

Research Project

Global Circular Competencies with Urban Mining as Case

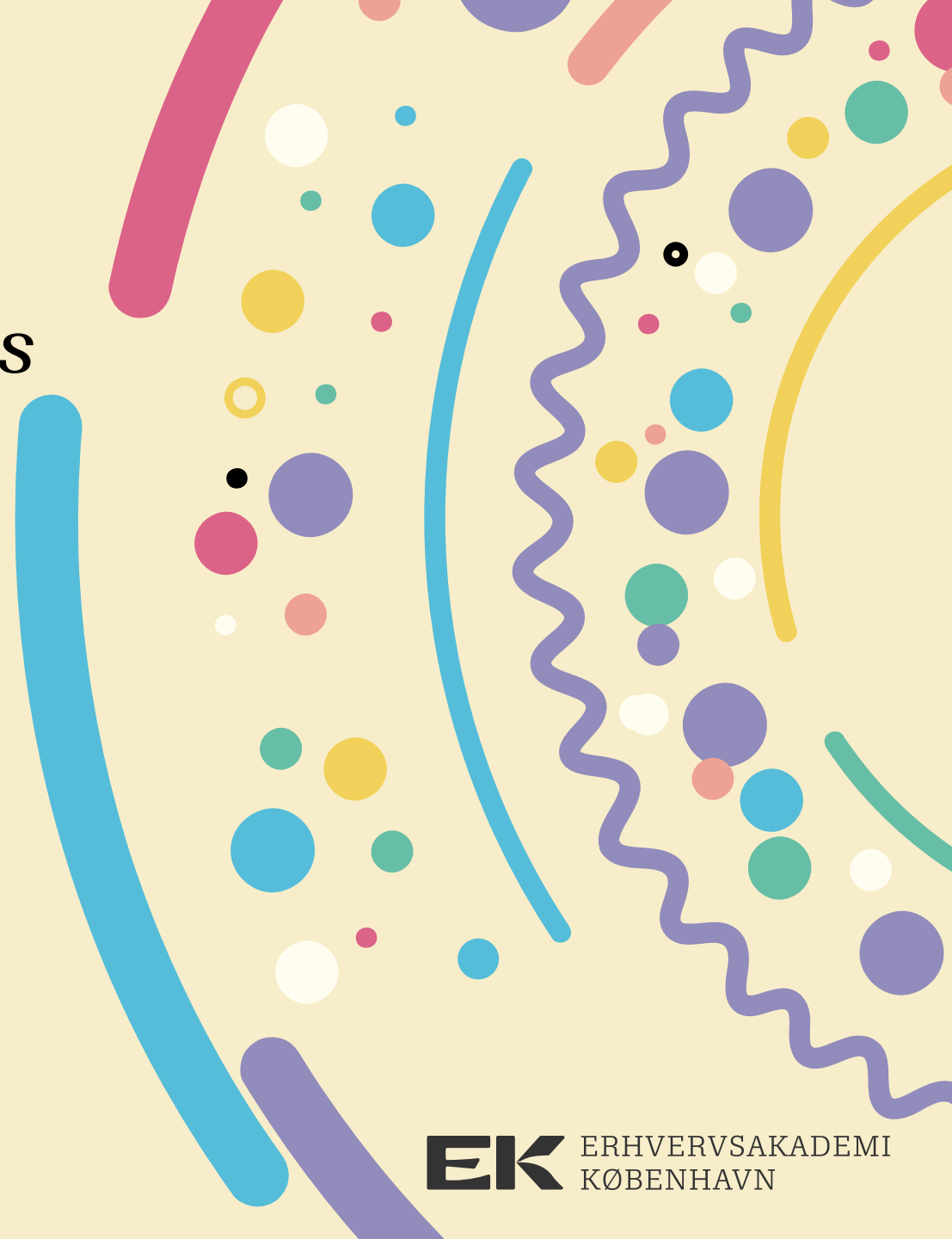
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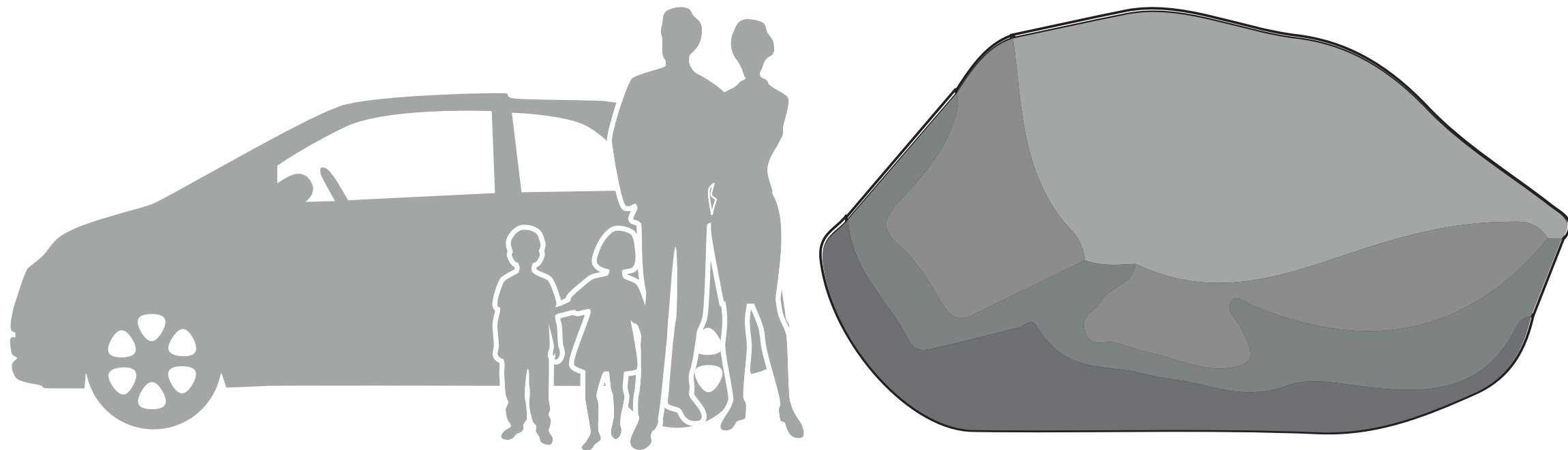
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Fonden for Entreprenørskab**

**KARL PEDERSEN
& HUSTRUS INDUSTRIFOND**



EK ERHVERVSAKADEMI
KØBENHAVN





Goal

To strengthen Danish students' circular competencies, to better utilize resource and waste flows and to help accelerate the Danish design industry's circularity goals.



The Research Team

KEA Design (Now: EK Design & Experience)

2023

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2024-25

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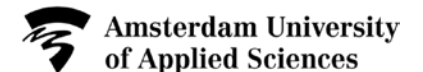
National and International Partners

Danish Partners

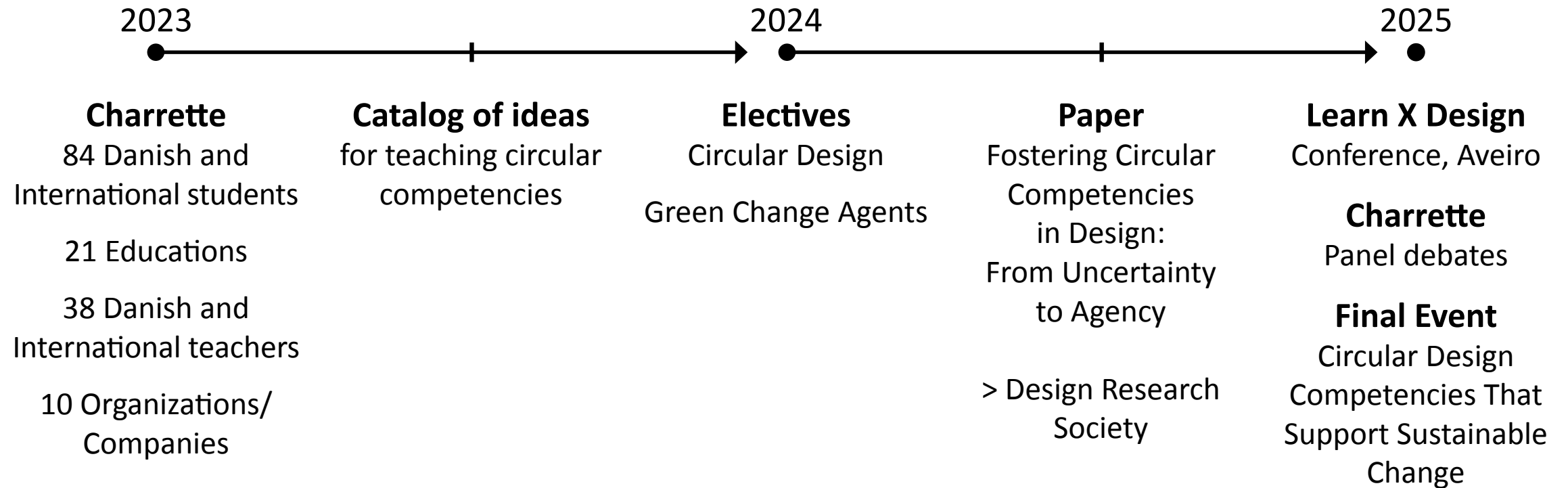
- Morten Carlsbæk /Dakofa
- Rune Clausen /MiMa
- Lauge Clausen /Circular Copenhagen, Copenhagen Municipality
- Nikolaj Bach-Andersen & Jasmin Skøtt /Nordic Urban Mining

International Partners

- Anne-Marie Tuomala /LAB University of Applied Sciences, Finland
- Andrea Bortolotti, Matteo Clementi /Politecnico de Milano, Italy
- Kasper Lange, Deborah Sumter
/Amsterdam University of Applied Sciences, The Netherlands
- Lisa Pusch, Christin Schäfers, Anika Steinkuhl, Johanne Rybak
/TH OWL – University of Applied Sciences and Arts, Germany



Main Activities



Urban mining

“Urban mining (...) does not have an exact definition but generally refers to the recovery of materials from anthropogenic resources.”

Fasail Aldebei & Mihály Dombi

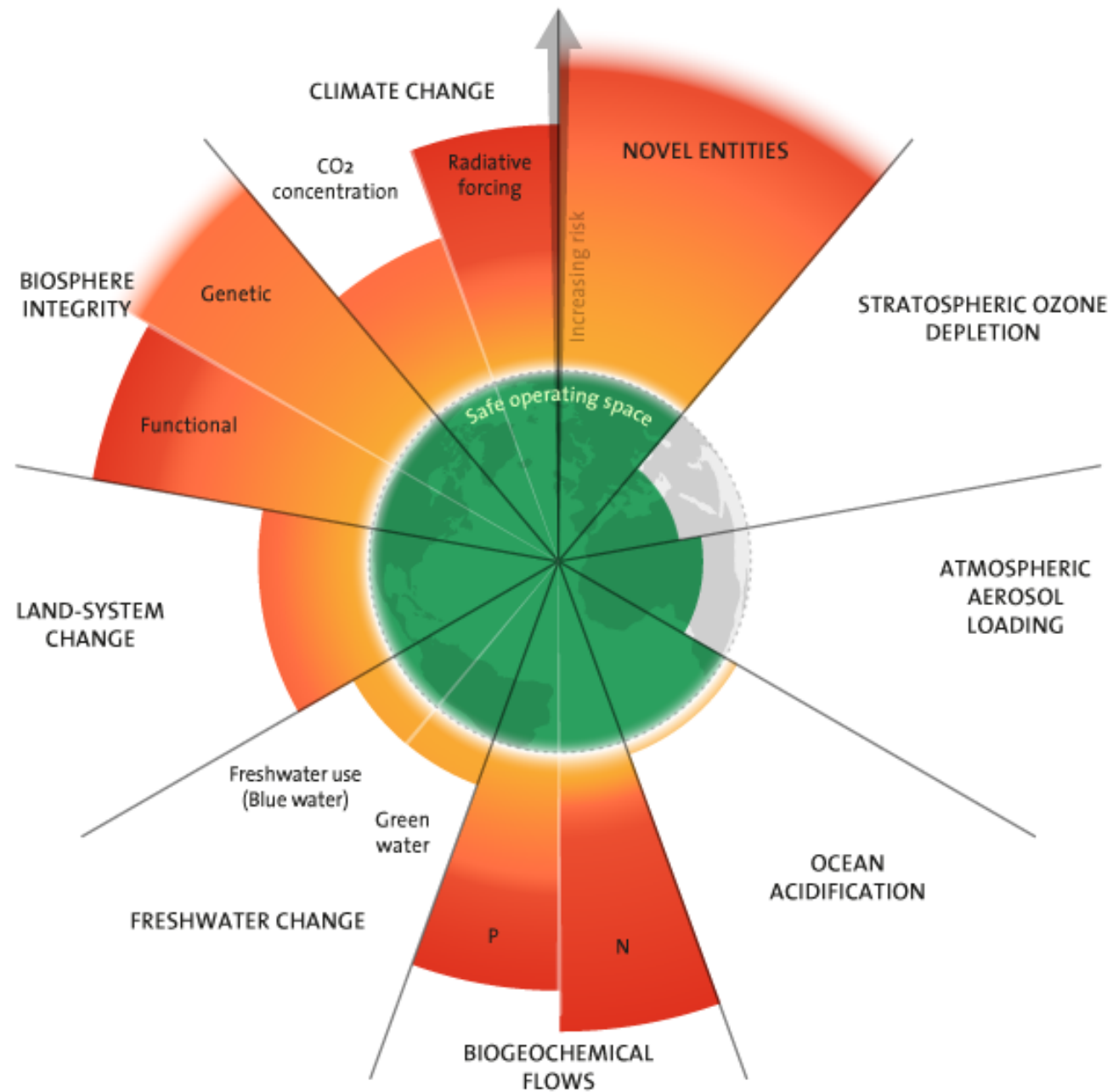


Source: Aldebei, F. & Mihály, D.: *Mining the Built Environment: Telling the Story of Urban Mining*, p. 5, 2021.

Image: Screen shot showing Madaster's *Building Information Modeling (BIM)* platform. [Link](#).



Chuquibambilla mine, Chile
Photo: Martyn Unsworth, [Imaggeo.org](https://www.imaggeo.org/)



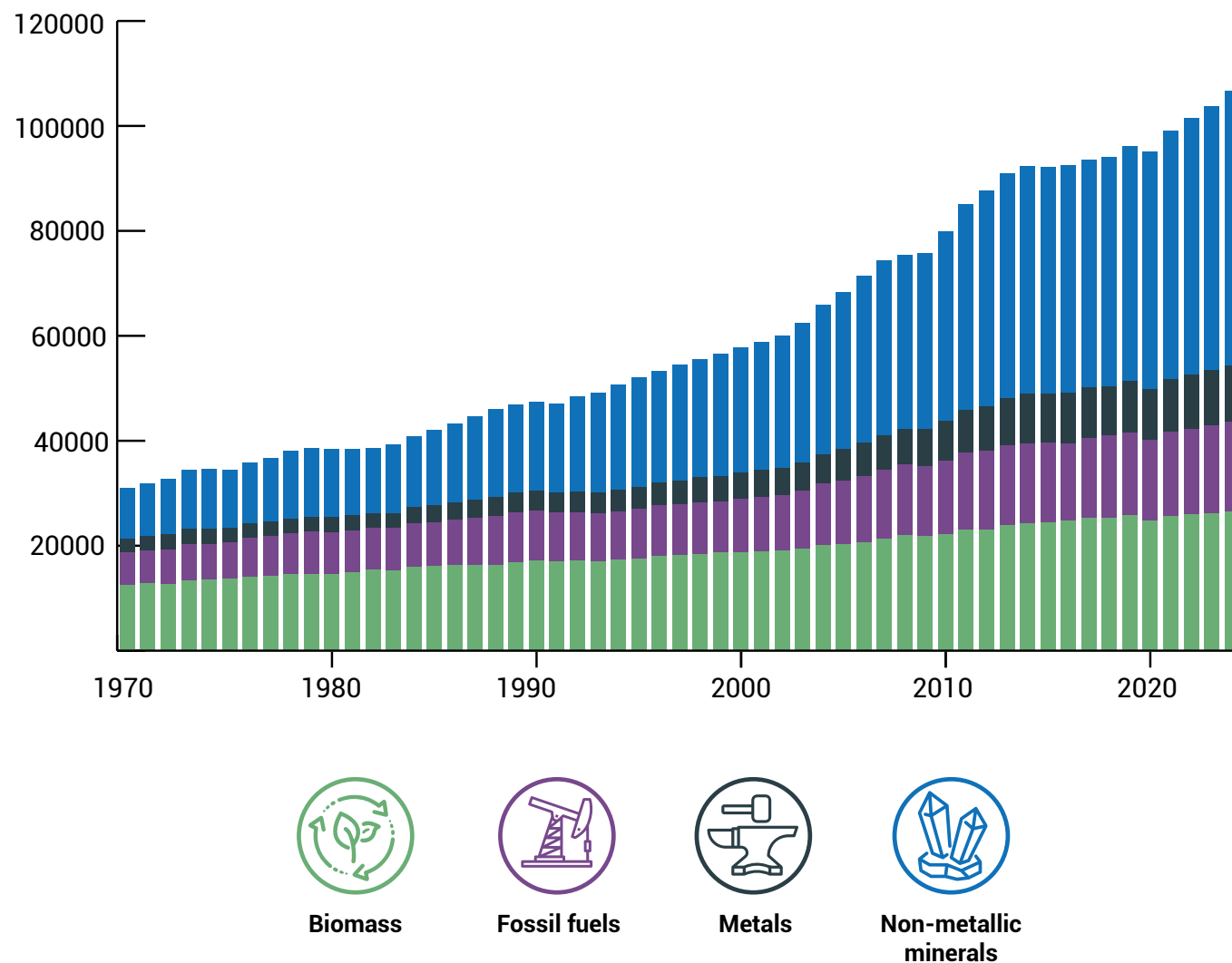


Chuquicamata town, Chile
Photo: Margot Bigg, Atlas Obscura

Resource use

Average global material use
pr. capita:

- 1970: 8,4 tonnes
- 2024: 13,2 tonnes

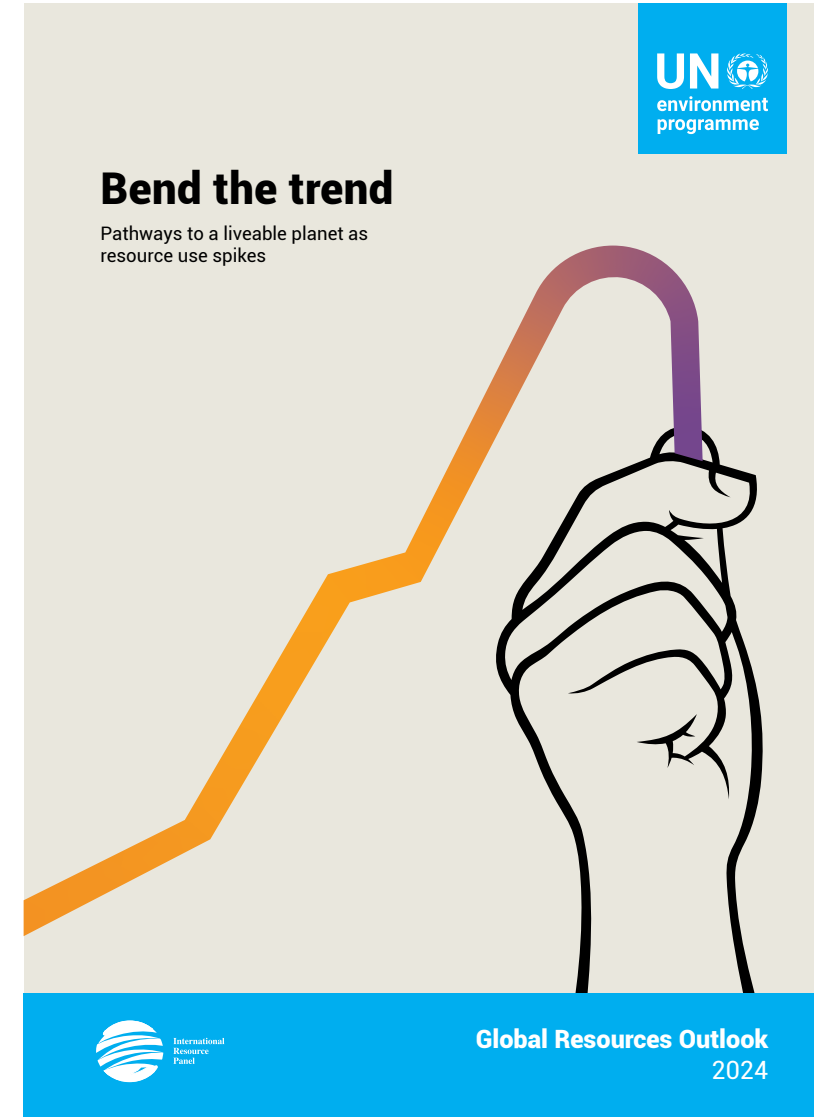


Resource use

“... sustainable and responsible resource use and consumption is a key enabling factor for the success of virtually every international agreement and initiative aimed at carving out a better future ...”

Inger Andersen

Executive Director, UN Environmental Program



Circular Economy (+200 definitions)

“Product circularity means taking an extended lifecycle perspective that focuses on maximising value in economic and social systems for the longest time; the focus is on the (re)use of products, and the materials and components within them ...”

Martin Charter

“The circular economy is a system where materials never become waste and nature is regenerated.”

Ellen McArthur Foundation

Sources:

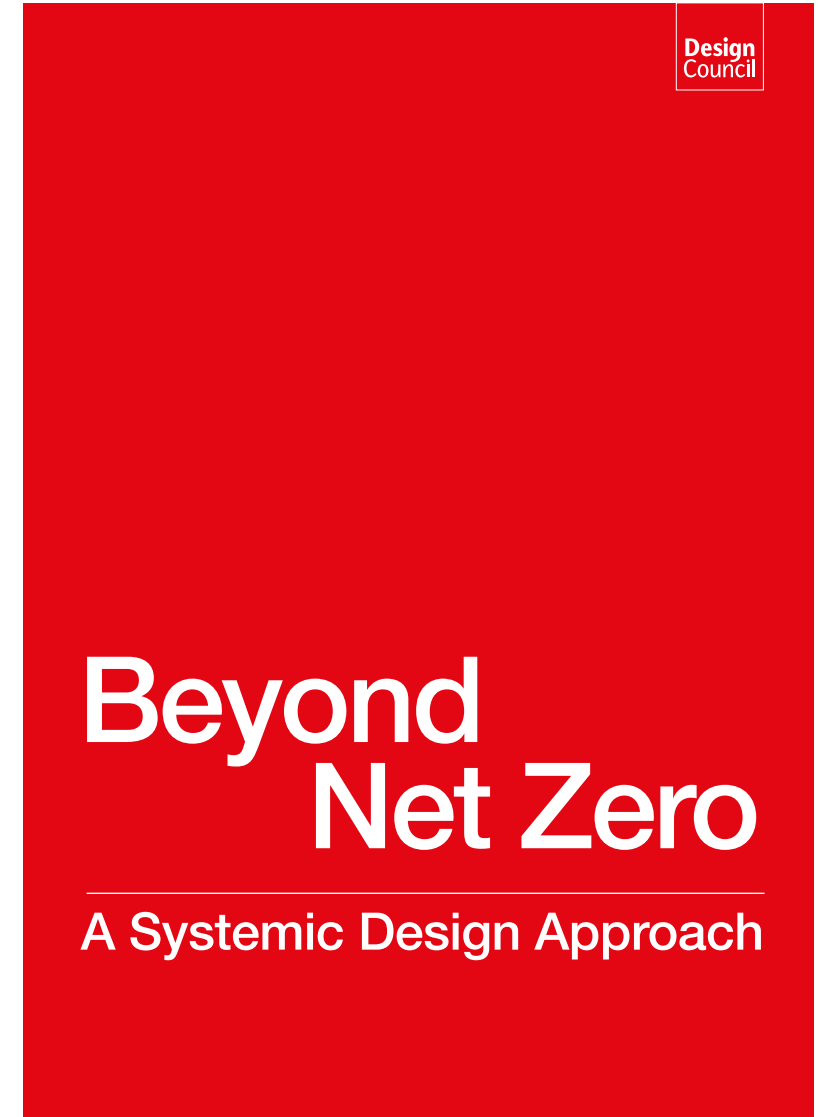
Charter, M. (ed): *Designing for the Circular Economy*, p. xxviii, 2019.

Ellen McArthur Foundation, [Link](#).

Designs role

“... for the most part, designers are not yet using their skills and knowledge to deliberately support the green transition in the way that they should and could.”

Design Council



Designs role

“... in the new paradigm, designers aspire to design for ‘quality of being’ rather than ‘quantity of having’ ...”

Peter Stebbing

Source: Stebbing, Peter: *The Paradigm Shift in Design*,
in: Stebbing, P. & Tischner, U. (eds), *Changing Paradigms: Designing for a Sustainable Future*, p. 24, 2015. [Link](#)



Two pathways for design



Sustainability Change Agent

Green Change Agents Course

6 weeks / 23 students

Program: Entrepreneurship & Design



Circular Product Designer

Circular Design Course

10 weeks / 24 students

Program: Sustainable Fashion Tech

Photos: Anonymized images of participating company founder and students at the two electives.

Sustainability competencies

Objective

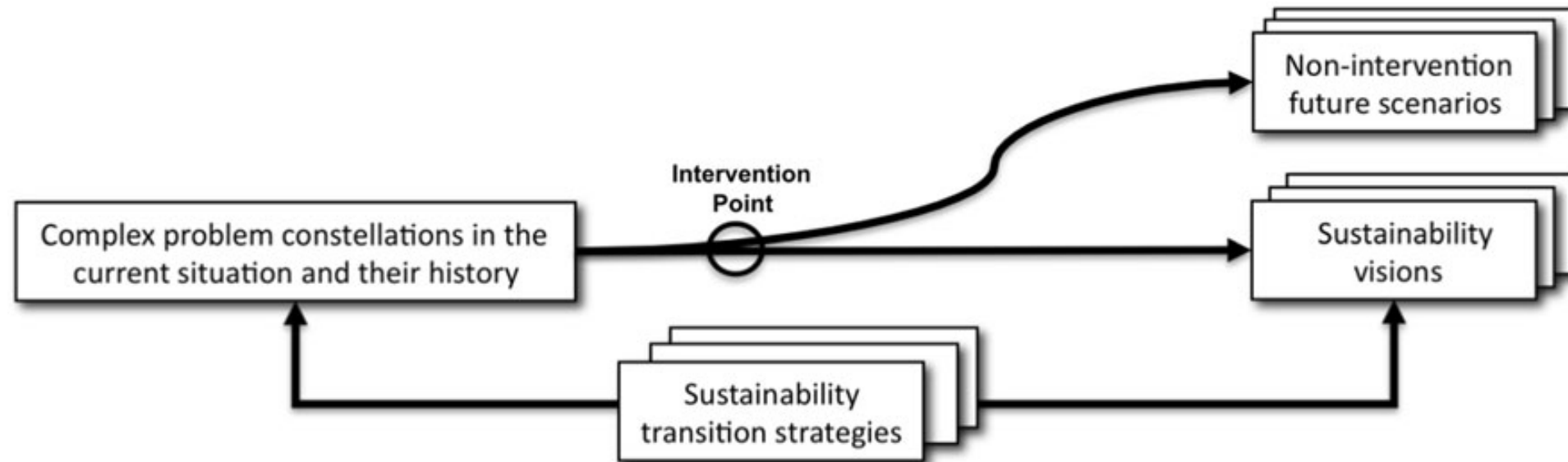
“... the goal of academic sustainability programs is to enable students to plan, conduct, and engage in sustainability research and problem solving ...”

Definition

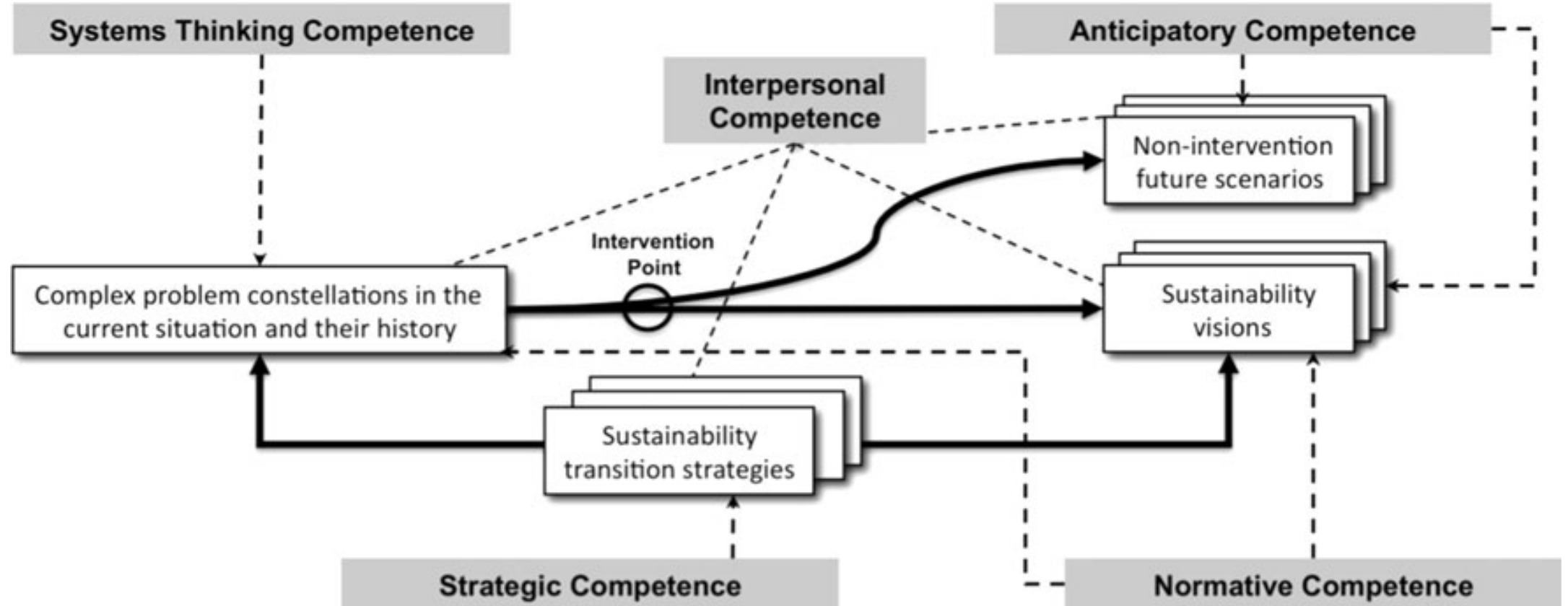
“... a functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem solving.”

A. Wiek, C. L. Redman & L. Withycombe Keeler

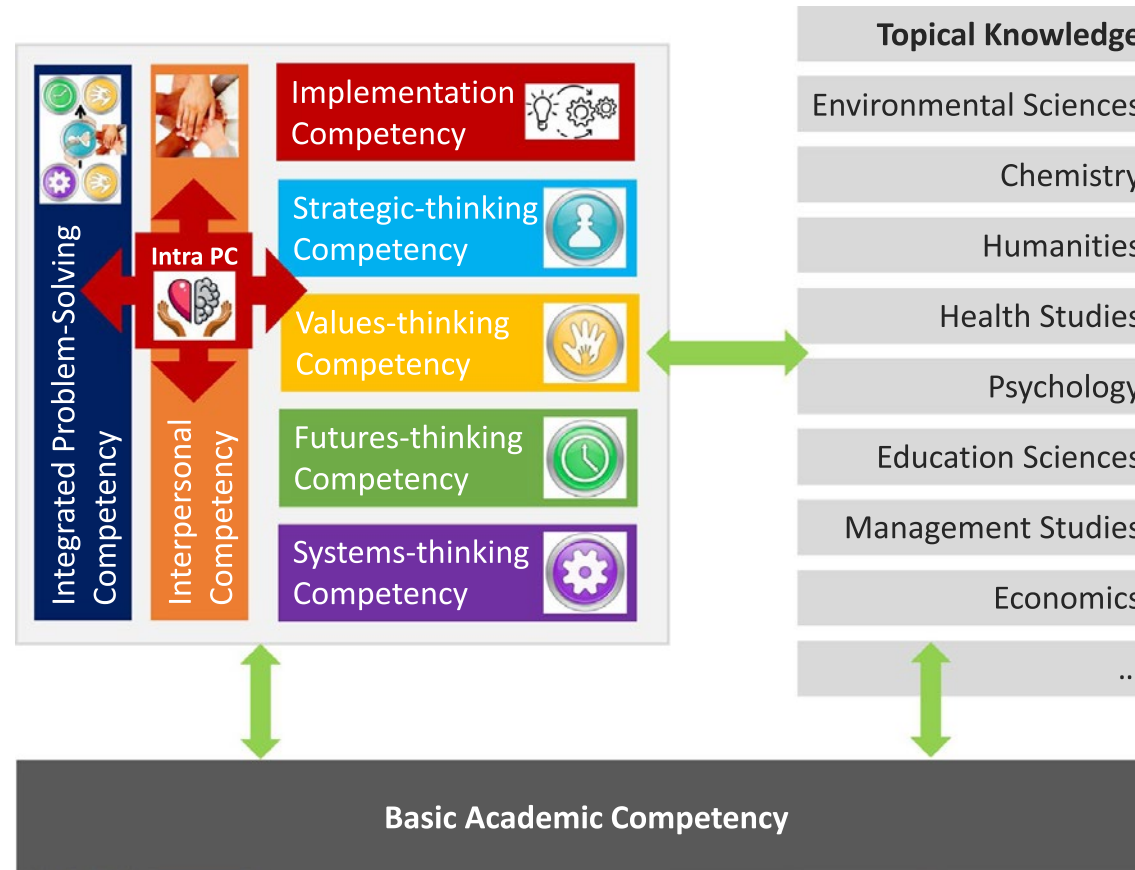
Sustainability competencies



Sustainability competencies

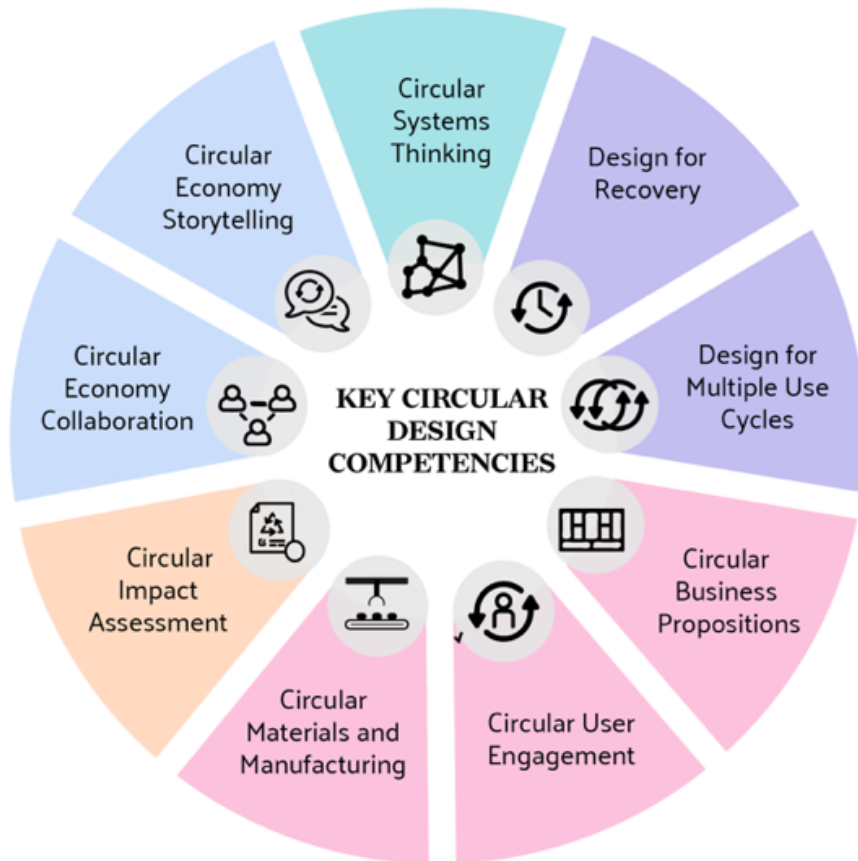


Sustainability competencies



Source: Brundiers, K. et al: *Key competencies in sustainability in higher education—toward an agreed-upon reference framework*, p. 11, 2020.

Circular Design competencies



- Systems-thinking competency
- Futures-thinking competency
- Strategic-thinking competency
- Values-thinking competency
- Interpersonal competency

Source: Sumter, D. et al: *Key Competencies for Design in a Circular Economy: Exploring Gaps in Design Knowledge and Skills for a Circular Economy*, p. 12, 2021.