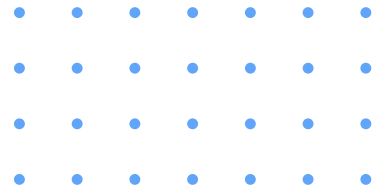
**Future of health-promoting ventilation
and air cleaning systems**

2nd June 2025
Delft University of Technology

Register now



Registration link: <https://www.aanmelder.nl/mistevent/subscribe>



Voorbeeld acties i.r.t. circulaire klimaatinstallaties


Circular Built Environment Hub

Platform for researchers of the Faculty of Architecture and the Built Environment with the aim to promote the development of knowledge towards a circular built environment that enables the design of future buildings, cities and infrastructures.

The Circular Built Environment (CBE) Hub has a living lab approach, conducting live scale projects and experiments in cooperation between researchers & educators, public sector, private sector and society.

Circularity is a transdisciplinary and systemic approach, concerning the different scale levels from city to building, component and material. Here, social, technological, environmental and economic aspects are of major importance as well as stakeholders, processes and design.

Please feel free to contact us.



The diagram, titled "Circular Built Environment", illustrates a multi-scale approach. It features four concentric circles representing different levels: "MATERIALS" at the center, followed by "COMPONENTS", "BUILDINGS", and "CITIES" at the outermost level. Surrounding these circles are five interconnected nodes: "Technology" at the top, "Society & Stakeholders" at the bottom, "Tools & Methodologies" at the bottom-left, "Management" on the left, and "Policy" on the right. Arrows indicate a clockwise flow between these nodes, suggesting a continuous and integrated process.

Circular Building Installations: An Introduction

Prof. dr. ir. Atze Boerstra is head of the chair of Building Services Innovation at the TU Delft Faculty of Architecture and the Built Environment. In this video, he discusses the current challenges of making building installations more circular.



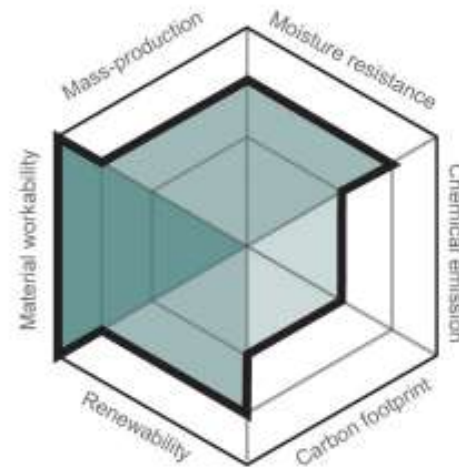
The video thumbnail features a grey background with the text "CIRCULARITY FOR EDUCATORS" in blue and white. Below this, it identifies "Prof. dr. ir. Atze Boerstra" as the speaker, listing his roles: "Chair Building Services Innovation", "Department of Architectural Engineering + Technology (AE+T)", and "Delft University of Technology". A white play button icon is centered over the text. On the right side of the thumbnail is a partial portrait of Prof. Boerstra, a man with glasses wearing a blue suit jacket. The TU Delft logo is visible in the bottom left corner of the thumbnail.

Afstudeerproject Kevin Wyniarczyk

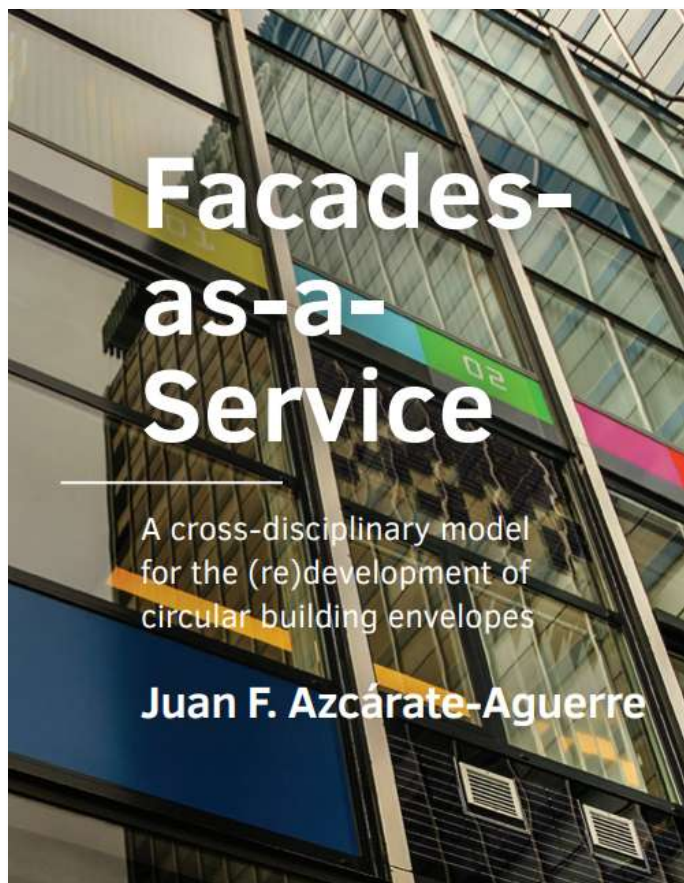
Graduation project Kevin Wyniarczyk on bio-based air ducts (see [link](#))



Bio-composite (Flax)



Voorbeeld 'ouder' TU Delft onderzoek rond circulariteit



Recente initiatieven waar TU Delft bij betrokken is

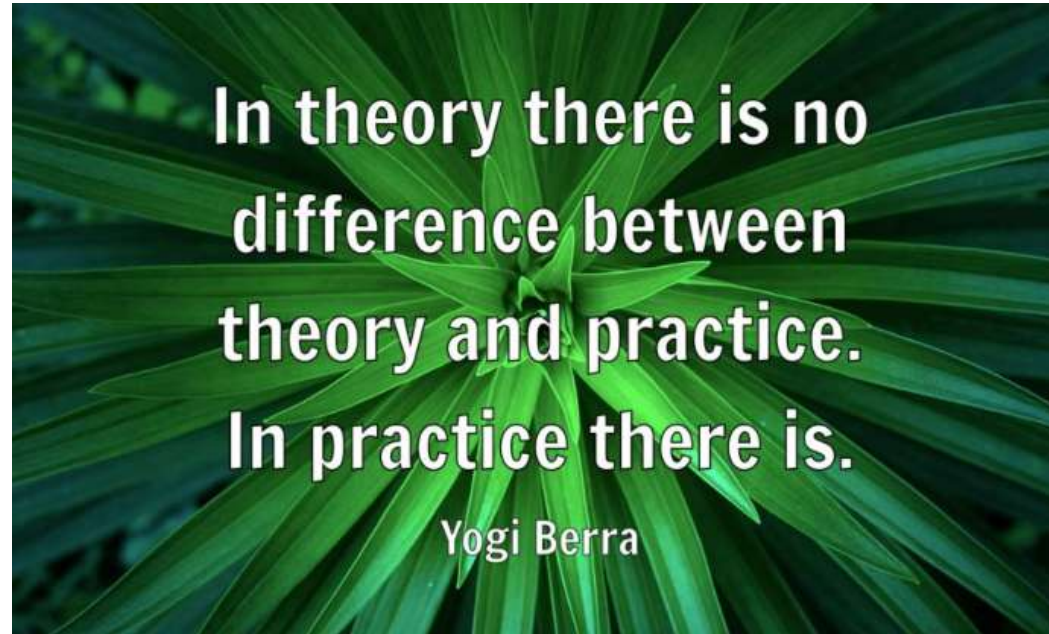


RVO MOOI project (2025 – medio 2027):



Persoonlijke observaties

Levend/lerend met 1 been in de praktijk en 1 been in de theorie....



Nog een paar suggesties

Stel, u vindt installatie-onderzoek en -onderwijs belangrijk en u wilt mij en mijn collega's steunen, wat kunt U doen?

- Doe mee aan onderzoeksconsortia (NL en EU) en co-sponsor onderzoek
- Geef uw toptalent te ruimte om 'om-niet' bij te dragen aan (ontwerp)onderwijs
- Wees pro-actief als het gaat om 'de politiek' scherp houden rond thema's als installatietechniek-innovatie en techniek-onderzoek/onderwijs
-

Tot slot

