

Interreg
Baltic Sea Region



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CIRCULAR ECONOMY

Circular spaces

Maker: Education Topic

Reusability, repairability, recyclability

maker



aker

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Topic summary	<p>[2-3 sentences explaining general idea and aim of your training topic] This topic focuses on <i>reusability, repairability and recyclability</i> and aims to inspire and educate local makers, makerspaces and business support organisations about circular design, production and business modelling.</p>
Duration (in hours and minutes)	4 hours
Training outcomes	<p>After completing the training trainees will:</p> <ul style="list-style-type: none"> • be introduced to the Interreg Baltic Sea Region programme project 2021-2027, CIRCULAR SPACES. • get new insights and knowledge about circular design in theory and methods. • get new insights, knowledge and practical experiences with circular design principals and tools. • get new insights, knowledge and practical experiences with circular business models tools and resources. • get access to an open repository of tools, templates and guides within the field of circular design and production
Training tools and resources	<p>[Indicate what tools or resources are required for carrying out the training]</p> <p>For trainer:</p> <ul style="list-style-type: none"> • Materialepyramiden by CINARK, KADK and Vandkunsten • The Upcycl: New Waste Materials • Material Reuse Portal (CIRCUI) • Designing your circular transition by DDC • How to get started with Distributed Design? Tools by DDC and Maker <p>For trainee:</p> <ul style="list-style-type: none"> • Materialepyramiden by CINARK, KADK and Vandkunsten • The Upcycl: New Waste Materials • Material Reuse Portal (CIRCUI) • Designing your circular transition by DDC • How to get started with Distributed Design? Tools by DDC and Maker
Training modes	<p>[Indicate how training should be carried out or adapted to different communication formats]</p> <p>In person: X</p> <p>Online:</p> <p>Hybrid:</p>
Target groups	<p>[Indicate how training could be used by different target groups including expected benefits for them]</p> <p>Makers: Independent makers and designers will benefit from getting access to a carefully curated selection of open resources and tools for transitioning existing design, prototyping and production principals and approaches into more circular models. This target group will gain practical experiences with some of the tools, and be inspired to work with open resources for kickstarting a circular transition.</p> <p>Makerspaces: Makerspaces, fablabs and similar collective workshop ecosystems will benefit from getting access to a carefully curated selection of open resources and tools for a circular transition. This target group will be able to share, implement and further train their local and specific community within these open resources and tools.</p> <p>Suppliers: Will get a communicative and branding opportunity to connect directly with independent makers and designers (customers) and to educate and inspire to use more circular materials.</p> <p>Start-ups: Start-ups will benefit from getting access to a carefully curated selection of open resources and tools for transitioning existing design, prototyping and production principals and approaches into more circular models. This target group will gain practical experiences with some of the tools, and be inspired to work with open resources for kickstarting a circular transition.</p> <p>SMEs: SMEs will benefit from getting access to a carefully curated selection of open resources and tools for transitioning existing design, prototyping and production principals and approaches into more circular models. This target group will gain practical experiences with some of the tools, and be inspired to work with open resources for kickstarting a circular transition.</p> <p>Business support organisations: Business Support Organisations will gain an understanding of the practices of physical entrepreneurs, makers and makerspaces thereby qualifying their own input and tools.</p>

TOPIC OVERVIEW

Session 1

About CIRCULAR SPACES and CIRCULAR MAKER EDUCATION TOPIC
- *Introduction by Maker*

Session 2

Introduction to circular design: design principals, good practices, mindset and methods
- *Reusability, repairability, recyclability*

Session 3

Kickstarting your circular transition (strategies, value and ecosystems)
- *Facilitated by Maker and Danish Design Center*

Session 4

CIRCULAR MAKER tool box of open resources: How to pursue your circular journey?
- *Facilitated by Maker*

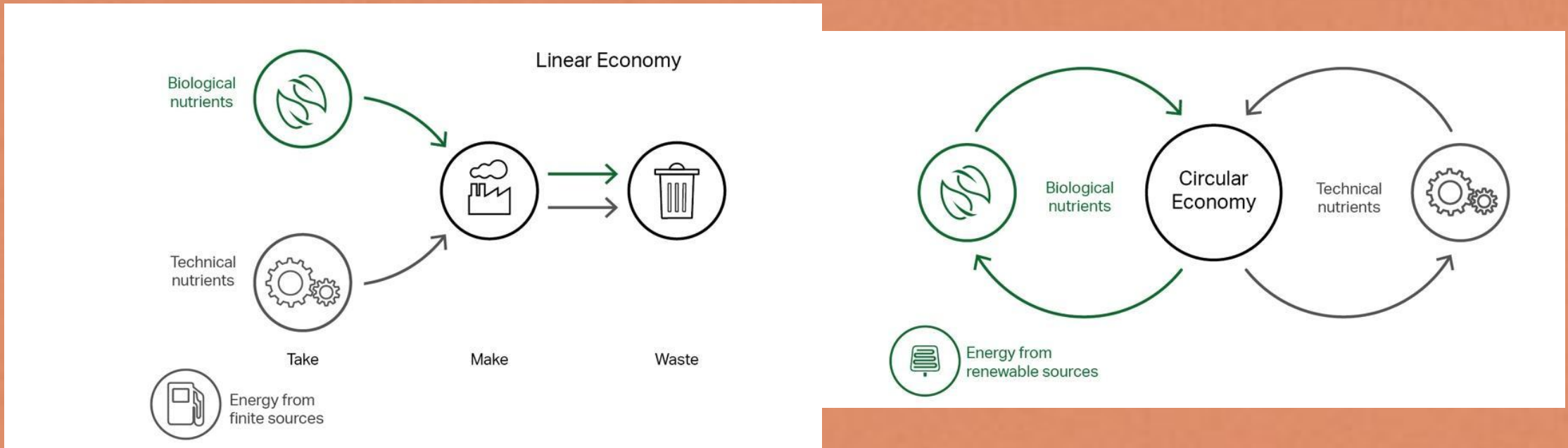
INTRODUCTION

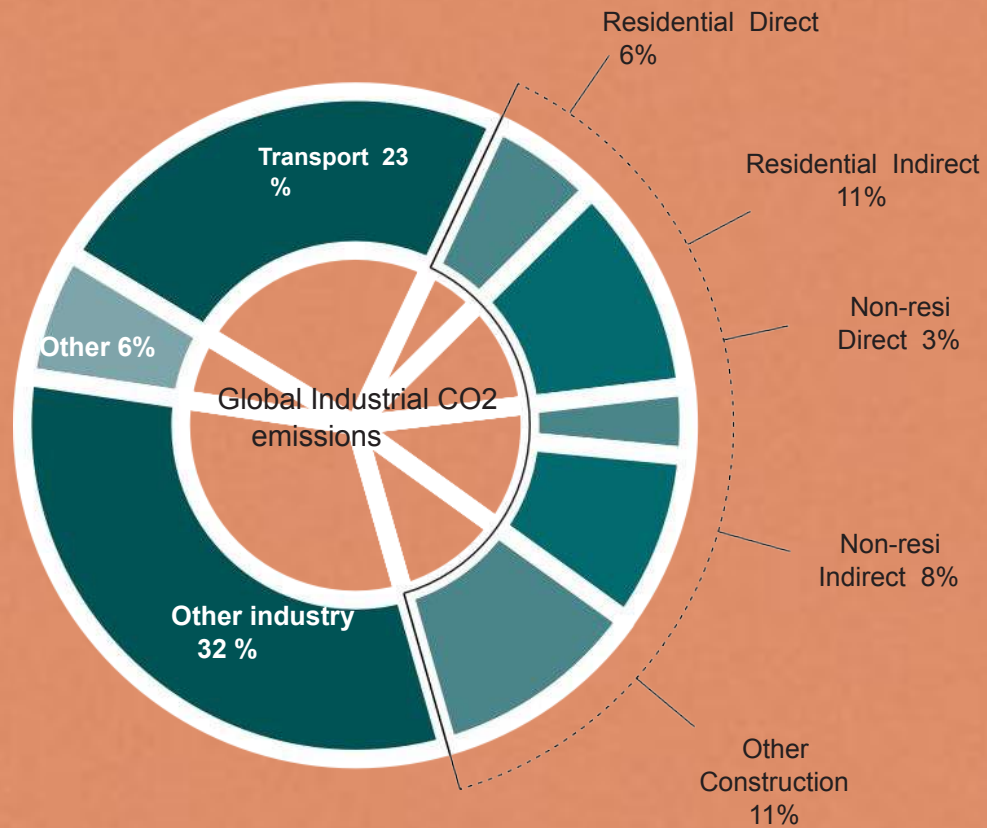
SESSION 1

About CIRCULAR SPACES and CIRCULAR MAKER EDUCATION TOPIC

From linear to circular

Recyclability and reusability – the future of material flows is focusing on recirculation of materials, direct reuse and material exchange ecosystems





Repairability, reusability and recyclability

The ideal way of disassembly



The reality

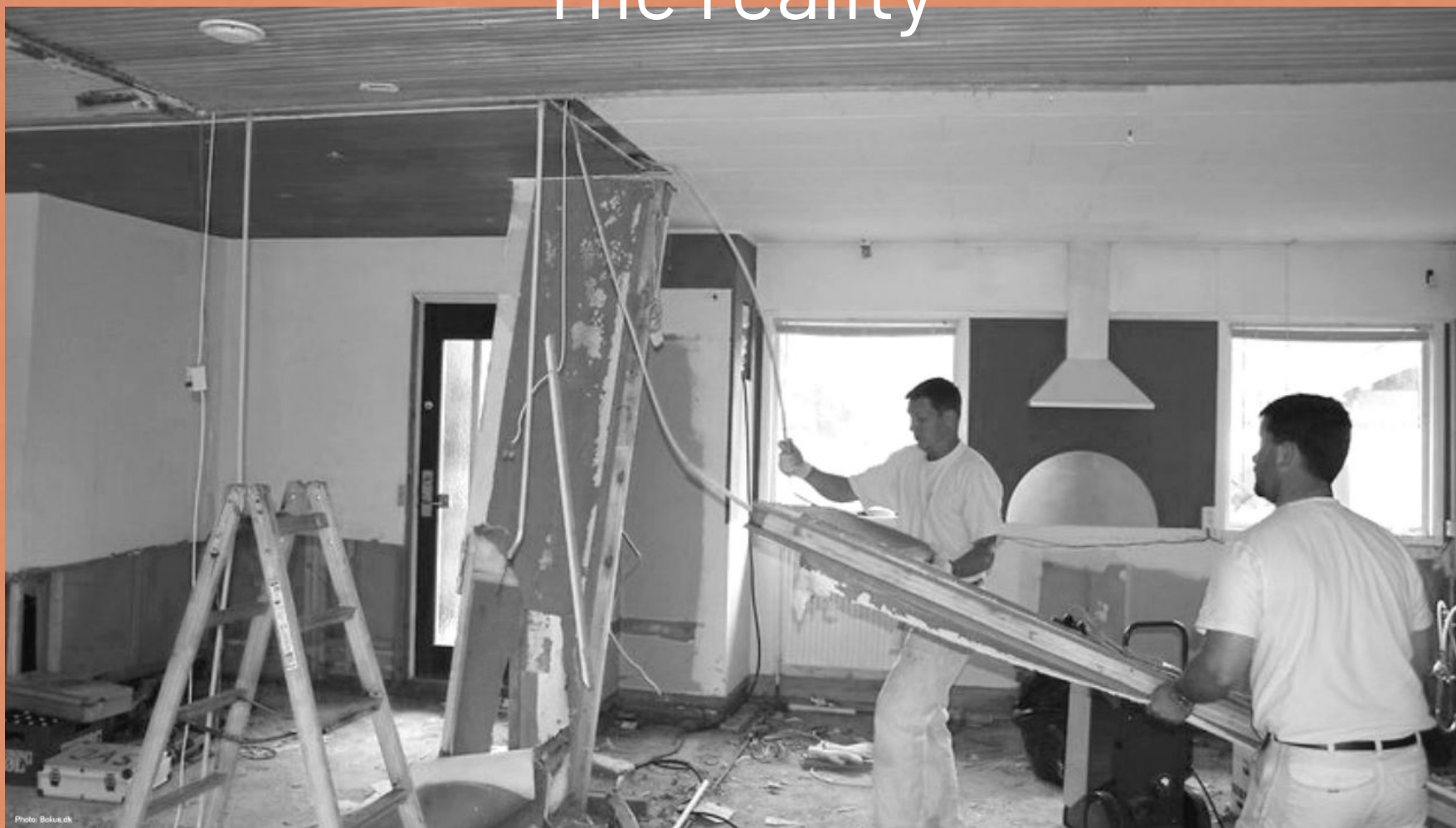


Photo: Bolus.dk

When designing for circularity everything must be designed for:

- 1) Reusability
- 2) Repairability
- 3) Recyclability
- 4) Upgradability
- 5) Transformability

CS: WP1 approach to circular design / economy (WILDAU)

About CIRCULAR SPACES and CIRCULAR MAKER EDUCATION TOPIC

Awaiting slides from PP

MAIN PART #1

SESSION 2

Introduction to circular design: design principals, approaches and methods



Circular design principals

Circular design

Innovation & research

Legislation & regulation

Durability & longevity

Marked demands

Transformation & flexibility

Engagement & consciousness

Material selection & exploration

Waste reduction

Upcycle

Resource efficiency and optimization

Local ecosystems & collaboration

Digitization & data tracking systems

Reuse

Principals / methods

Theme 1: REUSABILITY

Theme 2: REPAIRABILITY

Theme 3: RECYCLABILITY

} design
for

disassembly

future transformation and up/down-gradability

honesty (material/parts passport, transparency)

longevity - extended product lifespan

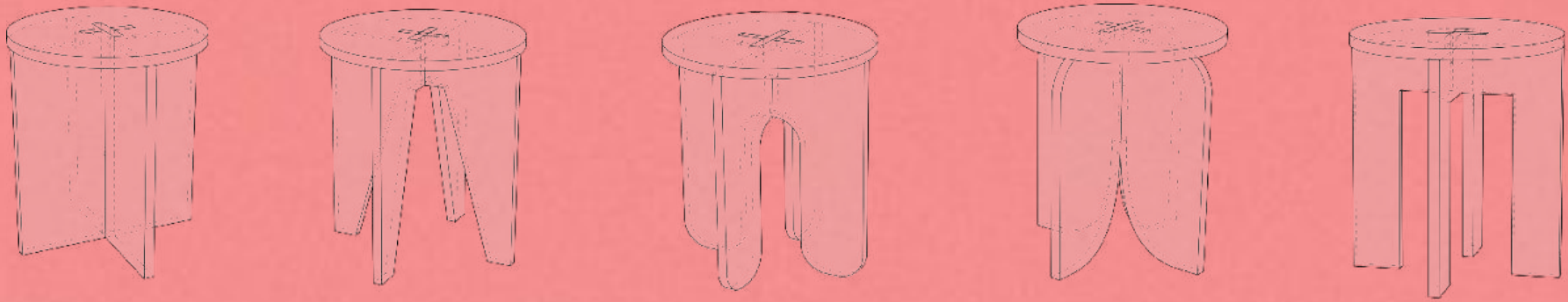
open collaboration

flexible materials

return offerings

Good practices for reusability, repairability, and recyclability

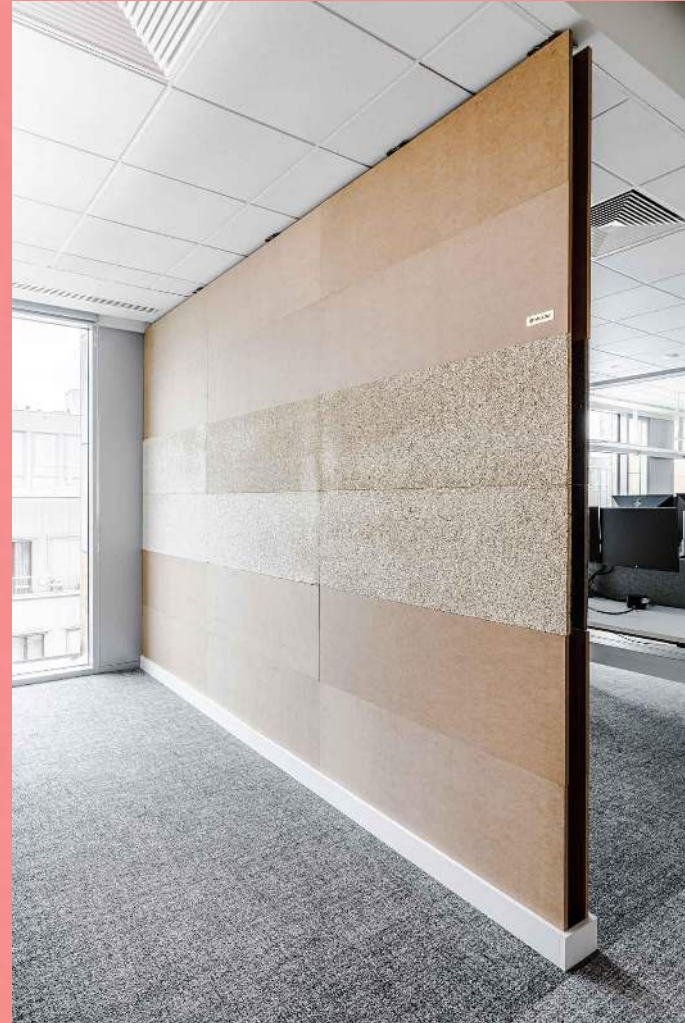
Design for disassembly, transformation and recyclability

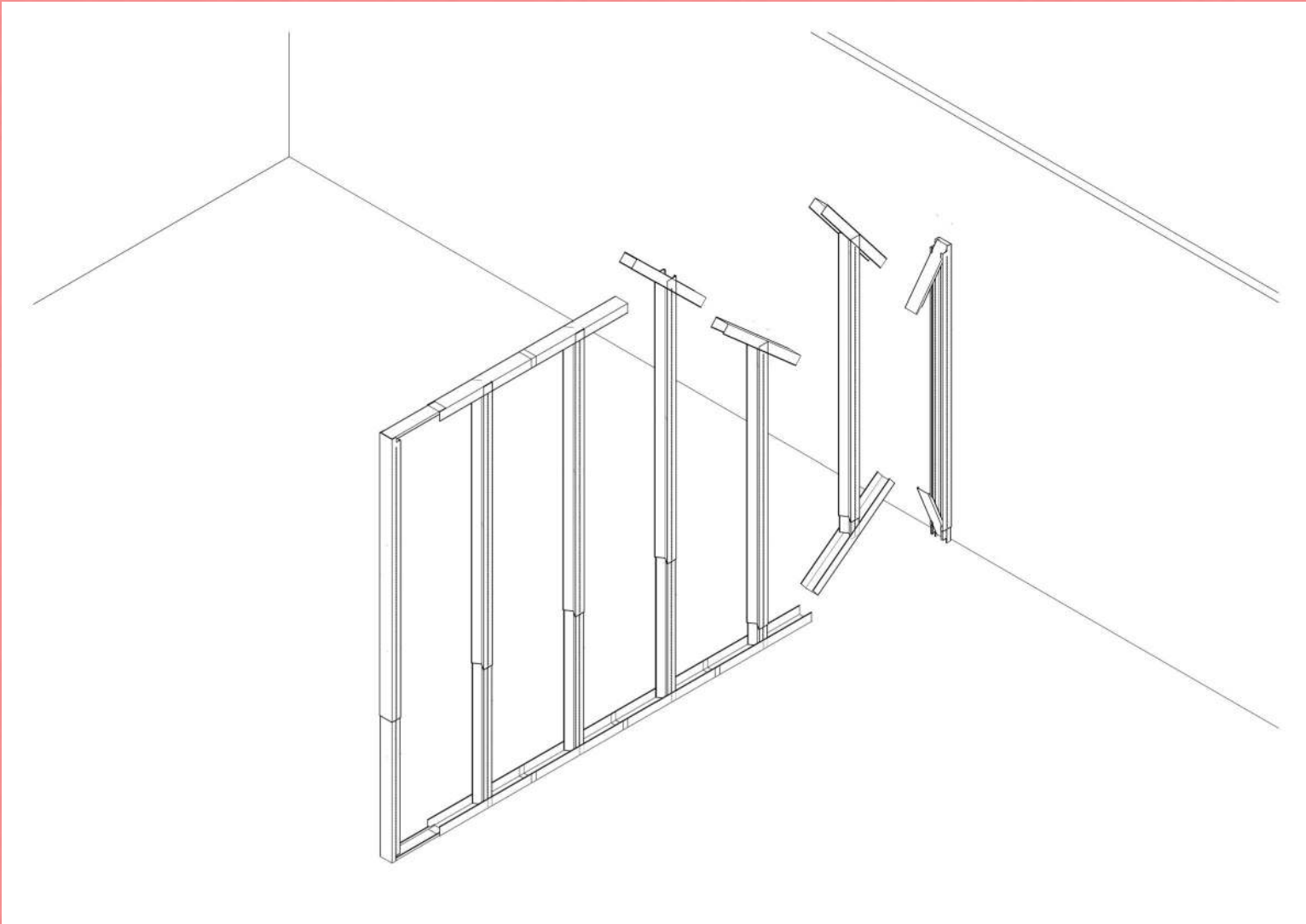


(And flatpack)

Good practices: Design for Disassembly – from hackathon to business

Plug'N'Wall by Emma Buchanan, Jan Dankmeyer, Katarina Kierulfova & Lukasz Marczuk





Good practices: Stykka Loop Kitchen



[Stykka Explainer](#)

Case: Stykka Loop Kitchen

Material and parts passports and online digital twins ensure traceability, repairability, future upgradability and material transparency for future recyclability

In the field of built-in fixtures, we are among the first to equip our products and parties with QR and RFID, which gives all parties a unique ID. This ensures identification and traceability and helps us keep track of what we have in circulation. The technology connects the physical product with an online digital twin containing product, material and climate data. Traceability is a prerequisite for enabling return logistics in the future, where parts are taken back and prepared for rebuilding.

<https://www.stykka.com/cirkularitet>

Case: Stykka Loop Kitchen

DfD

The right joints are a prerequisite for circular products. We assemble all our fixtures with special brackets and cut-outs so that all parts can be easily replaced or repaired.

The joints are part of our modular system, which means that all holes are pre-drilled to avoid drilling during installation, where the risk of damaging a part is greatest. Plus, our installers say it saves them a lot of time. At the end of use, the fixtures can be disassembled, returned and used for new products - without any loss of quality. With screws and dowels in chipboard, this would not be possible.

<https://www.stykka.com/cirkularitet>

Case: Stykka Loop Kitchen

Distributed production model - Global collaboration and local production

Technology & carbon footprint

With technology and a digital production method, our goal is to produce locally to minimize transportation and carbon footprint. We see ourselves as part of a global production network, powered by technology, where we send the recipe digitally instead of shopping for tons of materials. (<https://www.stykka.com/cirkularitet>)

Good practices: Design for Disassembly and flexibility on building scale

Co-creating beautiful ecological buildings.

For hybrid uses and internal flexibility.

At the urban scale.

Based on a reusable modular system.

Consisting of prefabricated elements.

As an inclusive technology for co-creation.



vivihouse

<https://www.vivihouse.cc/>

intersections are the main challenge

- air tightness
- sequence of assembly
- tolerances
- sound insulation
- thermal insulation



Photography: Robert Lichtveldt



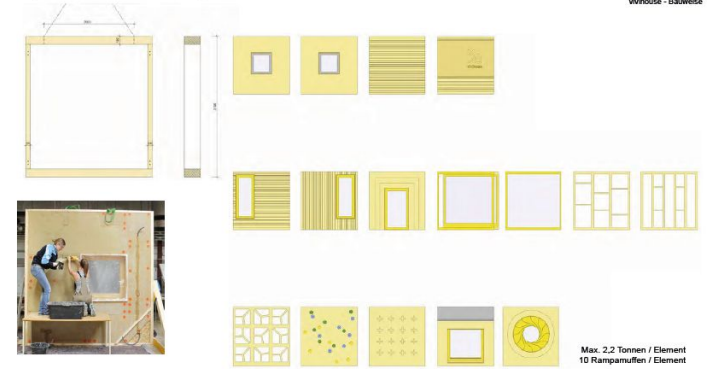
Considerations, DfD and Modularity

vivihouse: prototyping with strawbales, clay and lime



Natural materials and circularity

library of wall designs

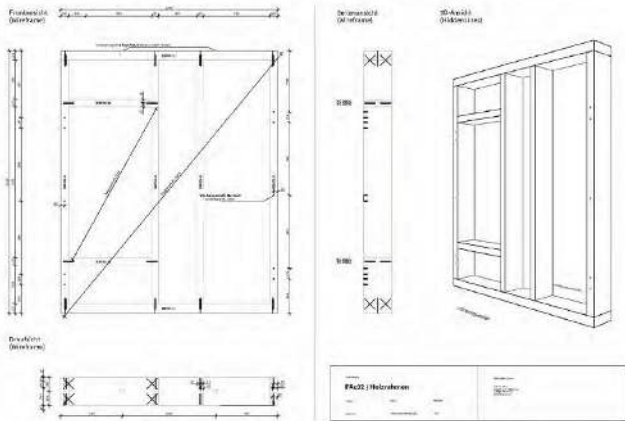


vivihouse - Bauelemente

Max. 2,2 Tonnen / Element
10 Rampenlufen / Element

Community and resources

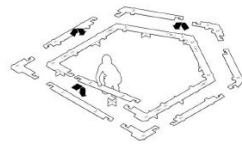
construction manual



Open source and sharing

inspiration: wikihouse

- > Inclusion in planning
- > distributed manufacturing



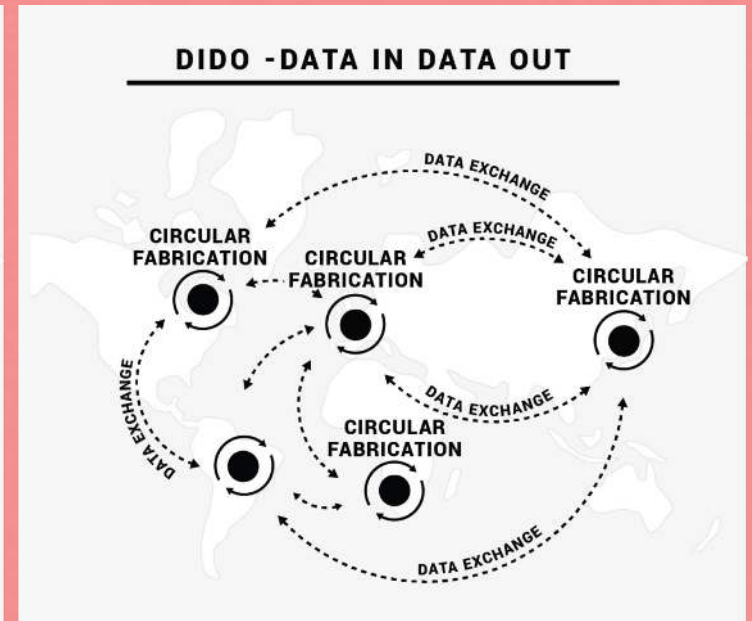
Open source - standing on the shoulders of others



Scalability

Good practices: Distributed design, open innovation and fab cities

The Distributed Design Platform is an incubator programme targeting the overall mission of Fab Cities and acts as an exchange and networking hub for the European maker movement. The initiative aims at developing and promoting the connection between designers, makers and the market.



[PITO TO DITO, Fab City](#)

Good practices: Distributed design, open innovation and distributed fabrication

Our values



Open

Open refers to the mentality and approach of designers to share and make their design processes transparent, replicable, and accessible, from hardware and software to implementation and usability.



Collaborative

Collaborative means enabling citizens to become active participants in the design process through meaningful and participatory co-design approaches.



Regenerative

Regenerative making and design principles aspire to renew and restore the systems that we are part of, rather than just replacing or devaluing them.

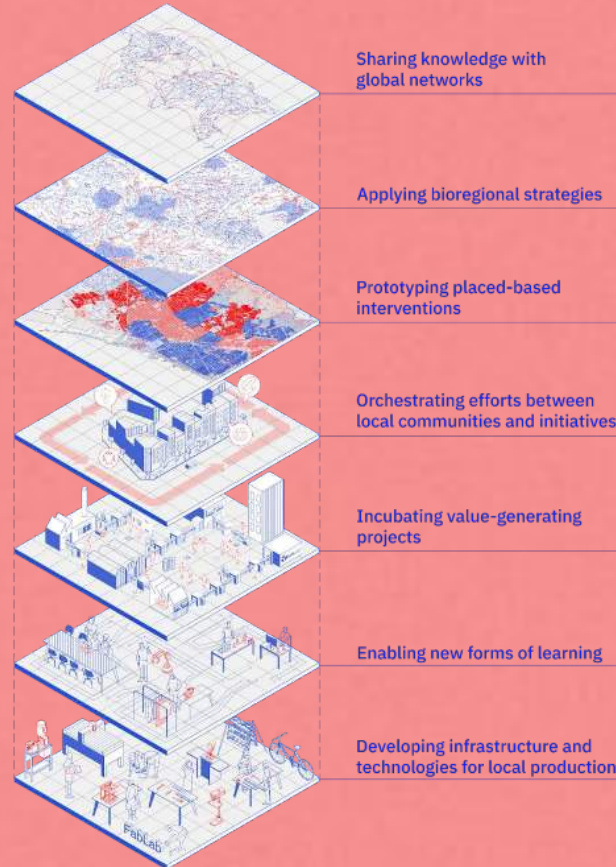


Ecosystemic

Ecosystemic means acknowledging the complexity of interactions between cultural, natural, and social aspects and designing to improve the health of social and environmental systems.

[DDP - Values](#)

Good practices: Fab cities



FULL STACK MODEL

Materials? Decisions, decisions



Organic and natural
Recyclable
Locally sourced
No use of screws or nails



BYGGERIETS MATERIALEPYRAMIDE
HUSK LEVETIDER



Interactive link to ["Materialepyramiden"](#)

Material and parts passport

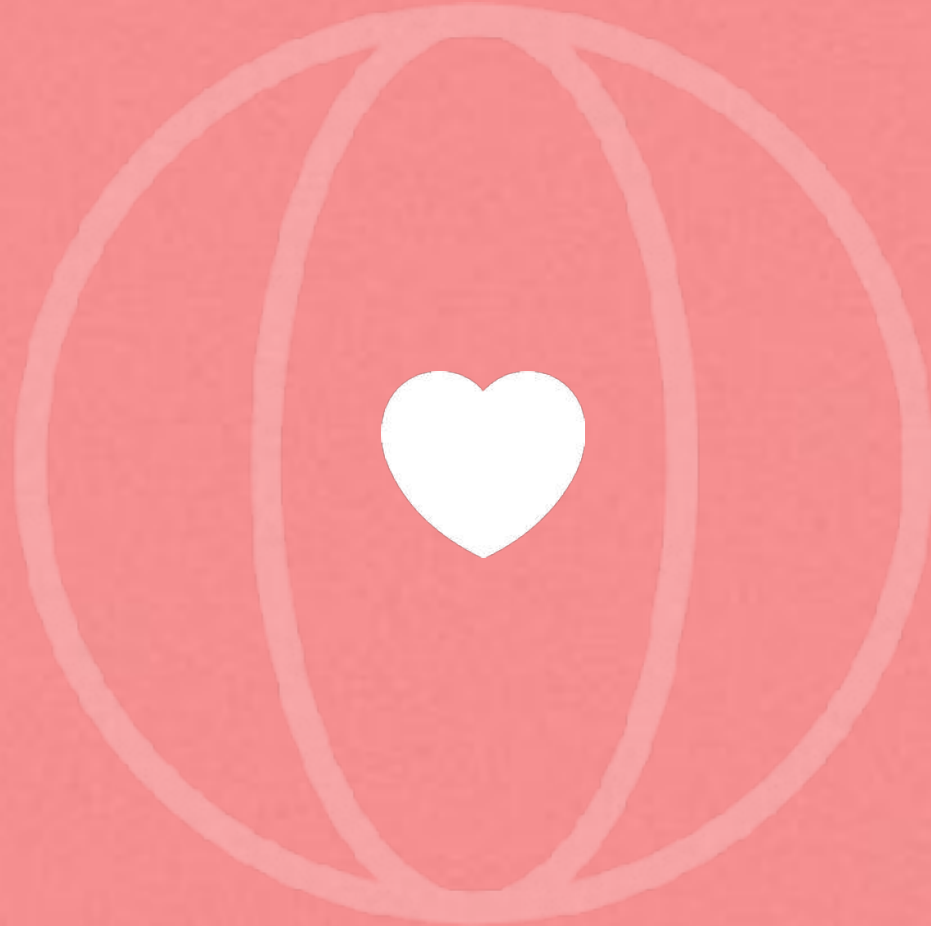
RFID and QR codes on all parts ensure traceability and connect the inventory with its digital twin on the operating platform.

This enables repairability, future transformability, recyclability and potentially also opens up for a second hand market of unwanted parts.



Stykkka: <https://www.stykkka.com/teknologi>

Durability & longevity





MAIN PART #2

SESSION 3 – Workshop

Kickstarting your circular transition (strategies, value and ecosystems)

Danish Design Centre

Open resources and [Circular Toolkit](#) developed by DDC.

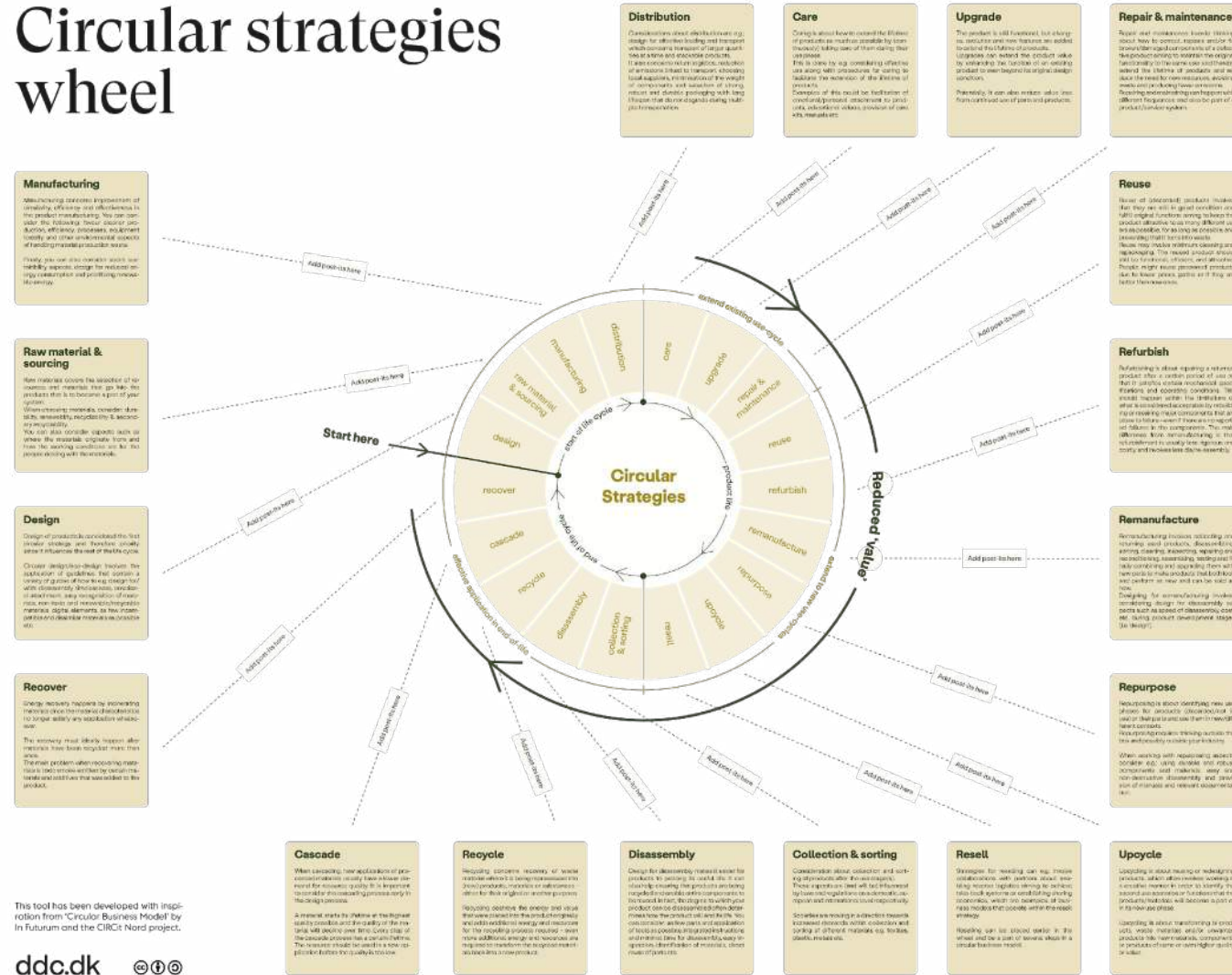
Possibility to do online training and physical workshops using the Circular Toolkit.

Video introduction to DDC's Circular Toolkit



<https://ddc.dk/tools/designing-your-circular-transition/>

Circular strategies wheel



The tool has been developed with inspiration from "Circular Business Model" by In Futurum and the CIRCUS Nord project.

ddc.dk

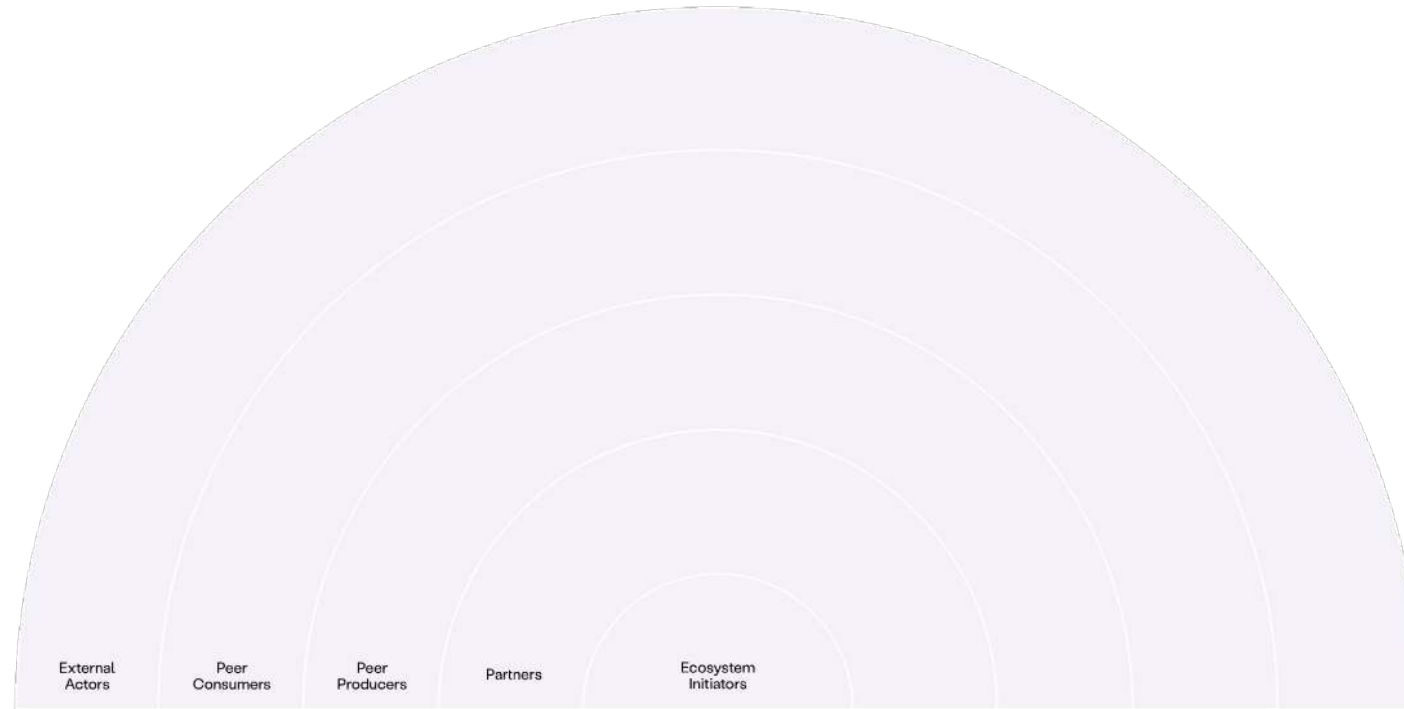
DDC

Danish Design Center

<https://ddc.dk/tools/designing-your-circular-transition/>

Ecosystem map

DDC



Entities that have a specific interest in the success or failure of the ecosystem, who is in a position of influence on regulation of the field(s) in which the ecosystem operates.

Entities interested in consuming, utilizing, accessing the value that is created through and in the ecosystem

Entities interested in providing value on the supply side of the ecosystem and seeking opportunities to engage deeper.

Entities that create additional value and collaborate with ecosystem initiators with a deeper relation.

Entities that form a vision which binds a group of actors together in what can be referred to as an ecosystem (which can potentially form the basis of a platform).

ddc.dk

Danish Design Center

<https://ddc.dk/tools/designing-your-circular-transition/>

CONCLUSION

SESSION 4

CIRCULAR MAKER tool box of open resources

Platforms and communities for circular makers and makerspaces

WIKIFACTORY

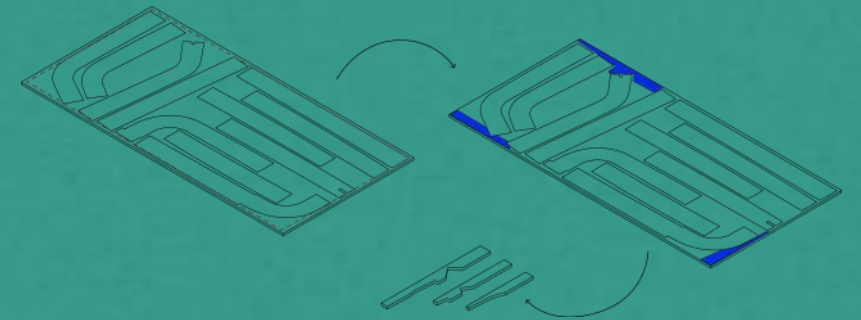
Is a product development platform built for engineers and designed for all extended team members. With no training required, you experience effortless real-time collaboration across teams, fostering efficient communication, streamlined workflows, and accelerated time to market.

DISTRIBUTED DESIGN PLATFORM

The Distributed Design Platform acts as an exchange and networking hub for the emerging field of distributed design. The initiative aims at developing and promoting the connection between designers, makers and emerging digital and local markets.

TOOL: Found Objects - Edge Generator

Reusability and recyclability



<https://github.com/found-objects/FoundObjects>

Open resources for LCAs and material comparisons

[OpenLCA](#)

The platform is freely available software for Life Cycle Assessment (LCA) developed by [GreenDELTA](#) in Berlin.

[BYGGERIETS MATERIALEPYRAMIDE](#)

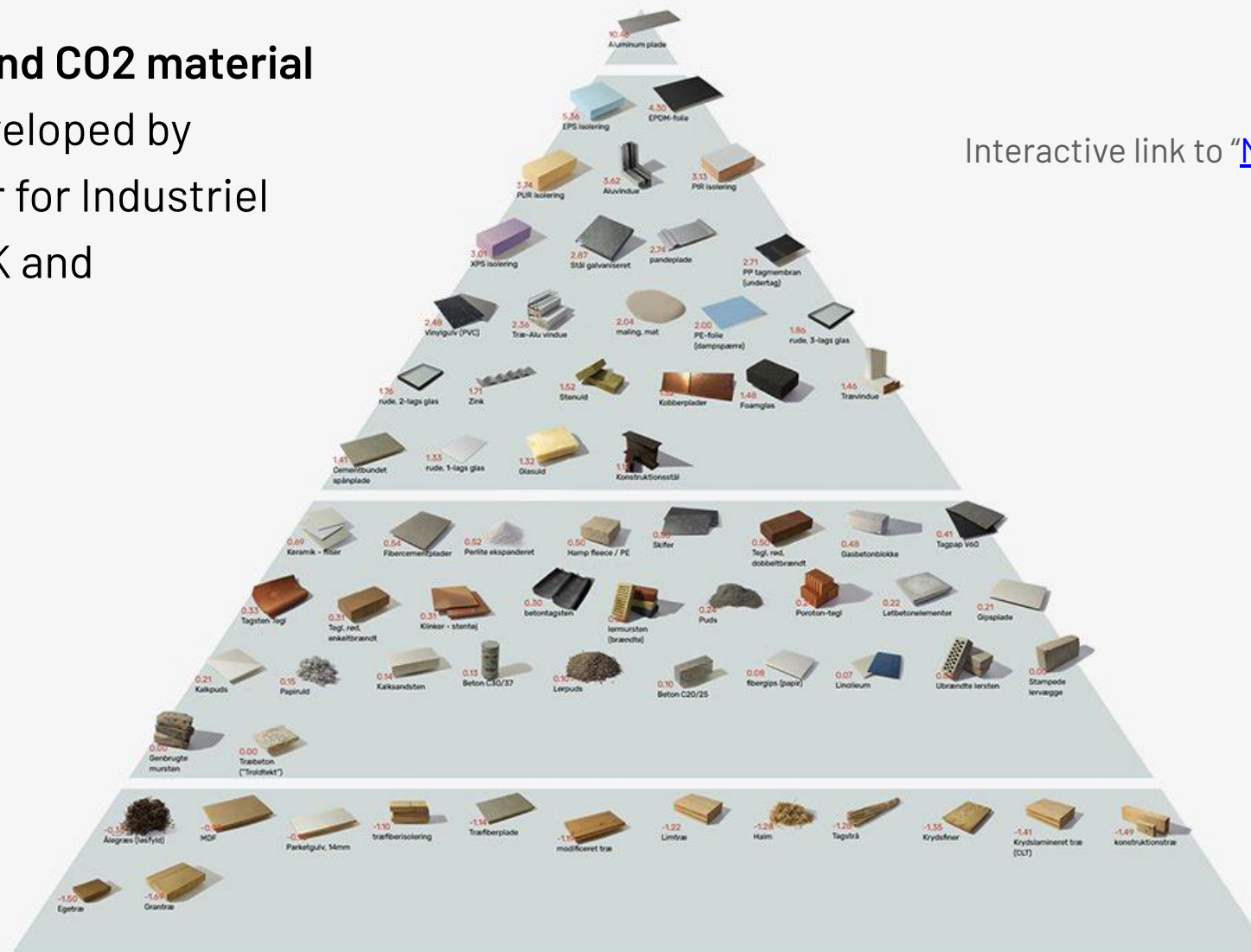
This website is an online and interactive tool for calculating and comparing the (relative) carbon footprint of various materials.

BYGGERIETS MATERIALEPYRAMIDE

HUSK LEVETIDER

Open LCA tool and CO2 material calculations developed by CINARK – Center for Industrial Arkitektur, KADK and Vandkunsten

Interactive link to "[Materialepyramiden](#)"



New waste materials and platforms

MATERIAL EXCHANGE PORTAL

The Material Reuse Portal brings together construction materials from multiple marketplaces to create a single place where reusable materials can be found. Developed as part of the EU funded project [CIRCuit](#).

THE UPCYCL

THE UPCYCL is a tool and a catalyst for the utilization of materials - even those with skewed dimensions and unrefined edges.

GENBYG

This website is an online and interactive tool for calculating and comparing the (relative) carbon footprint of various materials.

JJENSEN GENBRUG

This website is an online and interactive tool for calculating and comparing the (relative) carbon footprint of various materials.

What to know more? Check out these articles and websites

<https://distributeddesign.eu/how-makers-relate-their-work-to-circularity/>

<https://distributeddesign.eu/cities-as-distributed-and-decentralized-material-ecosystems-supporting-local-and-circular-production-within-all-sectors/>

<https://wikifactory.com/+wikifactory/stories/guide-to-design-for-disassembly-how-to-implement-it>

<https://www.teknologisk.dk/design-for-disassembly-haandbog-om-affaldsforebyggelse-i-byggeriet/40730>

<https://materialreuseportal.com/>

<https://wikifactory.com/>