



LCA thinking in business practice

Lecture in Aalto University, Nov 13th, 2020
Outi Ugas, Senior Advisor

 **Positive
Impact**

After the session the student should be able to...

- ... define the key characteristics and challenges of life cycle thinking and LCA
- ... differentiate between LCT and LCA and know how LCA can be used as a tool in implementing LCT in practice
- ... describe the basic process of LCT implementation in companies (qualitative & quantitative methods)
- ... Implement basic LCT techniques for both circular value chains and strategic planning (in non-professional teams)





Individual assignment

During the session, take notes with paper and pen, preferably in a diagram format:

What value does life cycle thinking bring to companies?

How is that value created?

- + What is surprising?
- + What are the most important questions?



Topics of today's session

Introduction to Life Cycle thinking in sustainability strategies. - nature's cycles.

Biases of LCA thinking (fake linearity)

Qualitative vs. quantitative LCA

Project examples - with real clients (= best teachers)

Life cycle design method examples - how to do it in practice, where to start. Exercises in Google sheets

! Note about the exercises - we don't need to do all of them, depends on interests and time spent.



“Outi in a nutshell”

Work-me:

Lahti Polytechnic, Designer craftsmanship BA, 2000

Entrepreneur for 20+ years (would have never guessed!)

Community building, entrepreneurship (Team mastery 2008)

MSc 2016, Cognitive science

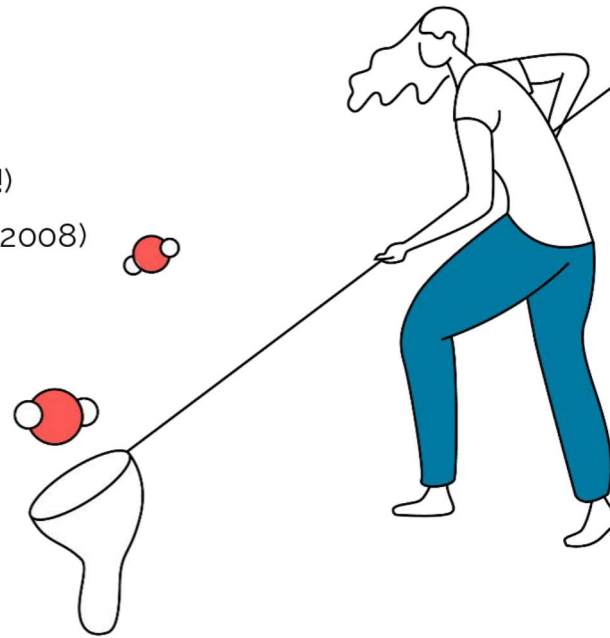
8 companies, incl. one bankruptcy. 5 still active.

Employed at Positive Impact since March 2020. 

Founding partner of Hiilipörssi Oy, launched 10/2020.

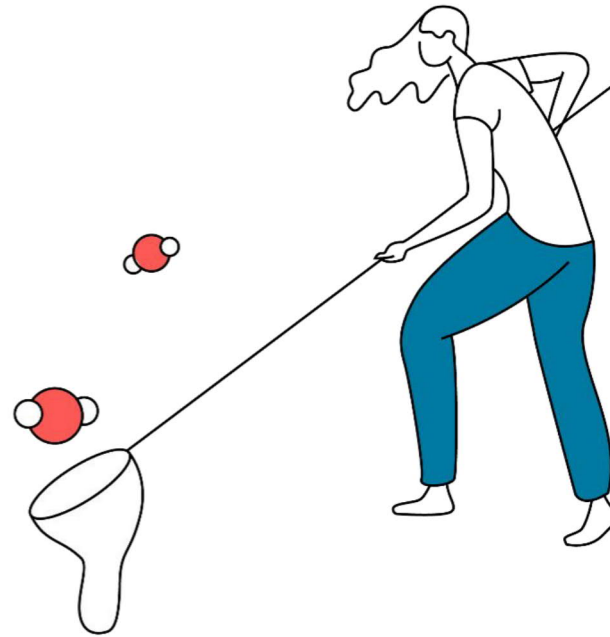
Non-work-me:

Two kids, one cat, one husband, two homes, one life.



Positive Impact – Principles of our work

- + **Facts** - We value research and our expertise is based on the latest research and knowledge.
- + **Sustainability** – The principles and goals of sustainable development guide all our activities.
- + **Impact** - We value and promote activity, without action there will be no positive impacts.
- + **Positivity** - We are positive and supportive of all development in right direction.



Sustainability data, facts and solutions

- + On a road to carbon neutral future we need more data and facts as well as know-how to use them.
- + Positive Impact is an expert company that offers strategic, digital and information-driven sustainability solutions.
- + We offer expertise on carbon neutral roadmaps, footprint calculators and handprint concepts.



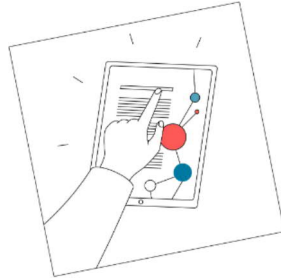
Our services



CO2 Roadmap™

Climate management platform for all organizations that aim to become carbon neutral. **Available in Finnish and English!**

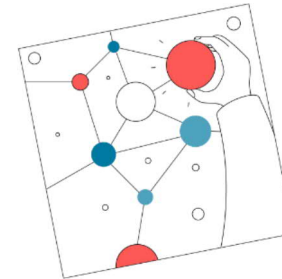
CO2 Roadmap™ combines carbon footprint calculations and data management, target setting and action planning to cut down emissions and quantify carbon handprint.



Custom Solutions

We produce turnkey sustainability calculators, starting from expert design, sourcing and coding for pages.

We produce sustainability data and facts for planning, reporting and decision making.



Advisory & Research

Sustainability strategies, environmental indicators, studies, publications, training and speeches.



CO₂ Roadmap™ – How it works?



1. Set up the boundary and data sources

- Kickoff workshop to define the boundary
- Set up the system:
 - Categories and components
 - Sites and units
 - Emission factors
- Identify data sources and engage people to the project

2. Collect data and create footprints

- Collect the data from various sources
- Add it in the app
- Create footprints and other reports
- Export data and tables for further use (desktop graphics, CSR reports etc.)
- Set up the update and maintenance routines

3. Set overall goal and targets

- Set company level goal: target year and emission reduction percentage
- Define target year and reduction percentage for each component
- Evaluate and adjust overall goal vs. targets

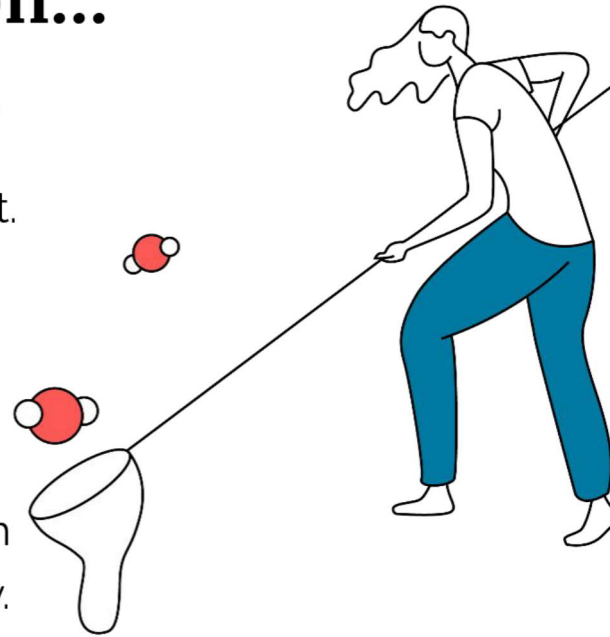
4. Create the roadmap

- Brainstorm actions
- Assign them to components
- Quantify actions with reduction percentages and emission factor changes
- Assign time frame
- Follow up and track the progress.



This year we've worked on...

- + Public libraries - CO2 footprint, handprint, environmental indicators
- + Shoe factory Sievin jalkine - CO2 footprint.
- + MaaS Global (travel app) - CO2 footprint
- + CO2 Roadmap online tool
- + Finlayson - CO2 footprint
- + Esec Estonia - CO2 scenario calculator
- + Korkeasaari - carbon neutral zoo program
- + Hiilipörssi (Carbon market) - business dev.
- + Compensate - advisory on CO2 calculators
- + Reima - verification of CO2 calculation model



The slide features a central white rectangular box with a black border. Inside the box, the text "Introduction" and "A little bit of theory" is displayed in a bold, black, serif font. The background is white and populated with numerous water molecules, each consisting of a large red sphere and two smaller white spheres. These molecules are scattered across the slide, with a higher density around the central box. In the bottom right corner, there is a small, stylized logo consisting of a black cross shape with a small red and white water molecule at its intersection.

Introduction
A little bit of theory

Life cycle thinking has many faces

Systems thinking

Structures

Ecosystems

Static vs. **Dynamic**

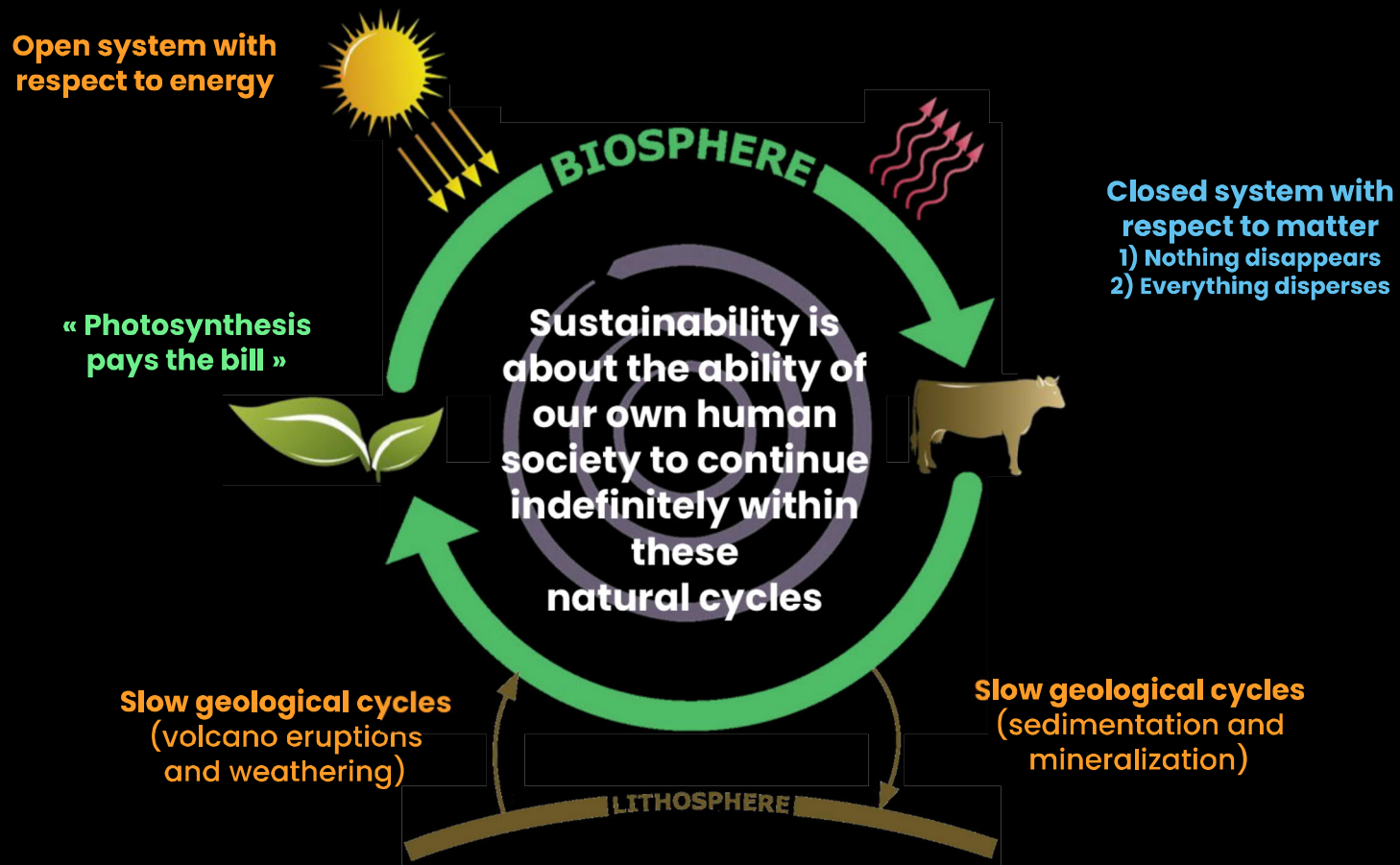
Linear vs. Circular

Triple bottom line and other concepts

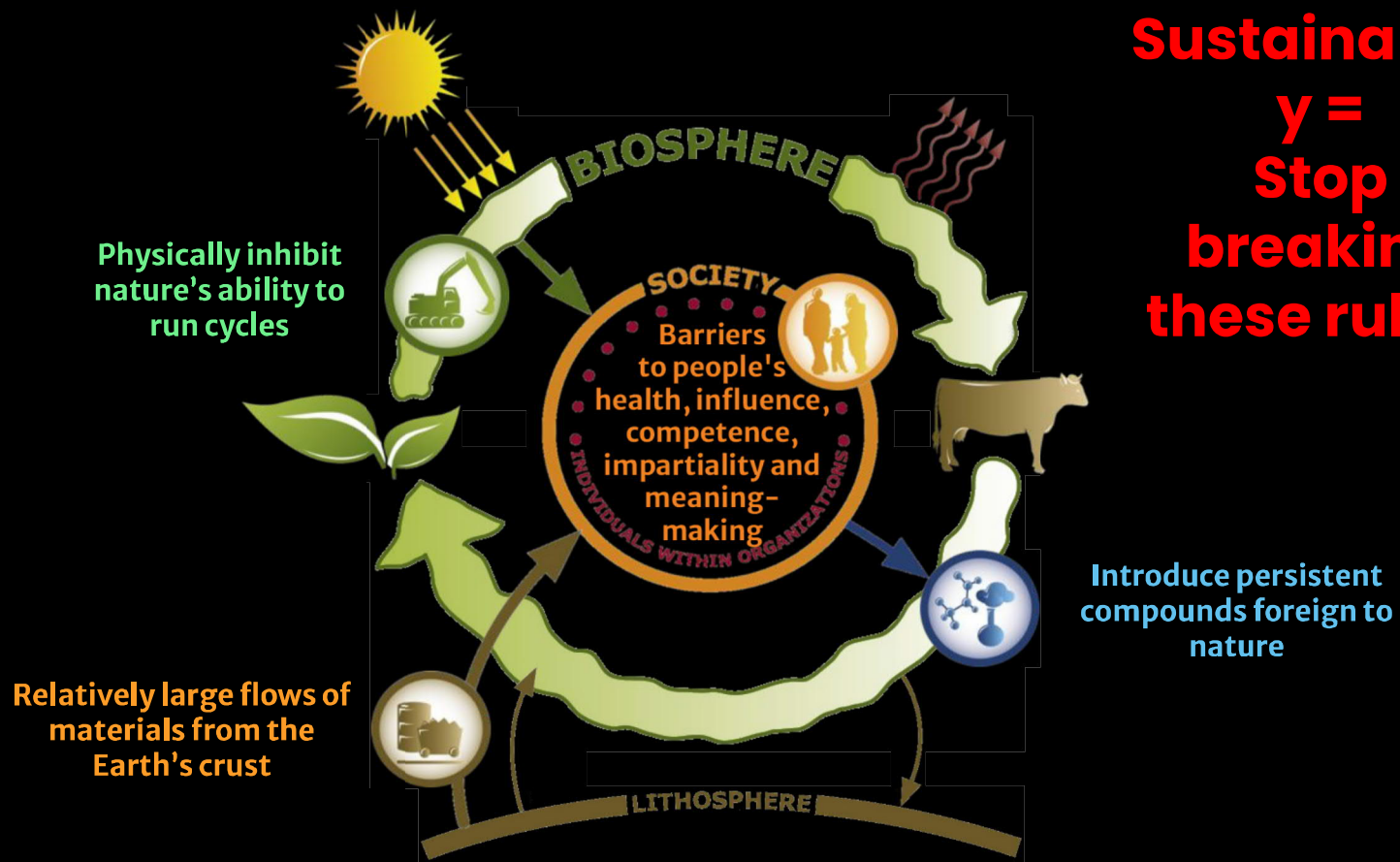
Nested circles



BASIC LAWS OF NATURE

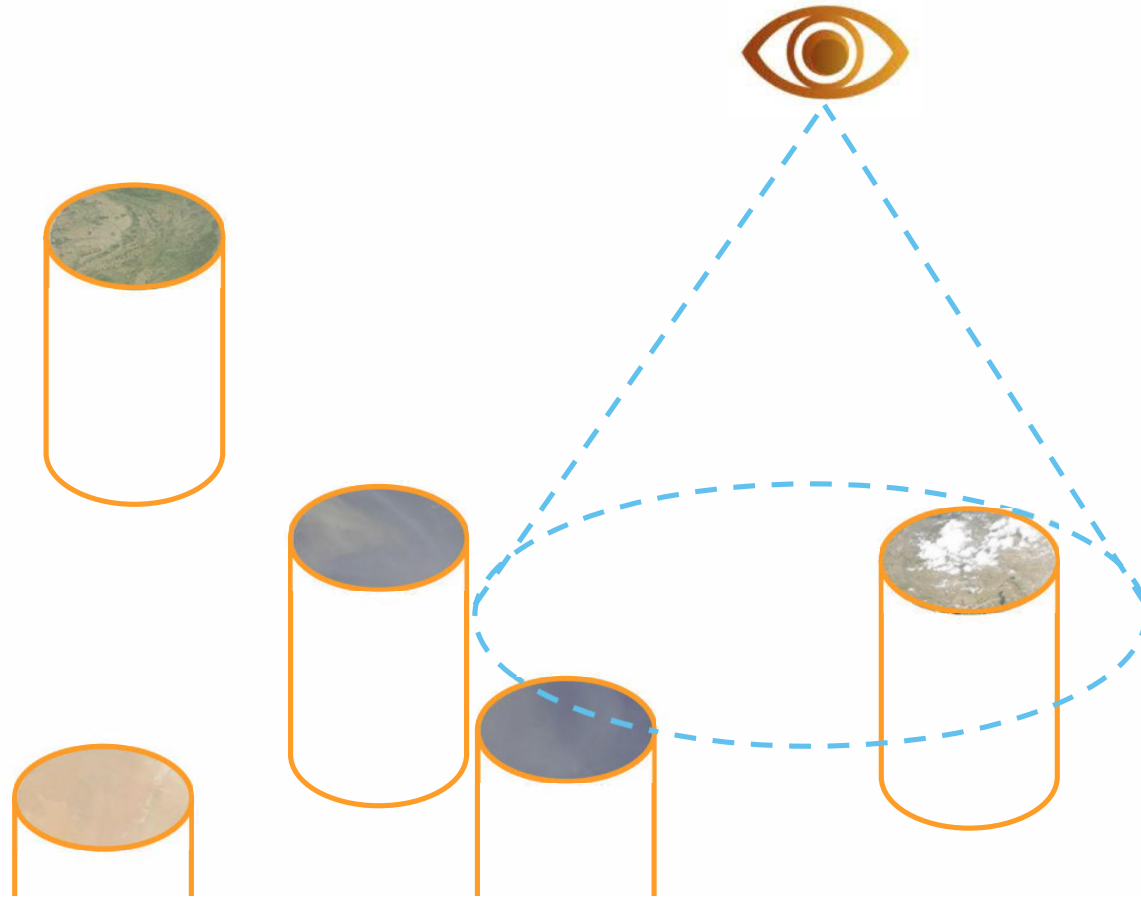


HOW WE INFLUENCE CYCLES

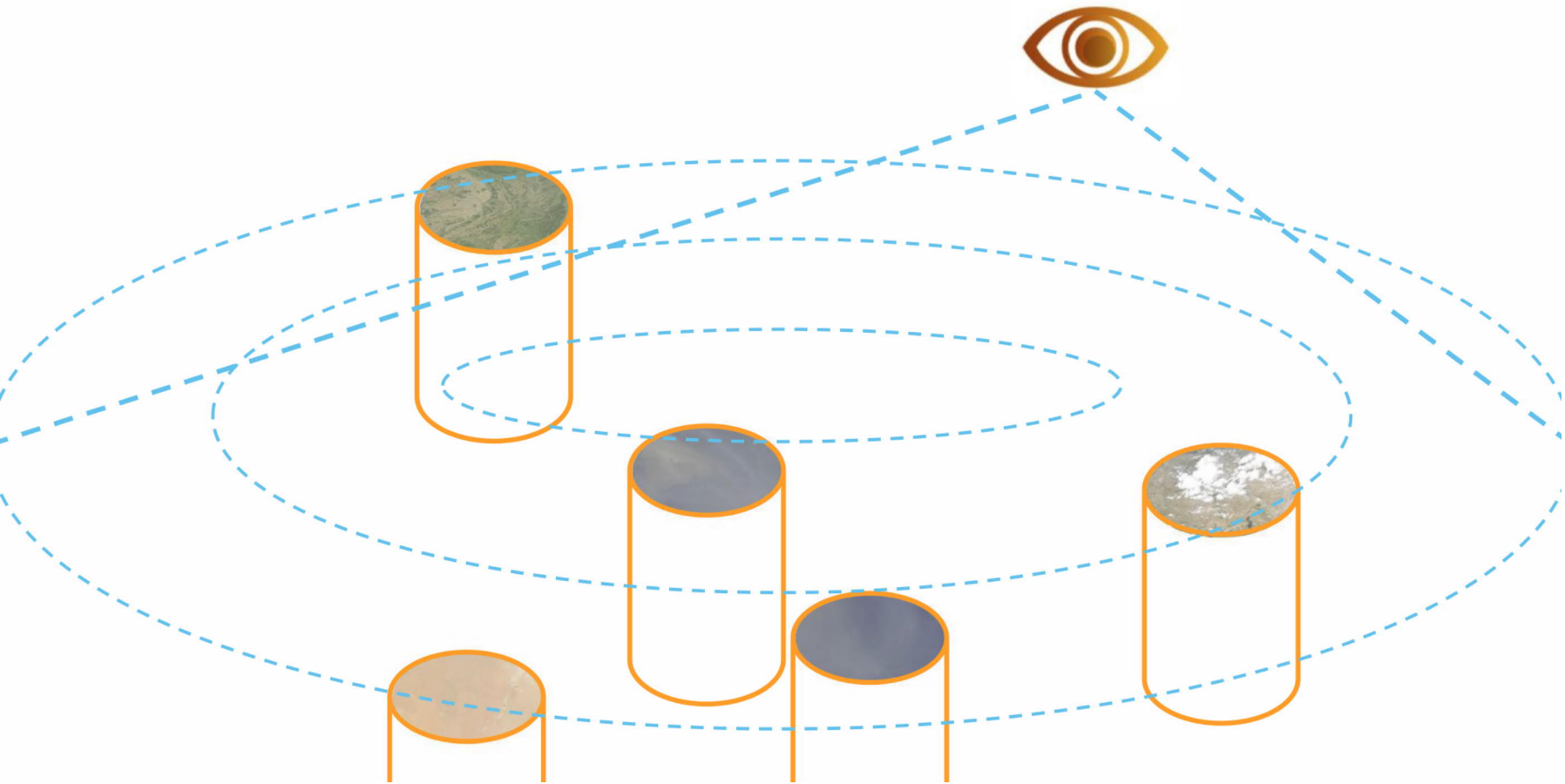


Sustainability
y =
Stop
breaking
these rules!

FROM REDUCTIONISM TO...



... TO SHARED VISION



... TO SHARED VISION



The image features a central white rectangular box with a black border. Inside the box, the text "Life cycle thinking ≠ LCA" is written in a bold, black, serif font. The box is surrounded by numerous water molecules, each consisting of a large red sphere and two smaller white spheres. In the bottom right corner, outside the box, there is a black cross symbol composed of several small squares.

Life cycle thinking ≠ LCA



Exercise 1: Challenges and biases of life cycle assessment / thinking

Challenge (uncertainties, limitations)	How to deal with it
False linearity	
Complexity	
Different mental models among stakeholders	
Interests	
resources	
Huge amount of data, access to data	



LCA use cases in business practice

Quantitative LCA

- Considered as real facts in sustainability
- Drill-in, deep understanding of a concrete, existing case
- Operational
- Looks at how things are done
- Often hard to generalize
- Great baseline for further development
- Accessibility - where to find the data?
- Applicable LCA studies
 - hard to find
 - don't exist
 - corporate confidential
 - too much data

Qualitative LCA methods

- Future oriented
- Strategic
- When you don't have exact numbers
- When you don't need exact numbers
- When you get confused with numbers

Remember: qualitative data is also data.

+ Creative LCA methods

- + **service design**
- + **custom matrixes**
- + [Check Lean service creation - what could it bring to LCT?](#)



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Examples of life cycle thinking in client projects

Fresh case from industry: Sievin jalkine CO2 footprint

GHG Scope 3 Company value chain standard.
Life cycle based boundary for CO2 footprint.

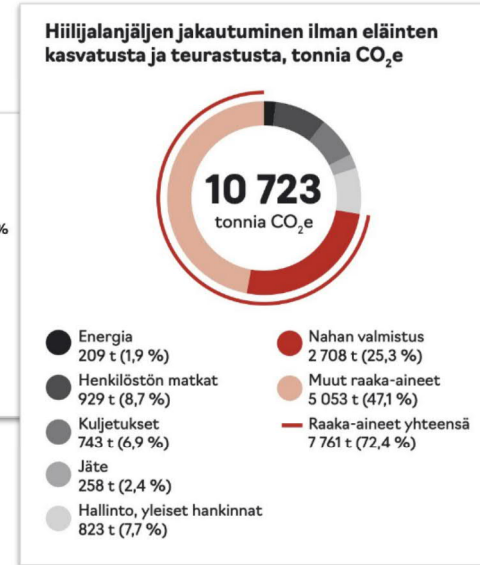
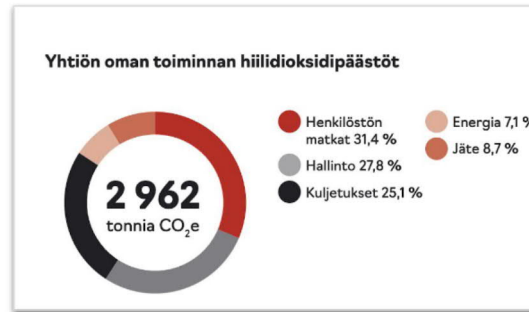
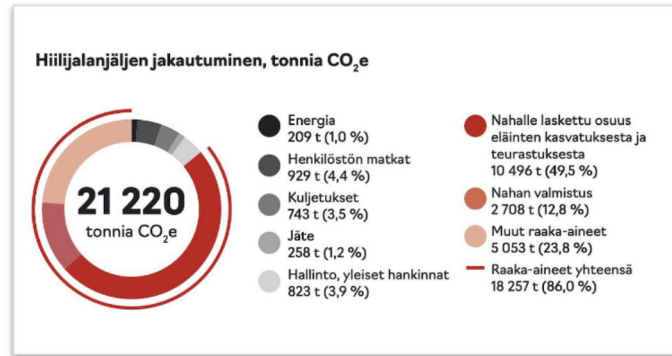
Intensive discussions about...

- Emission allocation - what should be included and why?
- How to explain the wider boundary (and thus a higher CO2 footprint?)
- Reputation?
- Responsibility?

All of these got resolved and results are published in their CSR report Oct 2020:

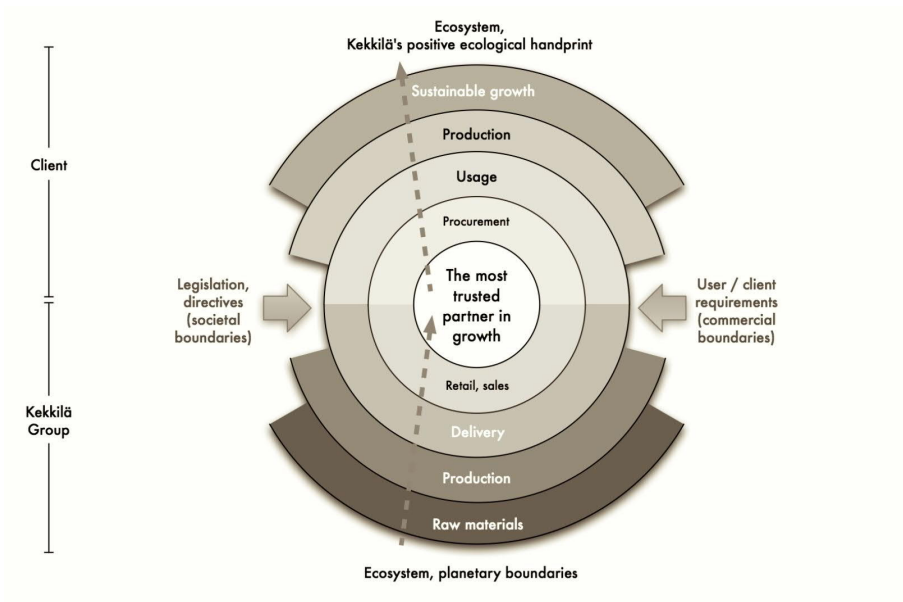
[Link to Sievi CSR Report \(Finnish only\) »](#)

They decided to display and explain all boundaries of the footprint, see pictures →





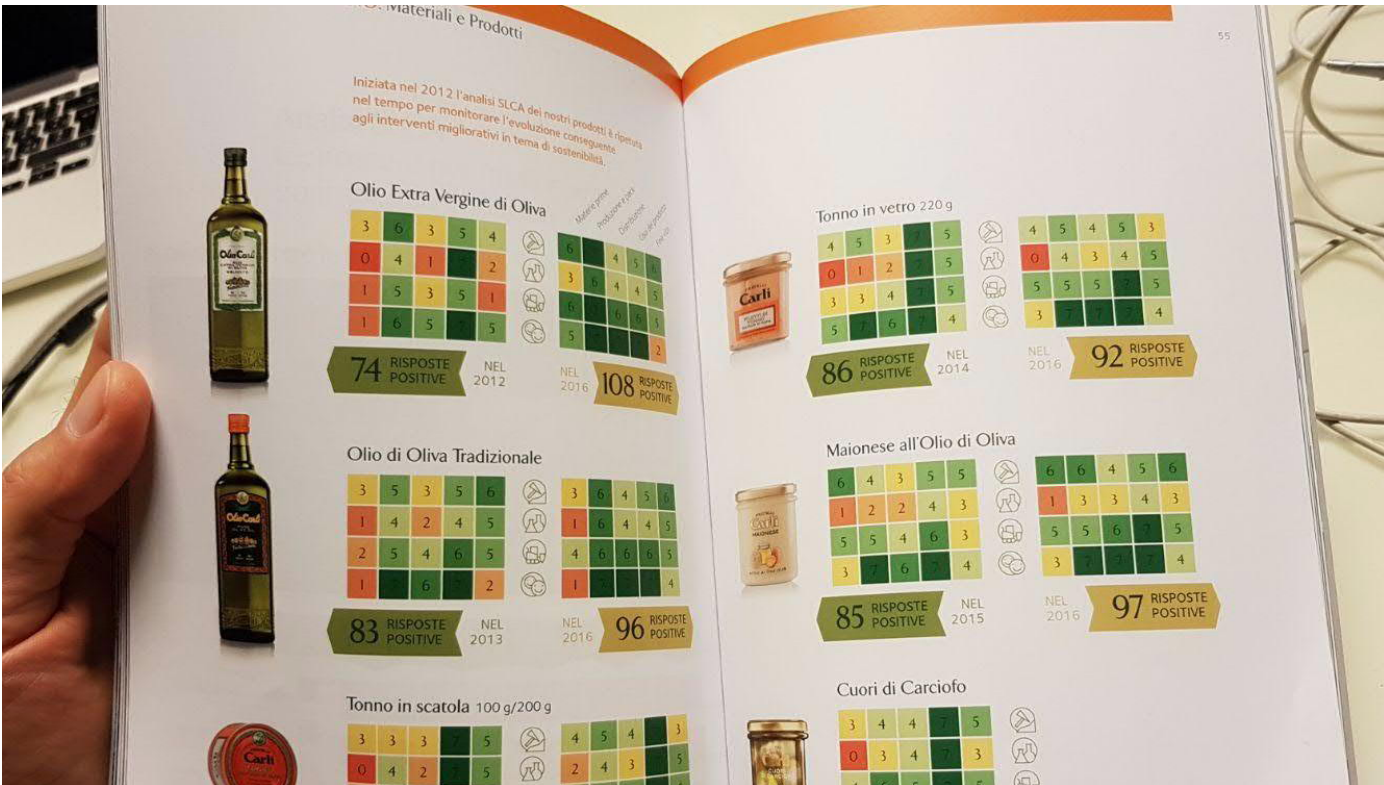
Kekkilä-BVB, from life cycle to strategy



www.kekkila-bvb.com/sustainability/



Fratelli Carli - SLCA based sustainability index



Hiilipörssi (Carbon Market Ltd): Life cycle data defines the value of Carbon credits

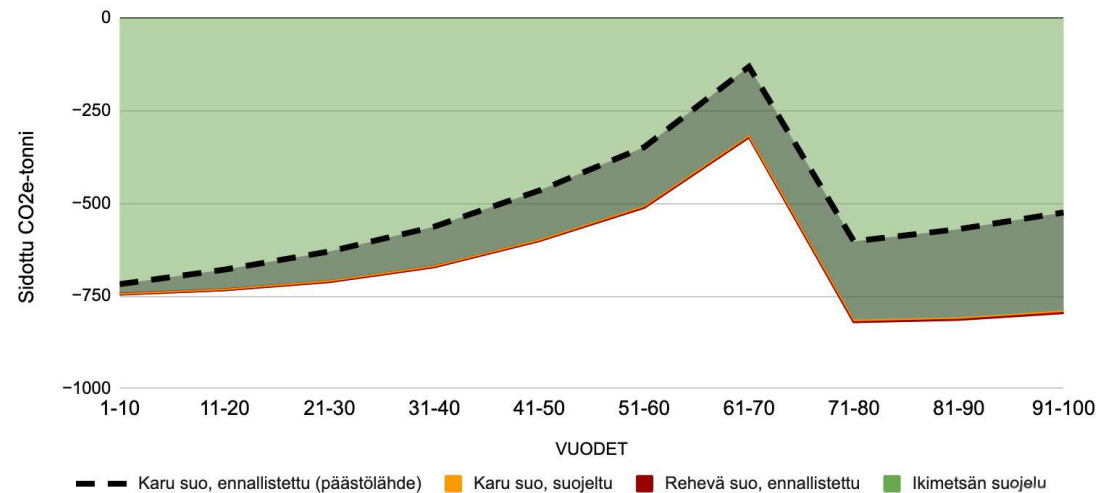
100 years' life cycle scenario as a basis for the compensation value.

Parameters:

- peatland types
- forest types
- restoration methods
- safety margins
- C-credit market price

[Example calculator >>](#)

Kokonaistuotteen hiilinielun muodostuminen 100 vuoden aikana t CO₂e / hehtaari



Case Vinyl Plus: Customized SLCA sets criteria for sustainable PVC additives



SLCA used as a method to assess the sustainability of Additives (from suppliers)



Vinyl Plus – Additive Sustainability Footprint

<https://vinylplus.eu/asf>

Detailed description of the development of ASF tool by Richard Blume and Mark Everard:

onlinelibrary.wiley.com/doi/full/10.1002/vnl.21733

Qualitative SLCA sets the baseline for PVC additives' sustainability criteria - reflections also about the limitations of LCA:

<https://iopscience.iop.org/article/10.1088/1755-1315/323/1/012148>

Existing schemes for assessment of chemical sustainability differ significantly in definitions of objective, interpretation and scope. Many such schemes concentrate on intrinsic chemical properties and particularly potential hazard²⁷. Regulatory mechanisms and management tools such as the REACH Regulation predominantly focus on hazard reduction or elimination. Risk assessment integrates hazard with potential exposure²⁸.

Both approaches—hazard and risk—fail to account for wider sustainability issues related to sourcing, production and application of chemicals, their interaction with products within which they may be used and their fate at or beyond end-of-life. Life Cycle Assessment (LCA) measures some of these aspects, using well-established environmental impact categories such as global warming potential, eutrophication, different aspects of ecotoxicity and ozone-forming potential²⁹. Yet, models used to assess life cycle impact differ from each other in basic principles, scope and outcomes, potentially omitting impacts of chemical emissions and making different approaches hard to reconcile³⁰. Lack of social considerations in conventional LCA has been acknowledged as a deficiency, and the SETAC/UNEP Social Life Cycle Assessment model is working to include social impacts as a more useful tool in progress towards sustainable development³¹.

The European Commission is developing a Product Environmental Footprint (PEF) methodology for potential application to all products on the European market³². It remains unclear when or if this methodology will be used or be applied to any important PVC construction products (e.g. window profiles).

The Additive Sustainability Footprint (ASF) tool has been developed by VinylPlus since none of the REACH, LCAs, and PEFs initiatives, taken alone, can account for the roles and behaviours of the additives as functional constituents of complex products. None of these initiatives accounts for the wider context of sustainability as articulated by the TNS System Conditions. None accounts for positive benefits arising from the functional contributions of additives, enabling articles to address the meeting of human needs on a potentially sustainable basis.

The ASF uses the Sustainability Life Cycle Assessment (SLCA) approach developed by TNS (Lundholm et al., 2008³³ and 2011³⁴). This life cycle assessment methodology implements the TNS FSSD within the ISO 1404X-compliant LCA methods³⁵. SLCA addresses strategic pathways towards full sustainability based on the FSSD, rather than focusing on specific known problems³⁶. SLCA has been applied in various operational contexts, including for example to paints³⁷.

The ASF development follows the ten-step SLCA approach consistent with established LCA protocols:



ESEC Estonia

Challenge: how to make customers see all hidden costs (monetary, societal, raw materials, climate...)
→ life cycle understanding needed on the client side too.

Scalability of the business model.

1. Tallinn Water alone 80000 manholes
 - District heating, gas and telecom to be added
 - 10-15% of them need attention
2. ESEC technology is applicable universally on every municipality who use circular manhole frames and covers



Current tech.

1. Truck, a van and a small excavator
 - a. 4-6 operators
 - b. Time used minimum 16-24h
 - c. Blocking traffic
 - d. Need to use virgin products
 - e. High CO2 output
 - f. Cost 600-1000€ plus materials per hole

Current situation in the market:

1. Municipalities acquire projects through contractors
 - a. Direct purchases through wholesalers
 - b. Direct purchases through contractors
2. Contractors are bound to municipal specifications
 - a. Warranty periods vary from 2-5 years
 - b. Differences handling normal wear & tear
 - c. Contractors are having headache for claims through municipal entities
 - d. No active solutions on marketplace other than non eco-friendly invasive methods

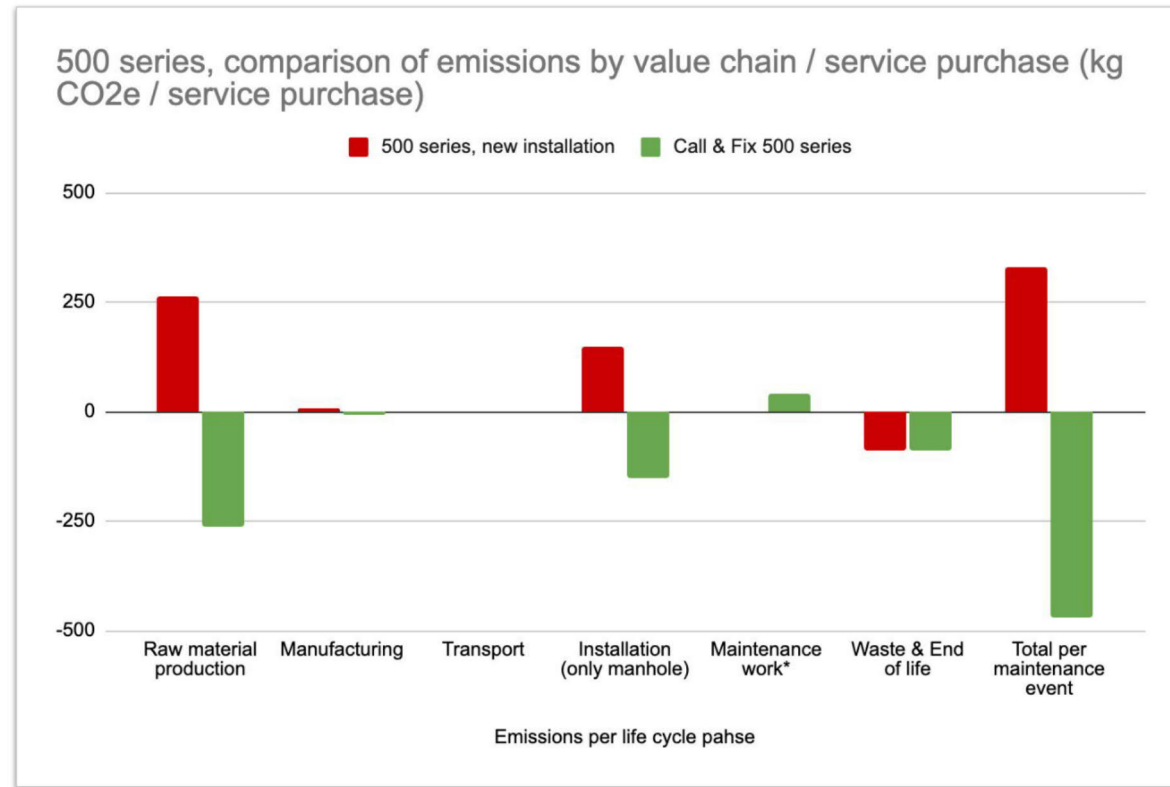


ESEC Estonia

Examples of working methods:

1. Comparison model (6/2020)
2. LCA scenarios (6/2020)
3. Communication statements
4. Productizing
5. *Complete LCA*
6. *Digitalization etc.*

[Link to the example matrixes >>](#)



Starting point: Comparison matrix (example)

Life cycle comparison (qualitative)		Conventional method (baseline)			ESEC's method (scenario)		
Phase \ Impact	per unit	Resources (€, time)	CO2 Emissions	Other impacts	Resources	CO2 Emissions	Other impacts
Raw materials	kg of product	Energy Raw material Additives Raw material processing		Environmental impacts, source of scrap - transport, working conditions - health	???	-20% reduction in weight > -7% in emissions	
Manufacturing	kg of product	Energy, puoring, cooling and surface treatment			more	-20% reduction in weight > -7% in emissions	
Transport	kg of product	Sea transport and last mile			less	-20% reduction in weight > -7% in emissions	
Installation	product	Tarmac, machinery			less	less	
Product usage time	product	Depends from traffic load (A, B, C road)			longer	XX % longer lifetime (thanks to XX and YY)	Life time lengthening process materials - what are they? What's the impact?
Maintenance work	product	4-5 hours, driving, machines, 5 persons etc.		safety Community Disturbance to commuting	less, predictable	less	Safety, Community impacts, Predictability in maintenance, smaller impact to community
End of life	product	Transported and recycled as raw material --> Reselling value?		Recyclable raw material	same		Recyclability? Raw materials detached?





Exercise 2 - Life cycle thinking contributes to better questions

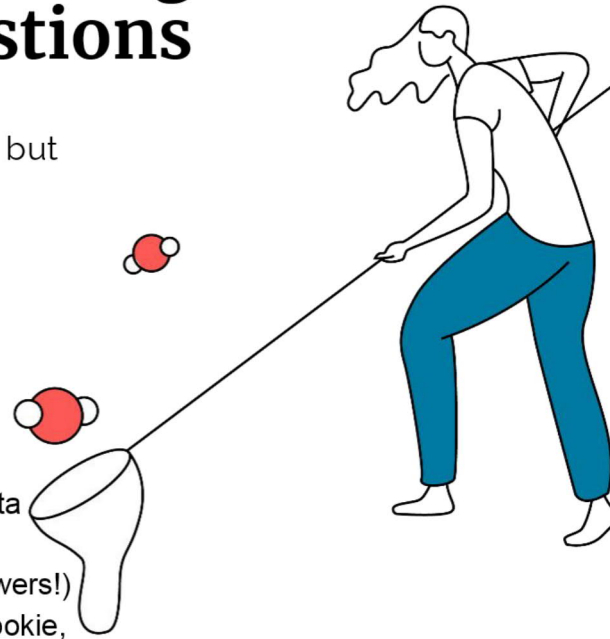
If you only know that you need to figure out something but you have no idea of what it is, where to begin?

→ Matrix as a mean of asking the right questions:

- What happened before?
- Where? Who? What next? How?

Lean Life Cycle mapping exercise:

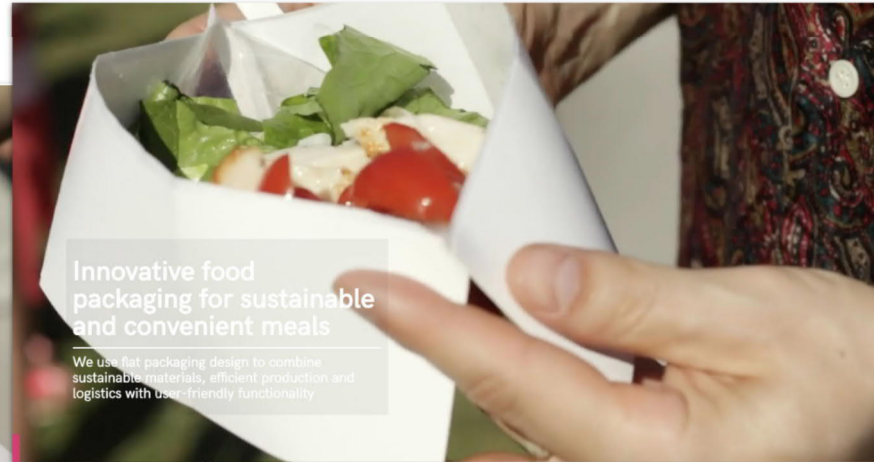
1. product owner: Pick a product, something simple
2. others: ask questions (bomb with questions) to fill in the data
3. product owner: Answer anything, use you imagination
4. Everyone: fill in the matrix with example questions (no answers!)
Product examples: Pencil, Chair, Coffee cup, Chocolate cookie, Bread, T-shirt....



[LINK TO EXERCISE TEMPLATE IN GOOGLE SHEETS »](#)

Case Koepala Packaging - SLCA as a tool for sustainable product design

www.koepala.com/





Exercise 3 - Circular business model challenges linear life cycle (!) thinking

No exercise was done during the session. But the template is here:

<https://docs.google.com/spreadsheets/d/1iHmUycTbKgnFUYqCg0oqypKgTzo5Aotk1b2otWFMTOM/edit#gid=445751783>



The page is decorated with numerous water molecule icons, each consisting of a red circle and two white circles, scattered across the background. A central white rectangular box with a black border contains the contact information. In the bottom right corner, there is a small black cross-shaped icon made of squares.

Contact:
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