

Nature-Inspired Design Strategies

insights from student projects & Cradle to Cradle design case



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Aim of the research

Explore how and why Nature-Inspired Design Strategies help designers in developing a 'sustainable' product.

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Contents

- Two studies:
 - 1) student projects - comparing design strategies
 - 2) 'real life' project - in depth into Cradle to Cradle
- For each study:
 - set-up, results & main findings

Ecodesign / eco-efficiency

Improving the environmental performance of products

- Consider the entire product lifecycle
'Cradle to Grave'
- Include all (harmful) environmental impacts
- Reduce impacts.

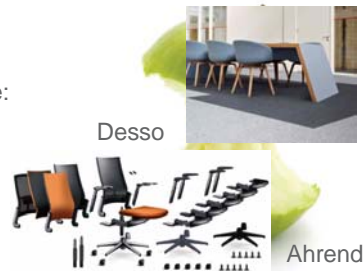


Cradle to Cradle

Aim for *good* design, not 'less bad'

Using design principles from nature:

- Waste = food
- Use current solar income
- Celebrate diversity.



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Biomimicry

- Innovation inspired by nature
- Learning from nature about:
 - forms
 - processes
 - systems
- Applying basic principles from nature.

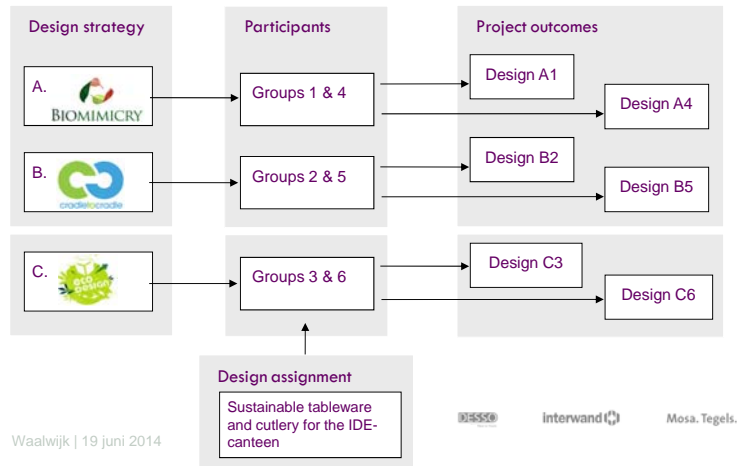


Mirasol display



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Set-up of the comparative study



Analysis

Reports, presentations, questionnaires >

- Application of strategy
- Design choices
- Sustainability
- Student evaluation of strategies.

Main findings

1. Use of design principles
2. Design solution space
3. Communicating results

1. Use of Design principles

- Example: 'Waste = Food'
- Seem effective to guide and challenge
- Absolute (vs. relative)



'Nature recycles all materials'

VS.

'Increase recycling of materials'

2. Design solution space

Thinking out-of-the-box

Biomimicry:

Distill & Translate function

Cradle to Cradle:

Vision & Eco-effectiveness



'Animals don't use cutlery'

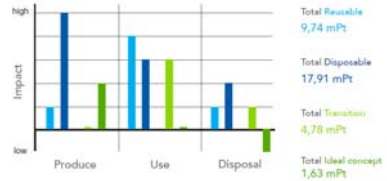


Student Skills

3. Communicating results



ANALYSIS OF THE EXISTING // LONG-TERM PLAN



Total Reusable
9,74 mPt

Total Disposable
17,91 mPt

Total Transitions
4,78 mPt

Total Ideal concept
1,63 mPt



Conclusions

NIDS seem to influence activities and outcomes

1. Offer 'absolute' design principles
2. Encourage out-of-the-box thinking
3. Facilitate communication of results.

Study 2: Application of C2C in product design



Aim of the case study

- Obtain better insight in the actual use of C2C by product designers
- Develop an understanding of *how* it currently helps them to design sustainable products

Case: plenic - closed-loop presentation system



Analysis

Interviews, sessions, reports, questionnaire >

- Application of strategy
- Impact on design process
- Design choices
- Sustainability.

1. Application of C2C strategy

The designers integrated many, not all elements of C2C in their design process.

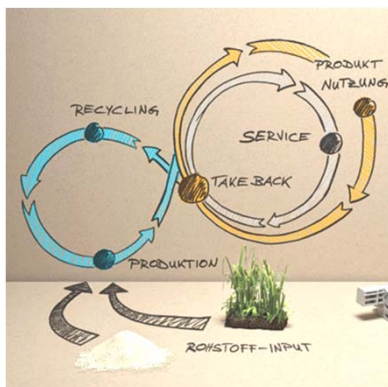
Focus on material side of C2C: on the 'Waste = Food' principle and related tools.

2. Impact on the design process

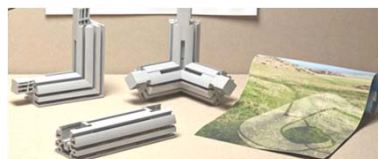
'A presentation system that never becomes waste'

- spend considerable time on material selection > material development

3. Design choices



- modular design
- service-concept
- textile fully recyclable
- water-based inks
- use-cycle frame: 4 x 2-5 years



3. Design choices

Designer on the use of aluminum:

“Yeah it could be recycled, but this is the problem, it *could* be recycled, but the question is *how* could it be recycled? [...] Everyone says ‘it could be recycled’ like you did. So, if I ask you how would you recycle it, in detail, do you have a clue?”

3. Design choices

Designer on why they did not apply the second C2C-principle:

“...it's almost as difficult to find the right materials and find the right producers. [...] We can't ask them the first question: ‘Are you using current solar income? No? Okay then, goodbye’, because that's the only opportunity to go further with our project.”

Conclusions (1/2)

- project shows clear link to application of C2C
 - ambition of 'presenting without waste'
- C2C activated a context-specific systems approach
 - the 'product loop'
 - innovative material solutions, in cooperation with suppliers

Conclusions (2/2)

- C2C was effective in guiding towards a closed-loop design:
 - apart from inks, all materials will be recycled
- not all C2C-principles were integrated: risk of shifting burdens
- lack of specific tools for implementing these C2C-design principles.



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