

**Circular Economy Platform Twente Newsletter - Issue 1:**

# Buildings, Bridges & Tires

**Welcome to the inaugural issue of the Circular Economy Platform Twente Newsletter!** Our platform serves as a hub for advancing interdisciplinary research and education, fostering multi-stakeholder collaboration, and translating circular economy principles into actionable solutions at the UT and the region of Overijssel. In this issue, we spotlight cutting-edge projects, pioneering PhD research, innovative education, and regional initiatives that exemplify the integration of science, policy, and practice. As we navigate the complexities of achieving a fully circular economy by 2050, we encourage you to engage with our community of scholars and practitioners. Together, we can shape a resilient, resource-efficient future and contribute to the global transition towards sustainability. Enjoy reading!

Dr. Devrim Murat Yazan

CEPTwente coordinator

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## Upcoming Events

# SAVE THE DATES!

## 2024

December  
**13th**

**Yifei Yu's PhD Defense: Circular Construction Ecosystems**

**Time: 12:30 – 13:30**

**Location: Waaier 4, University of Twente**

**Invitation Link: [click here](#)**

## 2025

October  
**10th\***

**Dutch Academic Network for Circular Economy (DAN-CE) Workshop**

CEPTwente is proud to host the 8th Dutch Academic Network for Circular Economy (DAN-CE) Workshop on 23 May 2025. Please stay tuned for further updates.

\* Rescheduled from May 23<sup>rd</sup> to October 10<sup>th</sup>





## Project Highlights

### IS2H4C- GREETINGS FROM BILBAO!

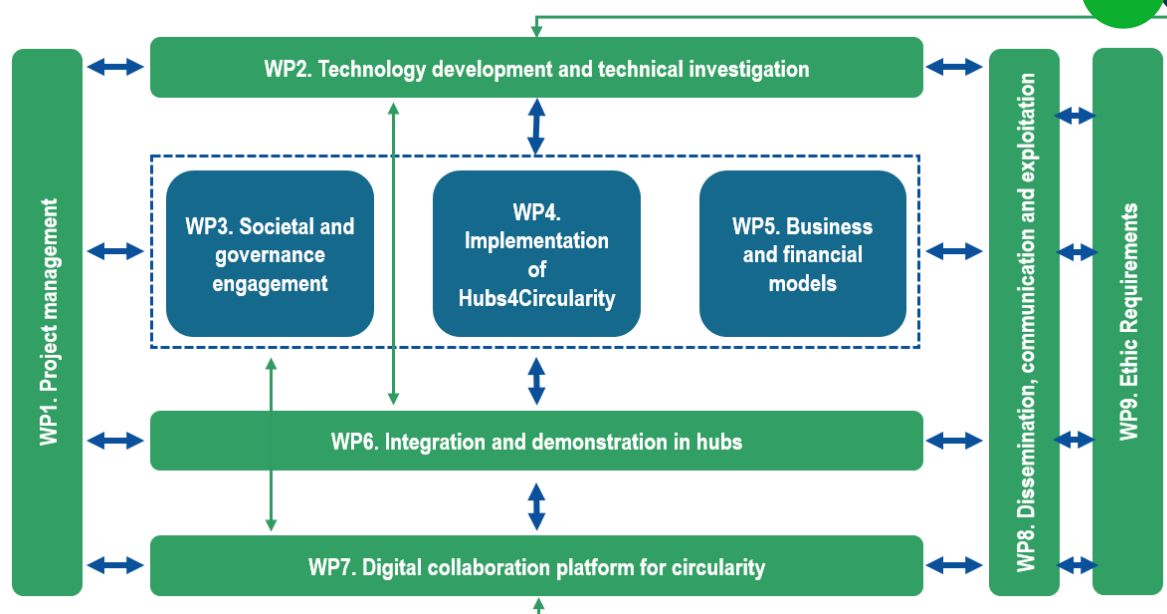
The “From Industrial Symbiosis to Hubs for Circularity” (IS2H4C) project addresses the challenges faced by heavily industrialized areas in adopting large-scale industrial symbioses and circularity practices. It aims to establish Hubs for Circularity (H4C) in diverse industrial regions in the Netherlands, Germany, Spain, and Turkey. If you would like to read more about IS2H4C hubs, [click here](#).

By leveraging innovative sustainable technologies, infrastructure integration, and groundbreaking research, the project seeks to drive systemic change and foster collaboration between industrial zones and their surrounding ecosystems. Through a digital platform for resource and information-sharing, IS2H4C focuses on maximizing resource efficiency, renewable energy use, waste prevention, and the reuse and recycling of unavoidable waste streams, paving the way for circular and resilient industrial zones.

The project aims to fulfill six objectives:

- Deploy and demonstrate near commercial scale **industrial symbiosis** through innovative technologies
- Ensure **resilience and sustainability** of H4Cs considering planet, people, and profit
- Facilitate the **market penetration** of H4C through novel financial schemes and social innovation approaches unlocking public and private investment
- Develop a **digital collaboration** platform for information-sharing and smart decision-support
- Achieve a standardized **top-down H4C design methodology**, applicable as a reference regional development model
- Maximize **wider uptake** of IS2H4C's results during and after the project's execution





To fulfill the objectives, the project is split up into nine Working Packages (WP) as shown in the figure above.

## Consortium in Bilbao

At the second consortium meeting of IS2H4C held in Bilbao, Spain from 16 to 19 September 2024, each of the WP's shared the progress from the first 6 months of the project.

**Collaborative Workshops and Site Visits:** Multiple workshops and interactive sessions have taken place to align strategies and gain insights into hubs.

**Renewable Energy and Resource Efficiency:** Advances in renewable energy integration across multiple vectors (electricity, heat, chemicals, and fuels) and circular material flows have been identified, highlighting hydrogen's role in enabling the circular economy.

**Stakeholder Engagement and Surveys:** Preliminary results of surveys have revealed a strong interest in industrial symbiosis and the importance of green transformation among key stakeholders. Stakeholder mapping is underway across all hubs.

**Model Development and Data Collection:** Preliminary models for energy management, hub operations, and supply chain optimization are in

progress, supported by active data collection efforts.

**Digital Collaboration Platform:** A blueprint for the Digital H4C platform has been developed, and feedback from project partners is shaping the next development phase.

**Dissemination and Outreach:** The project's communication efforts have garnered over 500 website visitors and a growing LinkedIn presence with more than 500 followers. Our IS2H4C project joined the Circular Industry Helix on the Crowdhelix Platform.

For more information about IS2H4C and its associated Hubs, visit the project website. For any further inquiries or collaborations, feel free to reach us via the IS2H4C email.

### Website:

<https://is2h4c-project.eu/>

### LinkedIn:

[IS2H4C](#)

### E-mail:

[is2h4c@utwente.nl](mailto:is2h4c@utwente.nl)





## PhD Showcase

# YIFEI YU: CIRCULAR CONSTRUCTION ECOSYSTEMS

Yifei Yu, a PhD candidate from the University of Twente, is about to wrap up his research on Circular Construction Ecosystems. In this brief, he would like to introduce his research and share the key findings with you.

### Background

Imagine a world where we waste no more and every material is kept in the usage loop. That is the goal of the Circular Economy (CE), which focuses on keeping materials in use longer and minimising waste. This idea has gained a lot of interest in recent years, especially as we face pressing environmental challenges like climate change.

Construction is one of the most resource-hungry industries. Moving toward a circular future is crucial here, as it could save a massive amount of materials and reduce waste. However, it is challenging to manage complex material flows across different projects over space and time, which is where Yifei's research comes in.

To truly turn the construction industry circular, Yifei's research focused to tackle the following challenges:

- **Unpredictable Supply-Demand:** It is challenging to predict when/where reclaimed materials will be available and when/where projects will need them;

- **Material Complexity:** Buildings are like complex puzzles, with countless unique materials interacting with each other;
- **Fragmented Supply Chains:** The industry is full of individual players and organisations, making it tough to coordinate on a large scale.

Yifei argues that it is an information-intensive task to match the unique materials and characteristics of multiple projects following CE principles.

**"Every construction project is unique, as is every deconstruction project."**

### Circularity Information Platform (CIP)

Yifei aims to develop a Circularity Information Platform (CIP) in this research. Think of it as a matchmaking tool that helps to link the supply and demand for materials across various (de)construction projects. By providing crucial data and decision support, this

platform makes it easier to manage materials across multiple projects and even sectors.

Yifei adopts a Design Science Research methodology to iteratively develop and test a CIP in different stages. The research context is based on a concrete supply chain in the Twente region the Netherlands, where he collaborates with industrial practitioners, governmental actors, researchers, and students.

**“CIP connects the dots between materials that need a new home and projects that could use them.”**

## Key Findings

**Matchmaking materials** between projects is like solving a puzzle, and simulations can help us predict what fits where. The provided simulation-based solution helps to manage multiple construction projects while keeping a “closed-loop” approach.

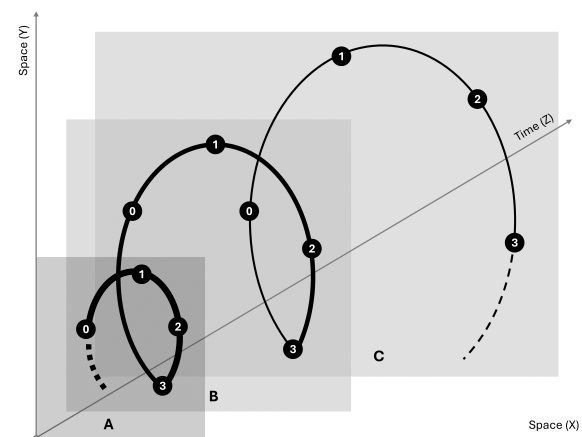
The platform we designed is part of a broader concept called **Industrial Symbiosis**, industries sharing resources to reduce waste. This study opens new avenues to advance this theory towards Industrial Urban Symbiosis, in construction.

Beyond a digital tool, CIP stands for a new way to **connect projects**. CIP promotes a harmony between new and reclaimed materials across projects, creating an interconnected ecosystem that uses resources wisely.

The **construction industry** is an “anchor” connecting different industries. The steps we followed serve as a “recipe” to design similar tools in different industries.

Circular Economy is about **flexible, long-term, multi-scale** use of materials across projects over space and time. Yifei’s work offers a new conceptual model showing how materials can travel

between projects, creating a spiral.



The proposed spiral CE conceptual model shows the systemic and interactive nature of CE with spatiotemporal features.

## Ending Remarks

Yifei’s thesis is a pioneer work that designs, prototypes, demonstrates, and validates a CIP as a type of potential matchmaking solutions to achieve a circular built environment from a Design Science perspective.

By promoting CE across multiple projects and even sectors, Yifei hopes this work will inspire a new way of thinking about circular construction ecosystems.

## Keep in touch

You can attend Yifei’s **PhD defense** presentation on the **13<sup>th</sup> of December 2024, 12:30 – 13:30, at Waaier 4, University of Twente**. (for the invitation [click here](https://yifei-yu-utwente.github.io/SCCE/))

If you interested in this topic, feel free to reach out!

**Website:**

<https://yifei-yu-utwente.github.io/SCCE/>

**E-mail:**

[y.yu-1@utwente.nl](mailto:y.yu-1@utwente.nl)



## Education

# CIRCULAR SYSTEMS ENGINEERING

With an increasing number of ageing bridges and infrastructure systems in the Netherlands, renovation of these has become critical. Many of these structures, built in the 1950s and 60s, are now reaching the end of life. As traffic loads additionally have grown substantially over the decades, determining their future has become crucial. The future of a bridge can take different paths such as repairing, replacing or changing its usage behaviour.

### Circular Systems Engineering Course

This is exactly where the master course Circular Systems Engineering by Marc van den Berg comes into play. It teaches students to combine principles from the circular economy with systems engineering practices. Set in the third quartile, the course is available to students of the Master programs Construction Management & Engineering and Civil Engineering & Management. It consists of a series of lectures, interactive workshops, guest lectures from leading civil engineering companies, and a hands-on project focused on real-life infrastructure challenges. The guest lectures bring valuable insights from industry experts, illustrating how circularity and systems engineering principles are being applied in practice to tackle similar projects, making the experience truly relevant.

### Designing for a Circular Future

The course's goal is to equip students with the knowledge to redesign infrastructure sustainably by merging circularity principles with systems engineering. This is a new but essential field of study for long-term sustainability and aligns with the national goal to achieve a fully circular economy by 2050. The current project invites students to apply these principles to a real-world problem: renovation or replacement of a bridge. Students must analyze and redesign this structure using circularity strategies, addressing aspects such as:

- Reusing structural parts where feasible
- Adjusting user behavior to extend the life of the structure
- Extending the overall lifecycle of the bridge
- Mining materials from the existing building

Through this project, students face realistic constraints similar to those in the field, such as managing risks, ensuring safety standards, and navigating the complexity of stakeholder needs. Additionally, they confront the challenge of assessing structural materials with limited data, just as they might in professional practice. This

requires not only technical knowledge but creativity and resourcefulness in developing sustainable solutions within systems engineering frameworks that emphasize reducing waste and conserving resources.

## Learning Outcomes and Practical Skills

By the end of the course, students gain a well-rounded understanding of both systems engineering and circularity principles. They learn to:

- Clearly explain systems engineering and circularity concepts,
- Integrate circularity into systems engineering practices, and
- Design sustainable civil engineering projects with circular principles in mind.
- This hands-on approach prepares students to meet the demands of a future in sustainable infrastructure.

For those interested in the course “Circular Systems Engineering,” it is possible to sign up via Osiris. For any questions related to the course or this research area, feel free to reach out to the course coordinator Dr. ir. Marc van den Berg.

### E-mail:

[m.c.vandenberg@utwente.nl](mailto:m.c.vandenberg@utwente.nl)







## Regional Initiatives

# CIRCULAR RUBBER PLATFORM

Rubber products are everywhere in our daily lives, from shoe soles and bicycle tires to coffee machines. But with such widespread use, the carbon footprint of rubber production is a major environmental concern. In all applications, most rubber ingredients are oil based, a material we will run out of in the foreseeable future. On the other hand, barely any rubber is recycled back into rubber, while man products like tires are produced in bigger and bigger quantities year over year, thus creating a growing pile of rubber waste.

How can the circularity principles be made of use to reduce the carbon footprint of rubber products and parts?

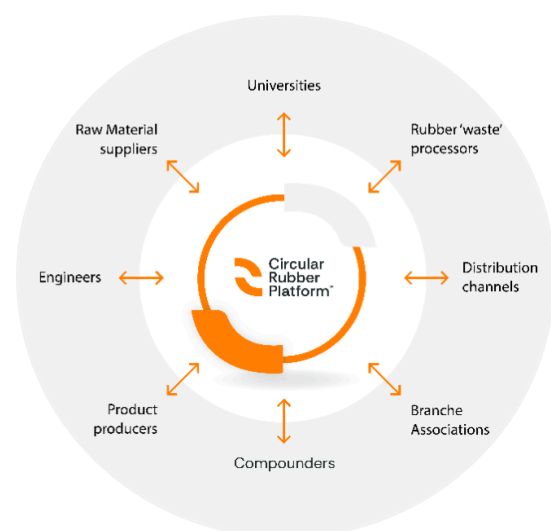
The same question Jan Boomsma and Enrico Koggel asked themselves and quickly found out that information on circularity in regard to rubber is scattered and scarce.

**“Back then, with a quick search you couldn’t find any answer”**

Frustrated with the lack of accessible resources, they began compiling their own research. Even when finding a solution, the question on how to apply it, use the know-how, and when to apply it still need to be answered. At the end of 2023, the decision was made to make

the knowledge gained also available for others and, through their Sondel Engineering company, they officially launched the Circular Rubber Platform to bring industry stakeholders together in advancing sustainable rubber practices.

Today, the platform has grown to 211 individual members and 71 companies from around the world, including the University of Twente. Anyone can join in return for a small membership fee. Members benefit from global knowledge sharing, networking, and collaboration tools, such as online webinars, database of solutions, and B2B matchmaking.



One example all Dutch can relate to concerns the inside bicycle tubes. Usually, after usage they are simply

thrown away. Even though they can be recycled and used to make new inner tubes or other products. Through a cooperation of the rubber platform currently, a collection of British and Dutch initiatives are collecting bicycle tubes and supplying them to several social workplaces which recycle them into raw materials in the cable and adhesive industry.

The goal of the platform is to lower the impact of rubber products by using circular economy principles:

- **Design for Longevity:** Emphasizing durable rubber products that last longer to reduce waste.
- **Use of Bio-based Materials:** Exploring alternatives to synthetic rubber, which is often derived from fossil fuels.
- **Recovery of Materials:** Developing recycling processes that reclaim valuable materials from end-of-life rubber products.

In the future the founders wish to start more innovation programs with their members. For this soon also a new website will come to facilitate the changes.

If you would like to hear more about the Circular Rubber Platform make sure to have a look at their website and to contact Jan or Enrico via email.

### Email:

Jan:  
[jan@circularrubberplatform.com](mailto:jan@circularrubberplatform.com)

Enrico:  
[enrico@circularrubberplatform.com](mailto:enrico@circularrubberplatform.com)

### LinkedIn:

[Jan Boomsma](#)

[Enrico Koggel](#)

### Website:

[www.circularrubberplatform.com](http://www.circularrubberplatform.com)





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# Thank you for reading!

**Thank you for reading our Newsletter!** If you would like to sign up to receive a notification whenever we issue one (no more than once a quartile), you can sign up [here](#).

If you would like to contribute to the newsletter, or be featured with your project, company, or research, feel free to reach out to us [here](#).

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### Email:

[ceptwente@utwente.nl](mailto:ceptwente@utwente.nl)

The newsletter is made by Chantal Ermling & Fran Karlović.