WORLD CIRCULAR ECONOMY FORUM 2024

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BEYOND EXPERIMENTATION

Europe 's leading role in mainstreaming circular practice

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Type your questions for the speakers in the Q&A app of Slido

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For what kind of organization are you working?

ⓘ Start presenting to display the poll results on this slide.

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What should be done to monitor the transition to a circular economy in a successful way?

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INFORMATION IN A CIRCULAR ECONOMY

KAREL VAN ACKER
KU LEUVEN

Circular Economy strategies

New Resources = **Societal Needs** x $\frac{\text{Products}}{\text{Societal Need}}$ x $\frac{\text{Materials}}{\text{Products}}$ x $\frac{\text{New Resources}}{\text{Materials}}$

7. Responsible mining

4.Maintain/Repair/ReUse/Reman.
(Lifetime extension)

5. Functional Economy
– Pay per Service
(Intensify use)

3. Ecodesign, Material/process efficiency

2. Substitution, Renewable resources

6. Life Cycle Collaboration and Co-creation
(Open Source / Supply Chain Financing)

1. Recycling

Information needs

1. Resource mapping
2. Carbon accounting, credits, etc.

$$\text{New Resources} = \text{Societal Needs} \times \frac{\text{Products}}{\text{Societal Need}} \times \frac{\text{Materials}}{\text{Products}} \times \frac{\text{New Resources}}{\text{Materials}}$$

8. Demanufacturing, modularity, reusability indicators & data

9. New business models: technological risk assessments

10. **Monitoring sustainability and circularity & predictive models for entire value chains**
    → Digital backbone

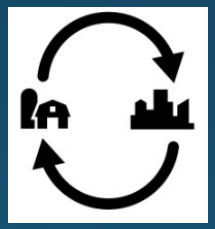
7. Data-driven design & predictive models

5. Regionalised & temporal data of biosources & impacts
6. Data-driven development of AMs

3. Urban mine, composition & dynamics
4. Tracking potential substances of concern

What do we need information about?

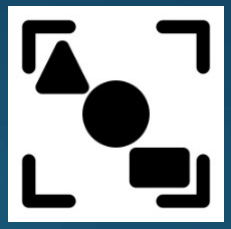
stocks



flows

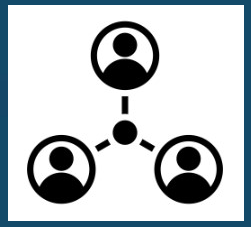
processes

compositions

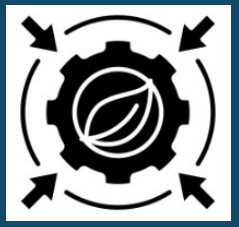


qualities

actors



impacts

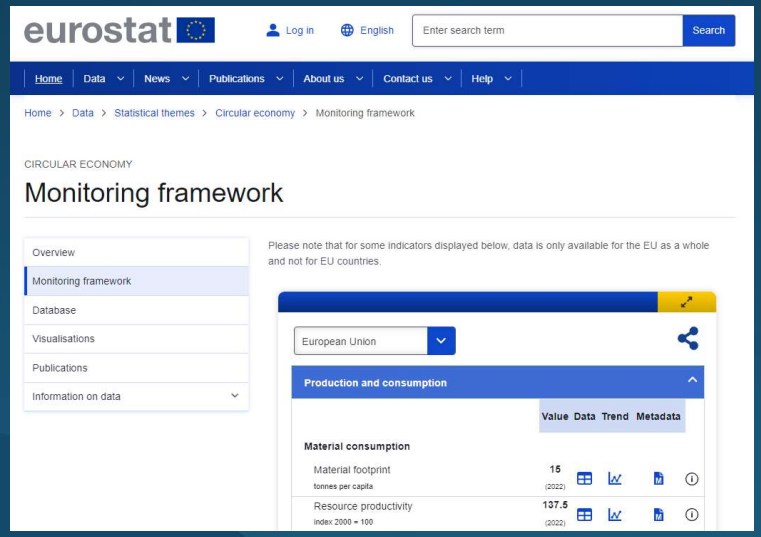


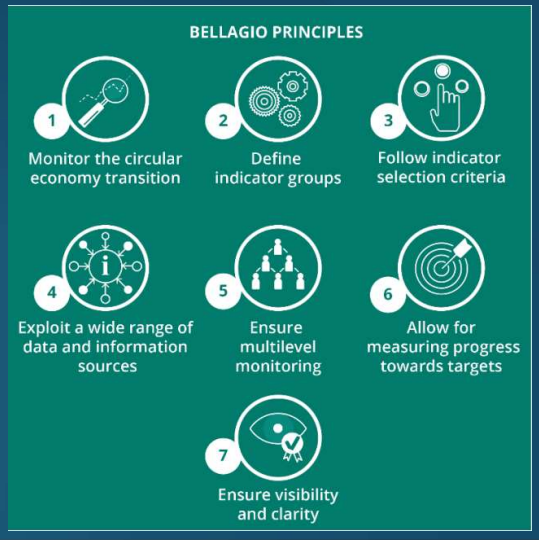
etc …

- Data availabilities?
- Data accessibilities?
- Lack of information = transaction cost!

Applications

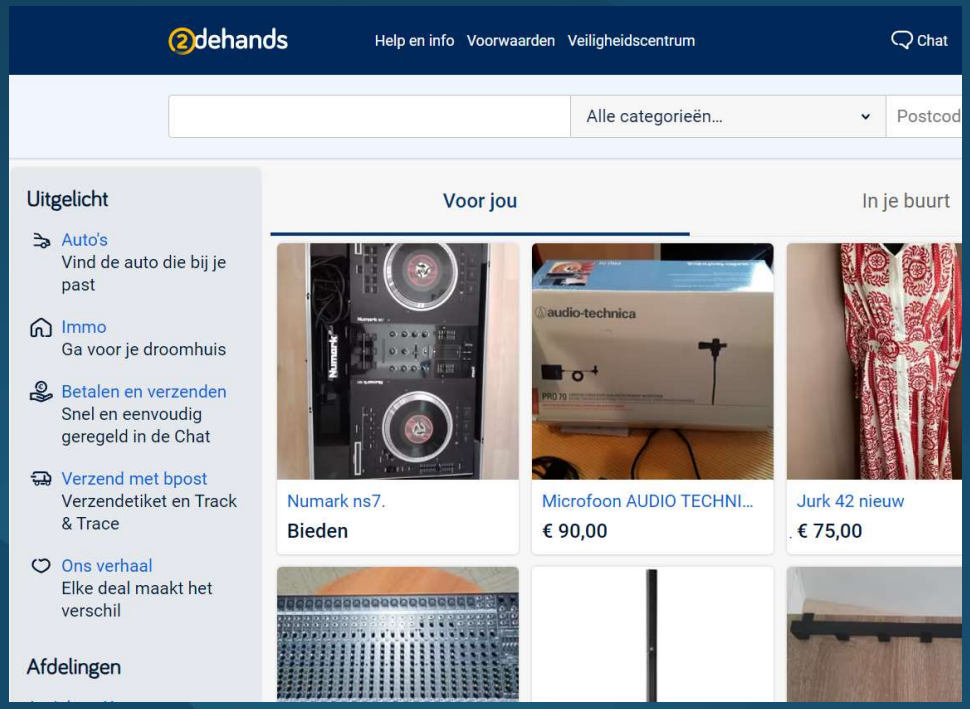
Monitoring progress





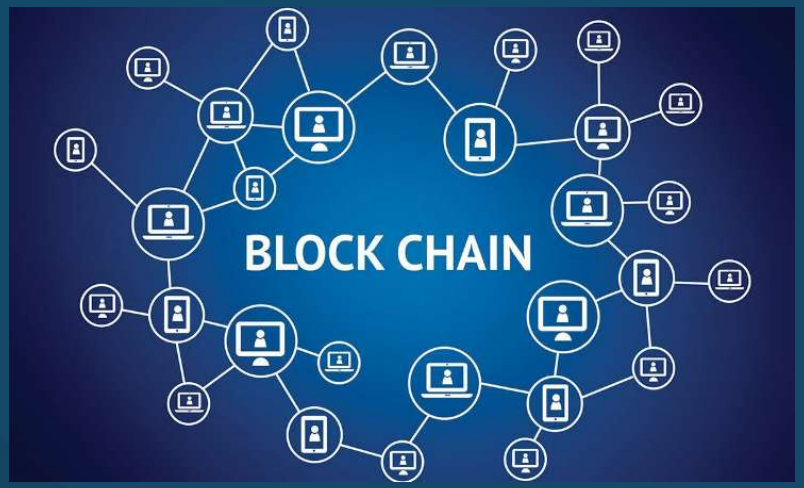
Applications

Product/material-centered



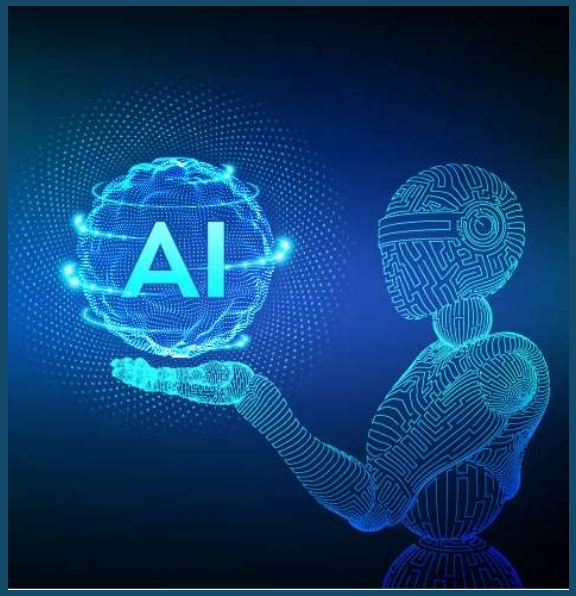
Digital evolution

devices exchanging performance or sensor data



being able to unambiguously store the history of materials and products

generate insights from large amounts of different information sources



Bottlenecks

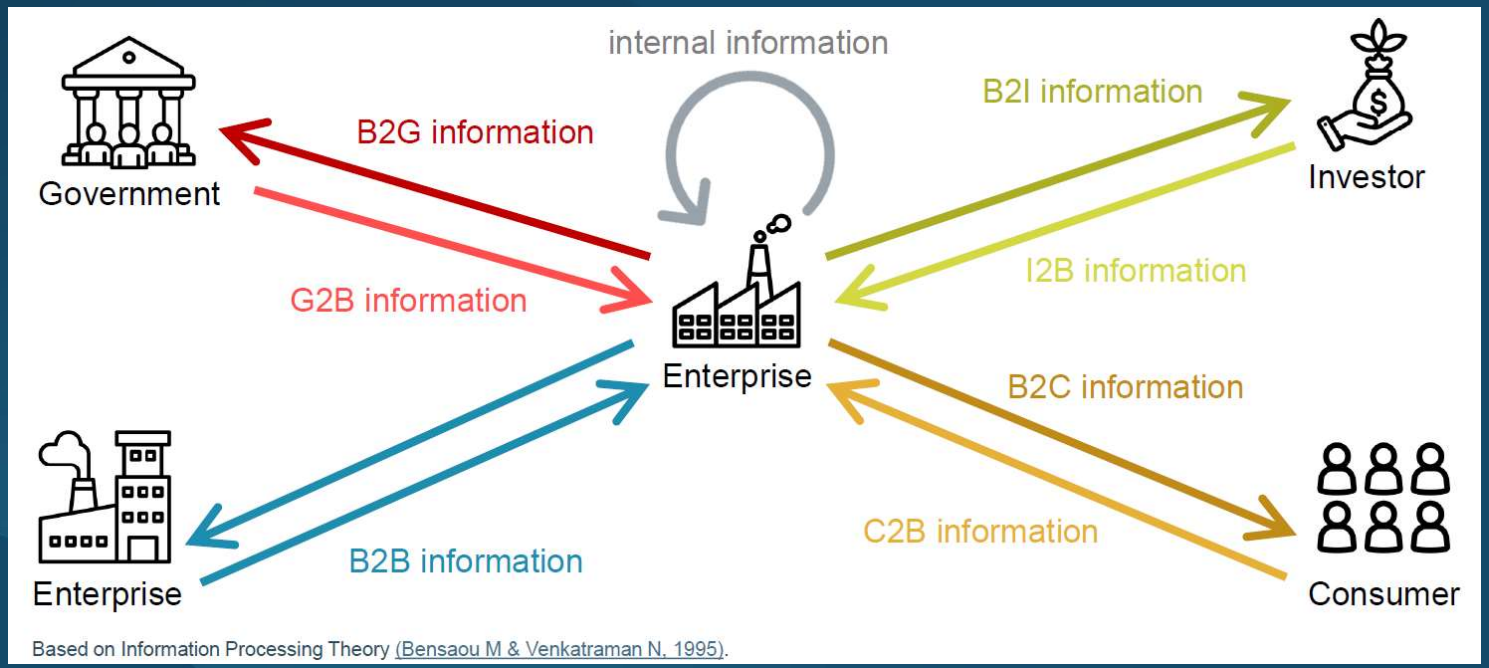
Circular economy + digital evolution seems to promise more and more open data

Though, availability of digital tools

- is not automatically creating the data we need
- does not solve data accessibility issues
- is not able to overcome reluctance to share data

Who needs which information for which purpose?

Information depends on the receiver



Based on Information Processing Theory (Bensaou M & Venkatraman N, 1995).

Also: data are eventually material

- infrastructure, devices, services etc.
- energy consumption and infrastructure

and contributions to CE are not granted

- How can a tool integrating product information contribute to a more circular management of the product or its materials?
- How can a CE monitor contribute to making the transition happen in a country?
- …

Beyond experimenting: examples today

Circularity metrics lab

Pepite

digital wallonia .be

Circular Wallonia

Baromètre de durabilité
Vanden Borre

AVERY DENNISON

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Monitoring CE in Flanders

LUC ALAERTS
KU LEUVEN / CE CENTER

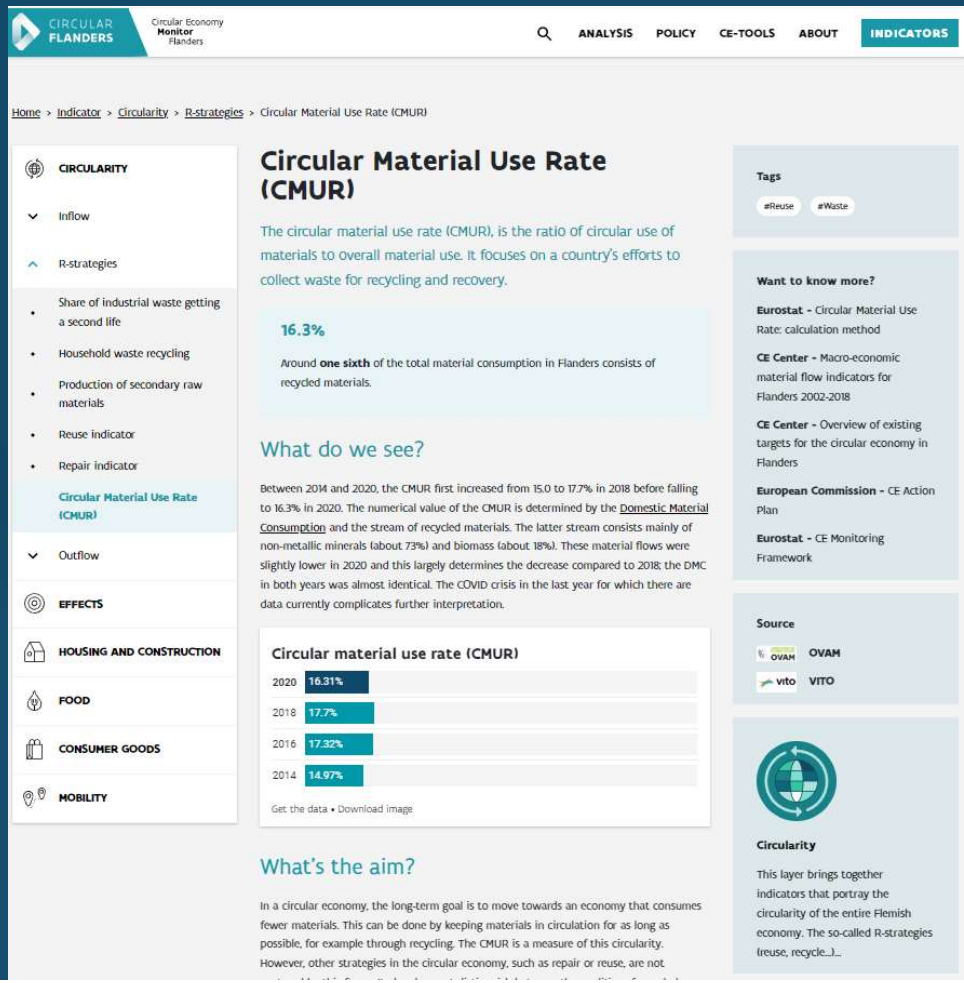
MONITORING IS KNOWING

Where are we today? Where are we heading towards?

Getting to the insights

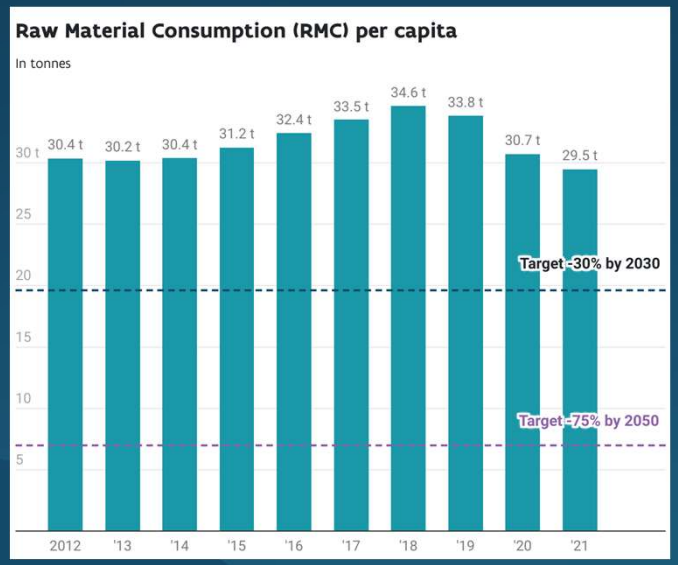
- strong focus on waste and recycling
- essential to tackle the large intakes of materials
- need to move to higher R-strategies

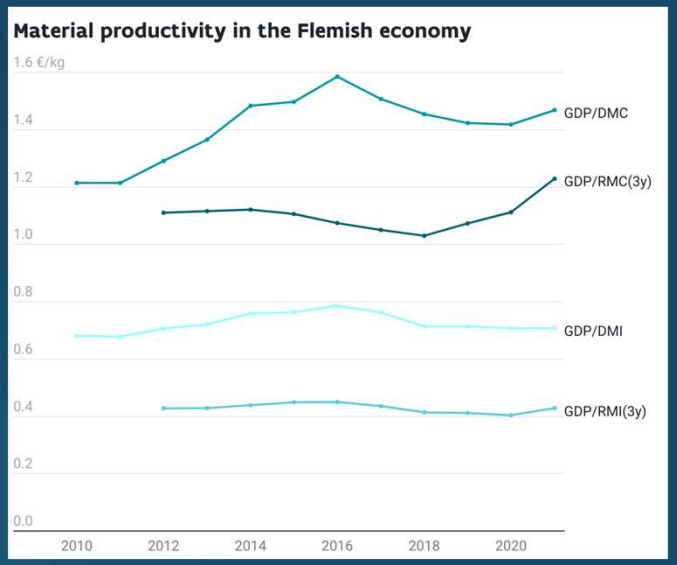
https://cemonitor.be/en/home-english/



FROM MONITORING TO STEERING

KPIs -> targets -> scenarios

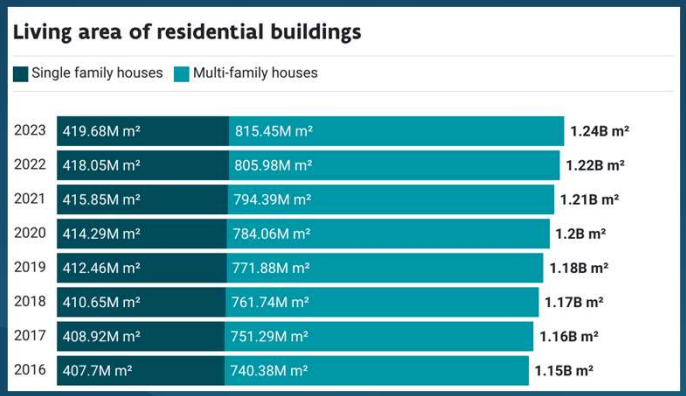


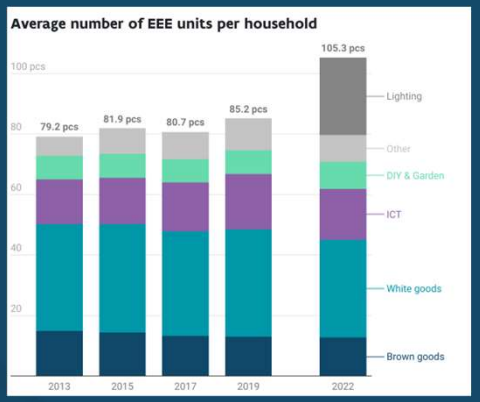


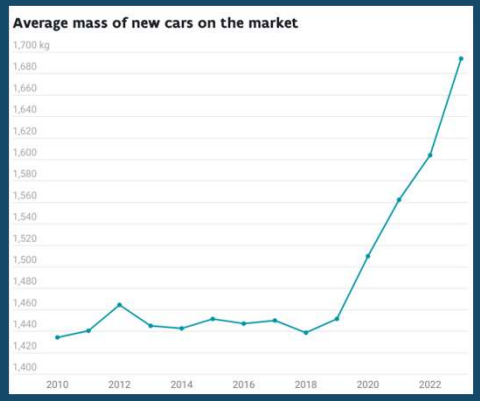
Who needs to untertake which action?

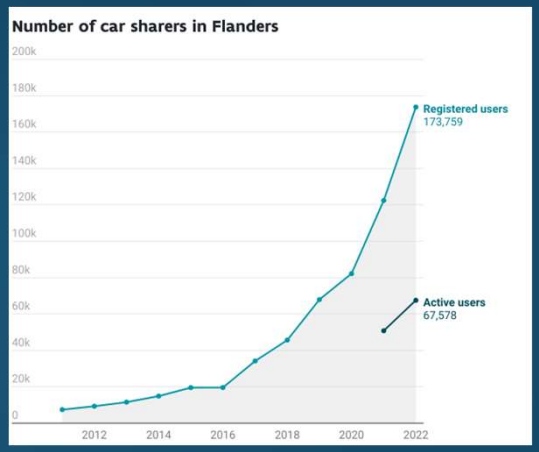
MORE DIRECT POLICY FEEDBACK

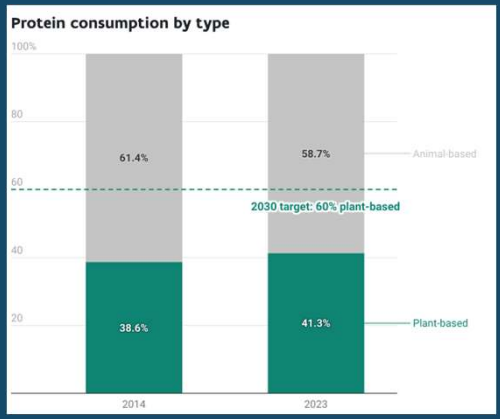
Beyond macro indicators:
fulfillment of societal needs





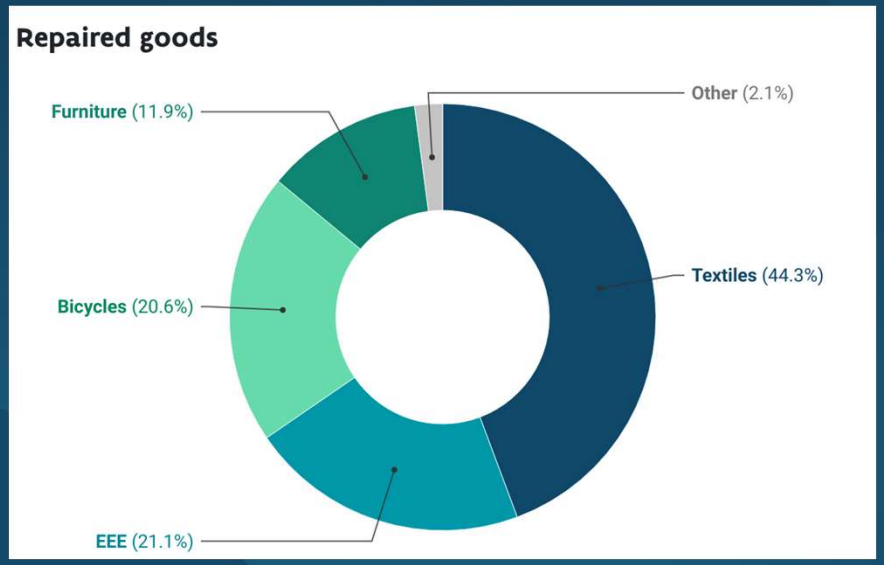


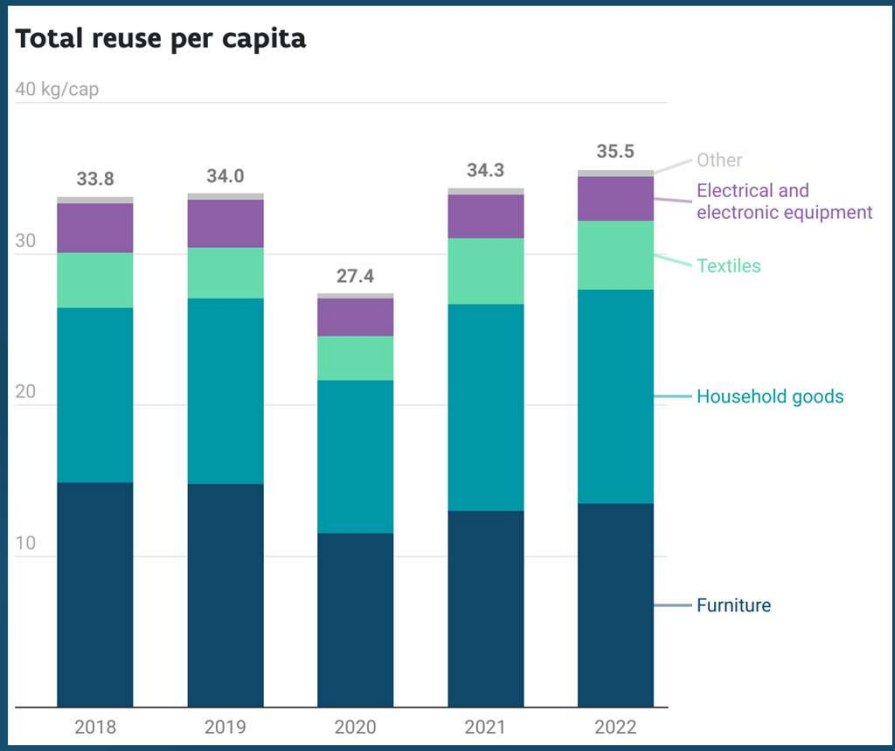




TACKLE KNOWLEDGE GAPS

e.g. higher R-strategies





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02

Circularity Metrics Lab (CML)

An Vercalsteren (VITO)

Why do we need an additional monitoring framework besides the CEMF?

About the CML

- Developed, launched and updated by **European Environment Agency**
- Co-developed and maintained by the ETC-CE
- https://www.eea.europa.eu/en/circularity
- Most monitoring frameworks
  - focus on macro-level perspective:
    - Capturing macrophenomena
    - Aggregated accounting of material flows and related impacts
  - insufficiently capture:
    - Implementation and effect of CE policy measures
    - Trends and progress in ‘inner circles’ and use of products

https://www.eea.europa.eu/en/circularity

About the CML

- CML
  - complements other frameworks by providing additional information on growth of CE from novel sources and across a wide range of perspectives
  - Aims to capture gaps which are not monitored by traditional indicators, often related to data gaps

- ***Circularity***: Seeking out datasets that provide insight within product loops and material cycles – life spans, repair, etc.
- ***Metrics***: Accessing responsive and informative data from national sources or research studies to allow insights not available via established indicators
- ***Lab***: Exploring novel and emerging data sources, f.e. techniques such as webscraping to find new information

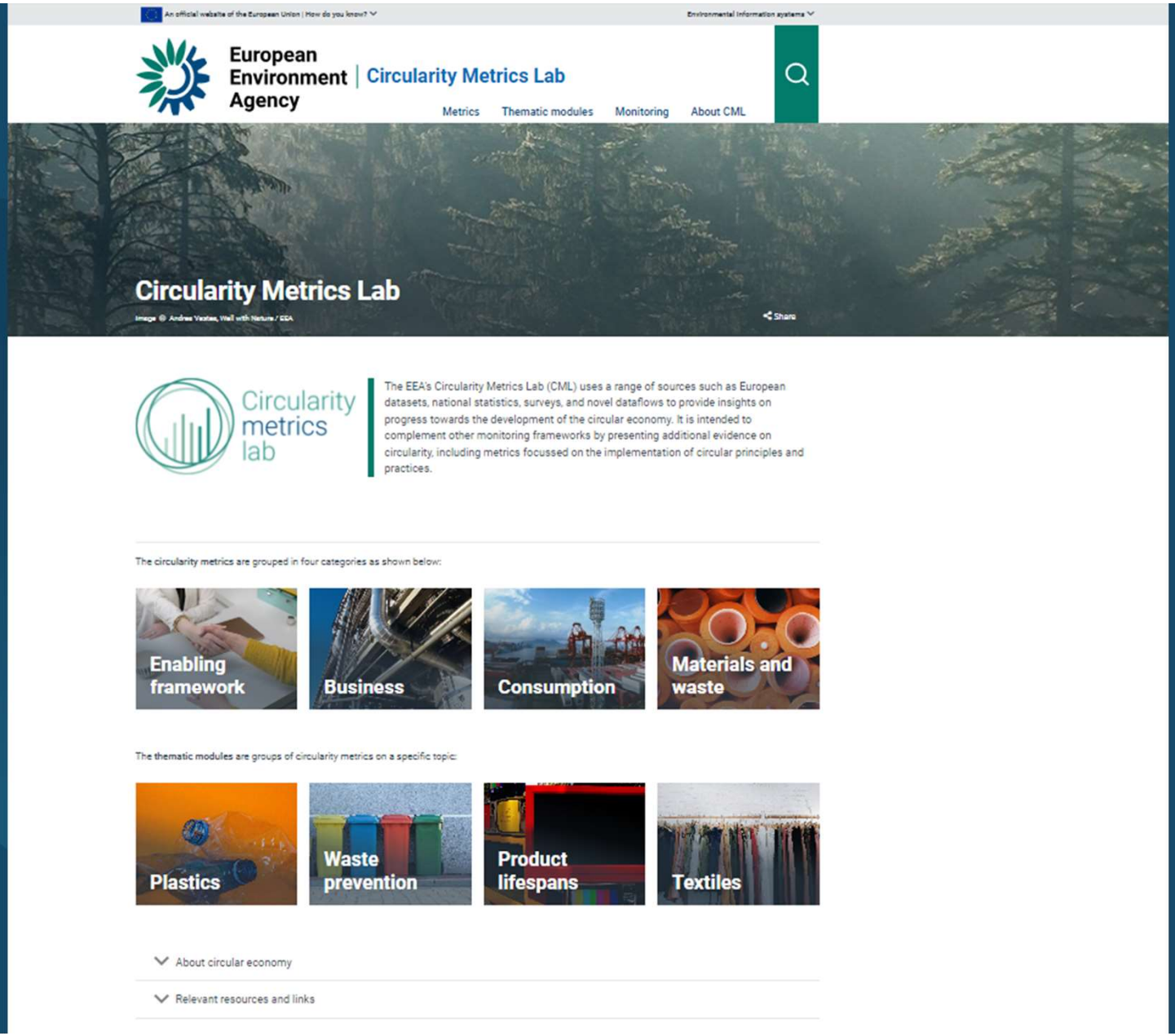
https://www.eea.europa.eu/en/circularity

CML metrics - data

Indicators
Well-established and EU-wide datasets which are frequently updated

Signals
Less complete datasets, only fragmented geographical and time coverage

Sources	*Examples*
Reported datastreams (current)	Waste and recycling data, material flows etc
Reported datastreams (new)	Reuse, GPP
Proxy data	Consumption expenditure, sectoral employment
Unreported data	Municipality monitoring programmes
Surveys	Eurobarometer, national surveys
Scientific outputs	Models, literature reviews
Novel data	'Big data' and other non-statistical sources


An official website of the European Union | How do you know?
Environmental information systems
European Environment Agency
Circularity Metrics Lab
Metrics
Thematic modules
Monitoring
About CML
Circularity Metrics Lab
Image © Andrea Vastes, Well with Nature / EEA
Share
Circularity metrics lab
The EEA's Circularity Metrics Lab (CML) uses a range of sources such as European datasets, national statistics, surveys, and novel dataflows to provide insights on progress towards the development of the circular economy. It is intended to complement other monitoring frameworks by presenting additional evidence on circularity, including metrics focussed on the implementation of circular principles and practices.
The circularity metrics are grouped in four categories as shown below:
Enabling framework
Business
Consumption
Materials and waste
The thematic modules are groups of circularity metrics on a specific topic:
Plastics
Waste prevention
Product lifespans
Textiles
About circular economy
Relevant resources and links

Enabling framework

Image © 'Work Business' by Kristin Hardwick

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Implementation of circular principles in production and consumption systems will yield measurable changes towards reduced consumption of resources and moderated environmental impact. The development and growth of a circular economy requires a framework of enabling factors to be in place, including policy, innovation and financing.

Assessment

- Political and economic momentum for circular economy is building-up in Europe, including growth in financing for circularity projects. The introduction of circular economy strategies at national level is well-advanced across the EU.
- Citation information indicates a strong and growing level of research and innovation activity for circularity. Data is lacking to validate progress on uptake of green public procurement - a key driver for new circular business models.

Signal [1]

National circular economy policies

20

EU member states have published national circular economy policy documents by September 2022.

Improving

Signal [1]

Circular economy lending and financing

€3.4Bn

of lending provided by the European Investment Bank for circular economy projects in 2018-2022.

Improving

Signal [1]

Scientific articles on circular economy

3,033

articles were published in scientific journals concerning circular economy innovations.

Improving

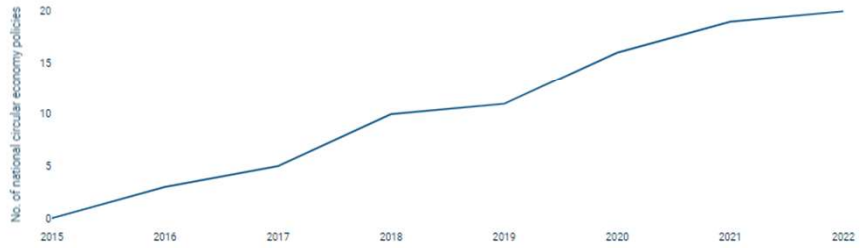
National circular economy policies

Share

Metrics > Enabling framework > National circular economy policies

20 / 27 EU member states have published national circular economy policy documents by September 2022. These plans guide national efforts towards the development of a circular economy.

Metric | Assessment | Background | Supporting information



Note | Sources | More info

Download Share Enlarge

Title: Countries with national adopted CE Strategies, Roadmaps, Action plans.

Status: Signal

Coverage: EU Member States, 2015-2022

Sources: ETC/WMGE, 2019, Eionet, European Environment Agency.

National circular economy policies

Share

Metrics > Enabling framework > National circular economy policies

20 / 27 EU member states have published national circular economy policy documents by September 2022. These plans guide national efforts towards the development of a circular economy.

Metric | Assessment | Background | Supporting information

Since 2015 Member States started developing CE strategies, action plans and roadmaps. The cumulative number of countries that have adopted national policies provides an indicator for stakeholder engagement in CE from national policy makers across the EU 27 through the years since 2015. The CEAP 2020 reiterates the importance of national policies, and the table below shows the evolution of published national policy documents across EU member states.

These policy documents are generally designed to cover an operational period of several years; and in some cases, countries have already adopted second version or updated the original policy.

Year	Circular economy plans published
2015	European Circular Economy Action Plan
2016	Finland, Netherlands, Belgium
2017	Italy, Portugal
2018	Denmark, Greece, Luxembourg, Slovenia, France
2019	Poland
2020	Malta, Spain, Sweden, Latvia, Germany
2021	Ireland, Czechia, Cyprus
2022	Romania

Consumption patterns play a crucial role in moving towards the circular economy. In a consumption context, circularity is about organisations and individuals making sustainable purchases and use of the products and services.

Assessment

- There are signs that consumers are ready to embrace more circularity in the products and services they consume. Increased interest in the sharing-economy and other novel circular models is positive, so long as this replaces conventional consumption, rather than adding to it.
- High levels of food waste, especially post-consumer waste, are concerning given the significant environmental footprint of food production.

Indicator [1]

Europe's consumption footprint

- 8.4 %

Decrease in Europe's consumption footprint between 2012 and 2020, although levels continue to exceed planetary boundaries.

Improving

Signal [2]

Consumer environmental activities

N/A

increasing action for purchasing local and second-hand products and worsening behavior towards energy and water use.

No trend

Indicator [1]

Consumer food waste in Europe

55%

of food waste comes from households, which generated on average 70 kg of food waste per inhabitant.

No trend

Signal [2]

Number of members of car sharing schemes

Signal [2]

Citizens who have chosen alternates to new products

Indicator [1]

Household expenditure on repair and maintenance

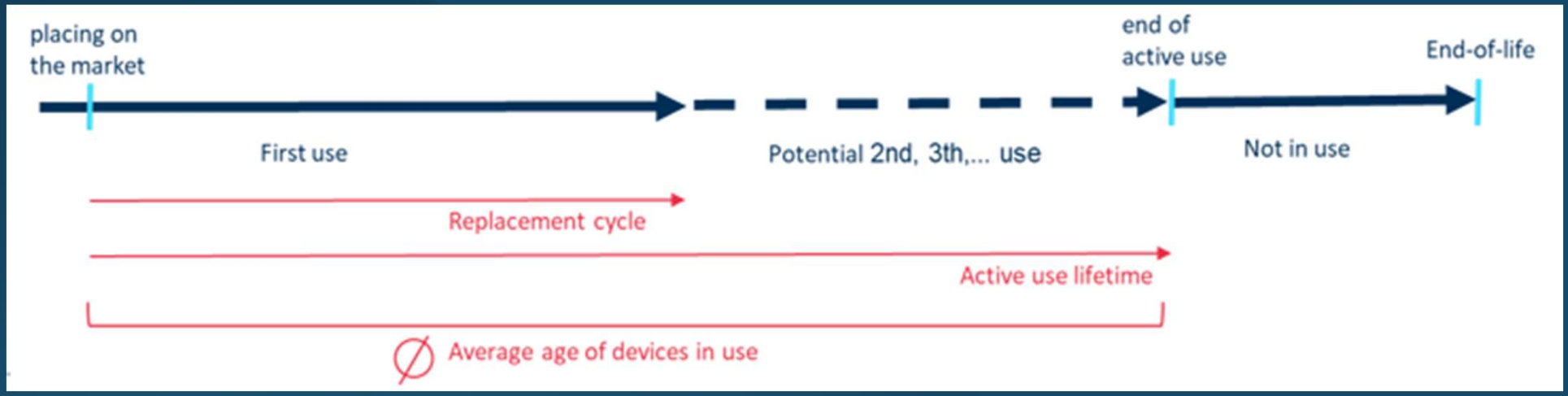
What are bottlenecks/challenges in developing this type of signal indicators?

Life span indicator as example

- **Smartphones**: nice example where value retention strategies impact the time these products are in use, i.e. actual lifetime
  →an effort to monitor the actual lifetime of products could provide a good proxy indicator for the deployment and success of value-retention strategies

- **Work in progress** to develop product life span indicators for CML thematic module

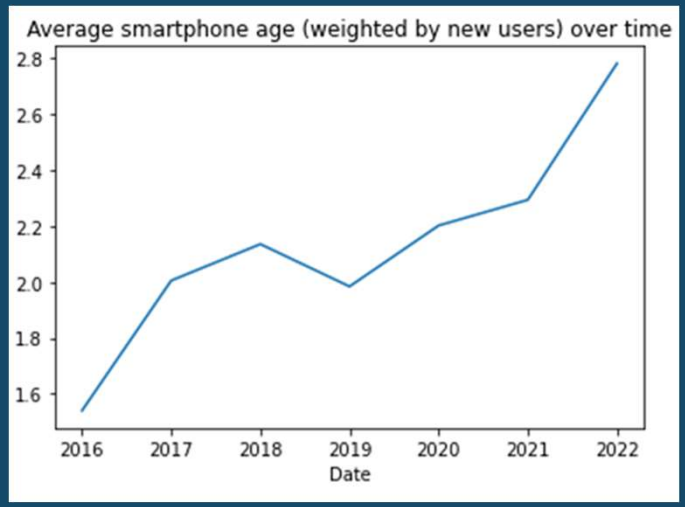
Product lifespans: concept



Source: Schischke, 2021a

Test: Google Analytics combined with website visits

- Data source: Daily website visits (October 4th, 2016 to October 10th, 2022)
- When the visitor accepts sharing of its data, a few specifications of the device are logged such as the brand and model number
- Combination with release dates of these models → indication of the average age



Average smartphone age (weighted by new users) over time

Challenges and bottlenecks

- Ownership of data
  - important to go in conversation with these organizations (e.g. Google)
  - Pay attention to sensitivity of data (brands, market shares, …)
- Retrieved data need to be trustworthy
- Geographic boundaries are not always possible to set
- Data are not available for free (paywall)
- Challenge to control data (changes, discontinuation)
- Representativeness
- Careful interpretation is key (confounding factors)
- Go beyond one-off data → specific difficulties e.g.
  - Relation with data provider is key
  - Format for data exchange is required
  - NDA

https://www.eea.europa.eu/en/circularity

The road ahead

EEA continuously updates and elaborates the CML:

- Strenghtening existing metrics
  - Car sharing schemes
  - Repairability index
- Adding new metrics
  - Secondary raw materials
  - Anthropogenic material stocks
- Adding new modules
  - Plastics
  - Textiles
  - Life spans
- EEA Briefings

Challenges:

- More monitoring = more resources
- Data opportunities from digitalization
- Trustworthy sources are critical
- State indicators → impact indicators

Thank you!

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Circularity metrics lab

https://www.eea.europa.eu/en/circularity

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Repairable Products with a longer lifetime

John Wante

Repairable Products with a longer lifetime

Ecodesign for sustainable products regulation

Right to repair directive

Directive on empowering consumers for the green transition

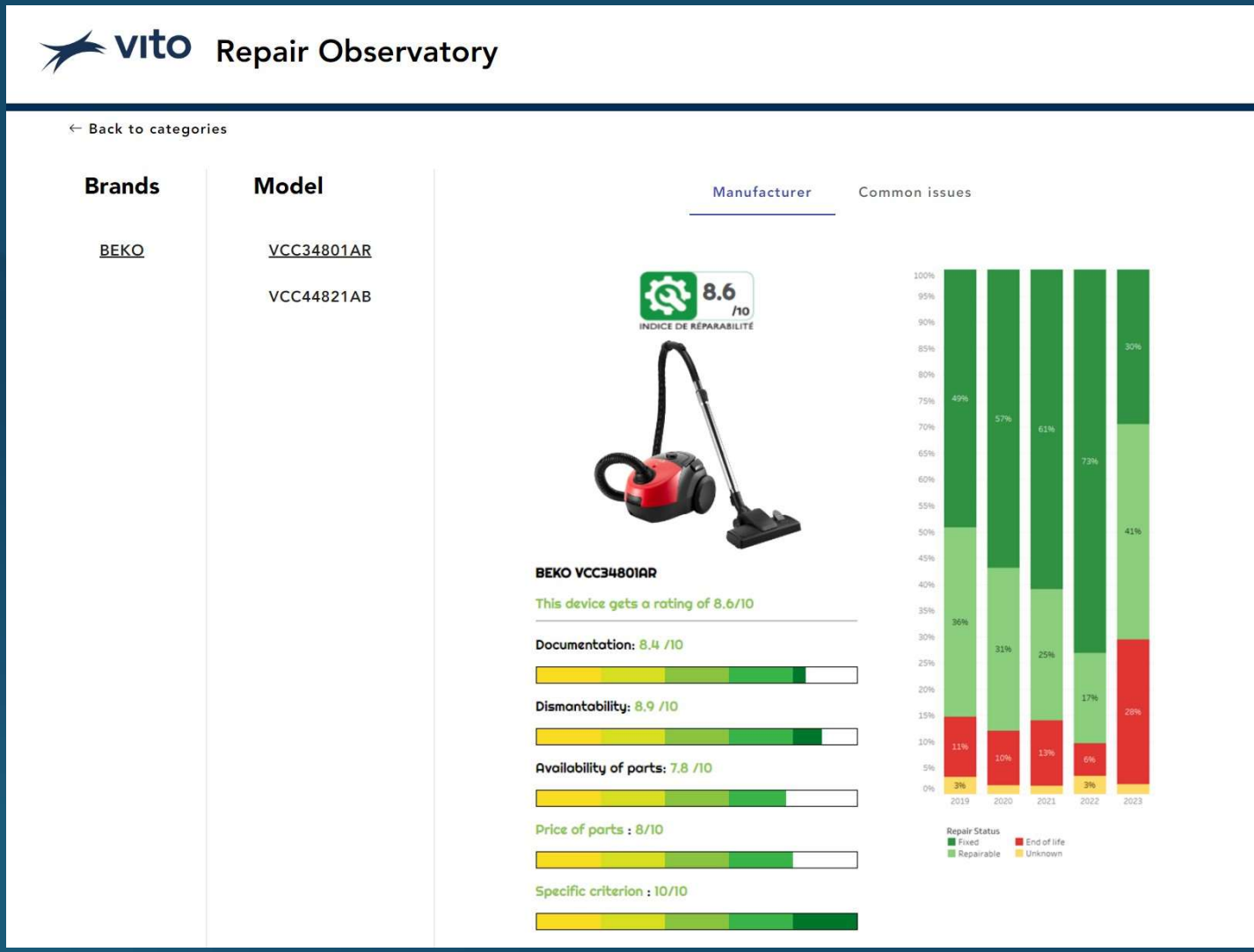
Repair index

Durability index

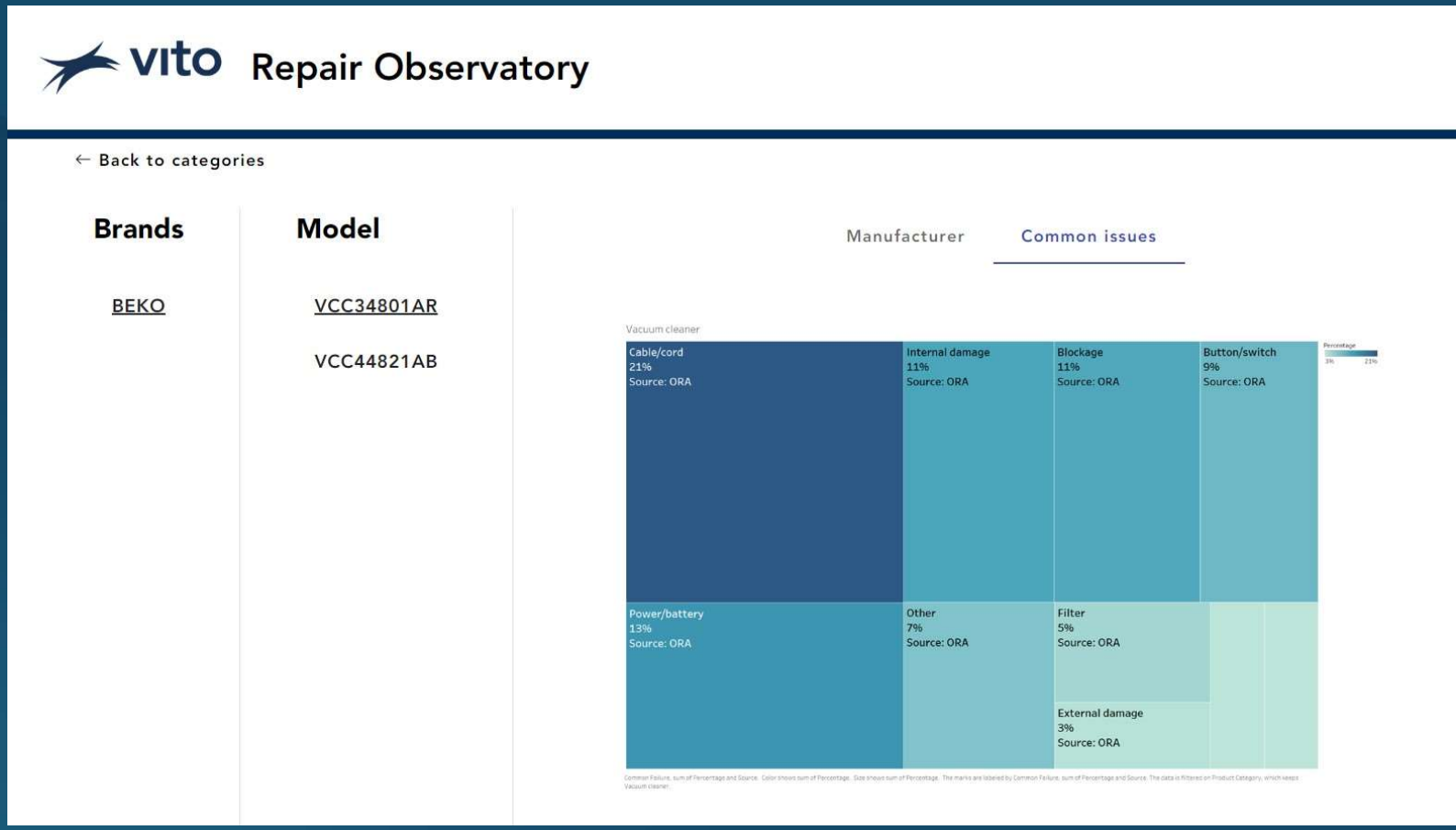
Repair database

vito Repair Observatory

Repair score versus actual performance



Frequently occurring defects



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Will a repair score or durability score have an influence on what you buy?

ⓘ Start presenting to display the poll results on this slide.

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Information Flows

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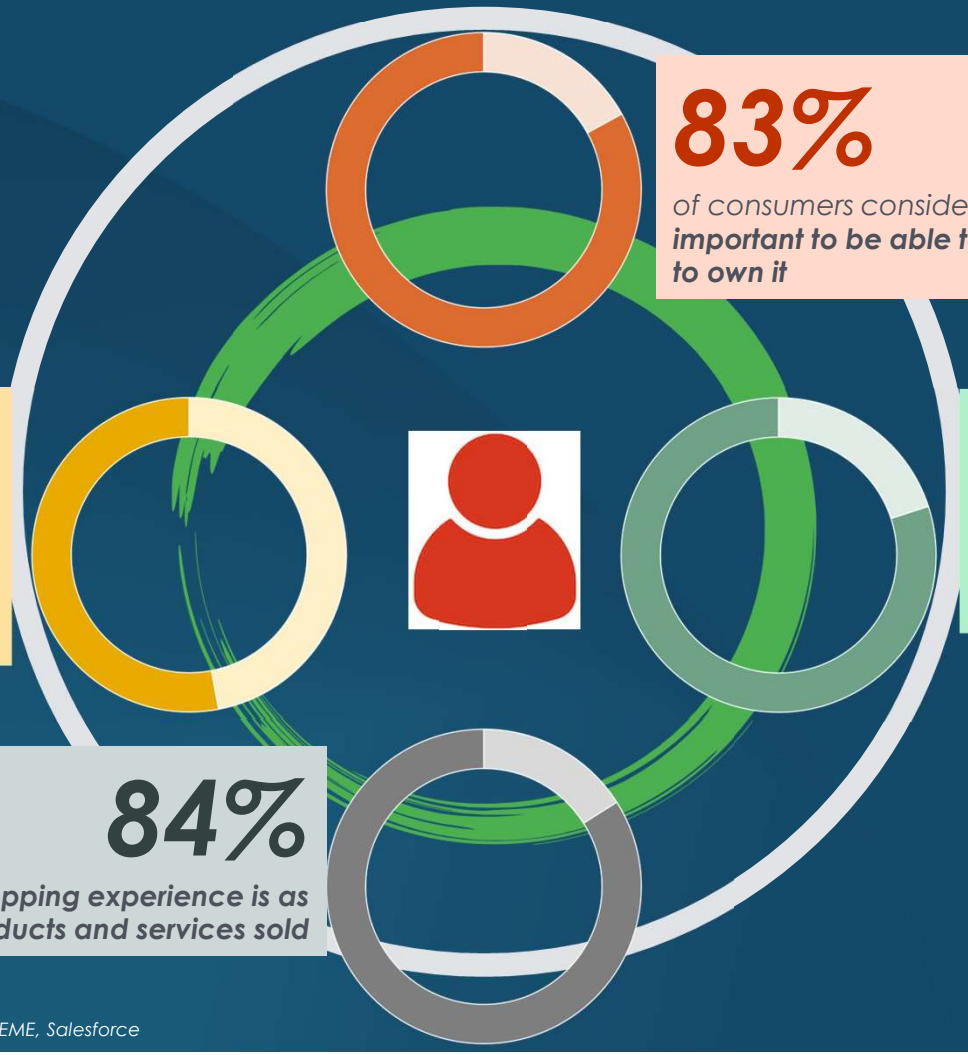
01

INFORMATION EXCHANGE WITH CUSTOMERS

CYRILLE REGARDIN
FNAC VAN DEN BORRE

STRONG CUSTOMER EXPECTATIONS



83%

*of consumers consider that it is **more important to be able to use a product than to own it***

53%

*of consumers say the abundance of choice **makes it harder to make a purchase decision***

80%

*of consumers say they have **changed all or part of their daily practices to reduce the impact of their consumption***

84%

*of consumers consider that the **shopping experience is as important as the products and services sold***

Sources : Observatoire des Sociétés et de la Consommation, Kantar, ADEME, Salesforce

WE HAVE 3 BELIEFS ABOUT THE FUTURE OF RETAIL

The **omnichannel model** is the **winning model** for retail

+7 pts

of online market share for omnichannel non-food retailers vs. pre-covid[1]

The act of buying is **inseparable** from the **advice and service** that surround it

7 to 8

the maximum number of options a consumer can consider before regretting their choice or not buying anything[2]

In the future, consumer behaviour will be **largely driven by environmental awareness**

60%

of French people buy second-hand products[2]

1. Étude BCG, France, retail non alimentaire
2. Crédoc (Centre de recherche pour l'étude et l'observation des conditions de vie), 2018-2019

Baromètre de durabilité

Vanden Borre

Durability Scoring

Durability

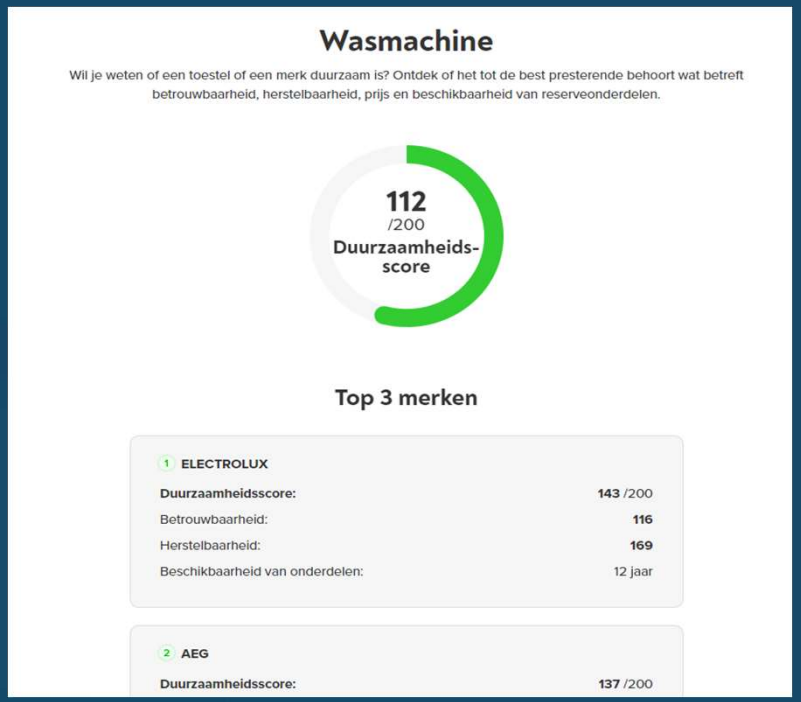
A durable products is reliable & repairable

= Average from scores reliability & repairability

Repairability & **Reliablity**

A reparaible product can get spares at economical cost and is rarely exchanged

A reliable product is failing rarely



Wasmachine

Wil je weten of een toestel of een merk duurzaam is? Ontdek of het tot de best presterende behoort wat betreft betrouwbaarheid, herstelbaarheid, prijs en beschikbaarheid van reserveonderdelen.

112 /200 Duurzaamheids-score

Top 3 merken

1 **ELECTROLUX**

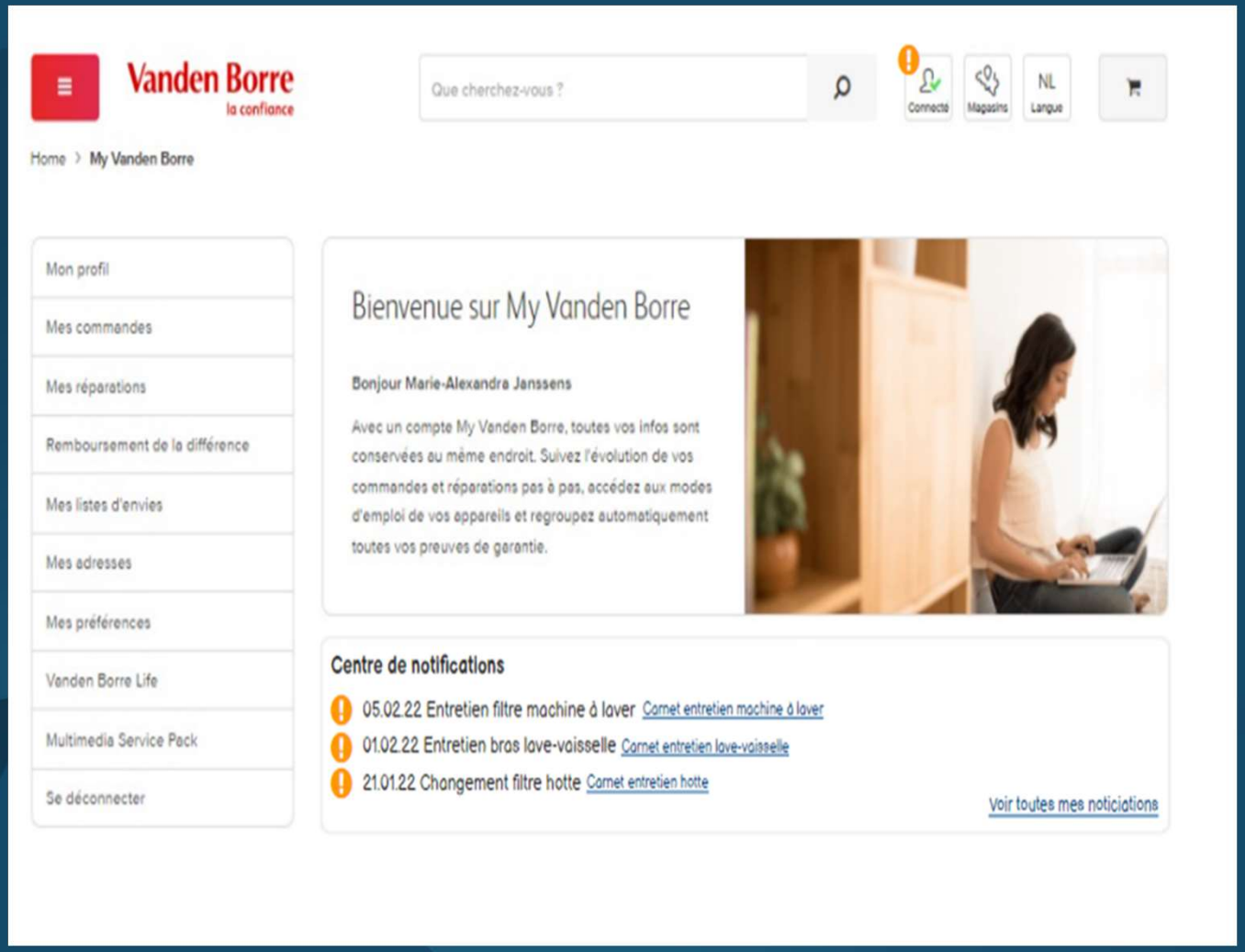
Duurzaamheidsscore:	**143** /200
Betrouwbaarheid:	**116**
Herstelbaarheid:	**169**
Beschikbaarheid van onderdelen:	12 jaar

2 **AEG**

Duurzaamheidsscore:	**137** /200


Vanden Borre
Life

(PRE) DIGITAL PASSPORT FOR PRODUCTS



EU CIRCULAR ECONOMY FORUM

BEYOND EXPERIMENTATION

Europe 's leading role in mainstreaming circular practice

slido

Type your questions for the speakers in the Q&A app of Slido

ⓘ Start presenting to display the audience questions on this slide

Data 4 Wallonia

Benoit Hucq
CEO, Agence du Numérique

Data 4 Wallonia

Territorial intelligence platform for Wallonia

Data 4 Wallonia is a collaborative dynamic aiming to place data at the heart of public policies in Wallonia. It has been developped based on the technical foundations of the Digital Wallonia Platform.

Data 4 Wallonia : Goals

Representing

Identification, mapping and description of actors (private and public companies, UAP, research centers, etc.) and their role/involvement in public strategies. Description of programs, operational actions, events, press articles, …

Understanding

Putting data into perspective through generic and thematic taxonomies. Clusters by types of actions, programs, … Analysis of ecosystems and identification of key players. Dashboard, business intelligence, data visualization, etc.

Prescribing

Analysis of dashboard indicators based on specific criteria (geographic areas, periods, budgets, etc.). Monitoring and evaluation of actions. Identification of areas of excellence. Transversal vision and recommendations for public policies.

Data 4 Wallonia : 2 main concepts

Data Model

Data 4 Wallonia is based on a data model covering all the resources necessary for the representation of public strategies in a vision of “platform as a service”, in particular through the concept of “profile” which makes it possible to identify any actor (business, administration, …) depending on its role within the framework of a strategy.

Taxonomy

The data and editorial content of Data 4 Wallonia are structured and managed on the basis of generic and specific taxonomies allowing resources to be qualified and grouped dynamically. These taxonomies are organized in collections of categories (products and services, networks, value chains, …). They are enriched according to the needs of the partners.

Data 4 Wallonia : Services

- **Support and assistance.**
  Each Data 4 Wallonia partner benefits from dedicated support to define their needs, draft specifications, integrate their data, …
- **Data Back Office.**
  Data 4 Wallonia is based on a “full cloud” back office that guarantees stability, elasticity and security for the capture, management and sharing of data and content.
- **Definition of taxonomies.**
  In addition to the use of existing taxonomies, Data 4 Wallonia allows each partner to design taxonomies to describe their areas of activity and ecosystems.
- **Business Intelligence.**
  Data 4 Wallonia also offers business intelligence and data visualization services based on data integrated into the platform, alone or combined with external data.

More info : www.data4wallonia.be

Example of dashboard created for the Digital Wallonia Strategy : www.digitalwallonia.be/dashboard

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DIGITAL & AI
Opportunities for the circular economy

Pepite sa

Philippe Mack

MISSION & VISION

OUR VISION

Fair access to basic goods and services for humanity requires **smart and rational** consumption of natural resources.

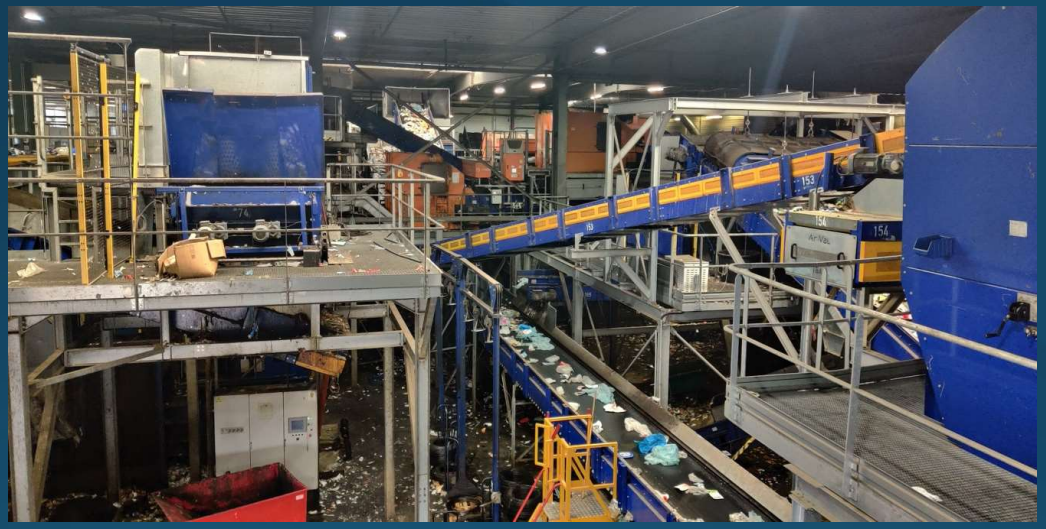
OUR MISSION

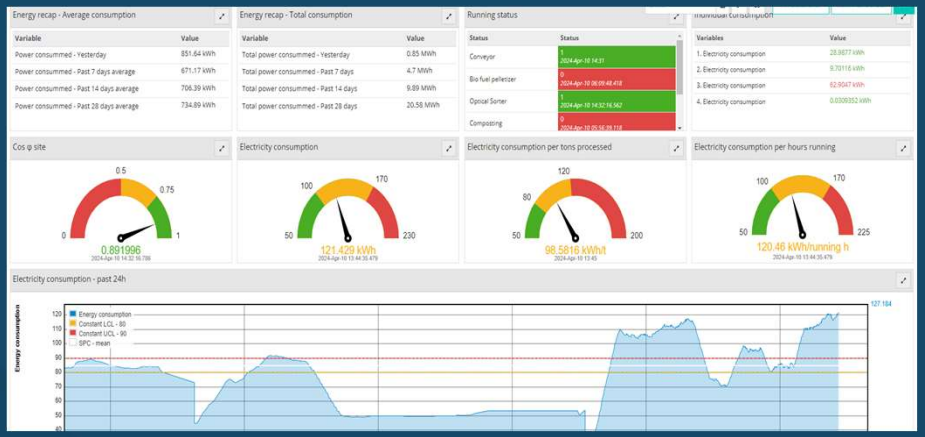
Enabling factories in reducing waste, in being more sustainable thanks to **digitalisation, data and AI**

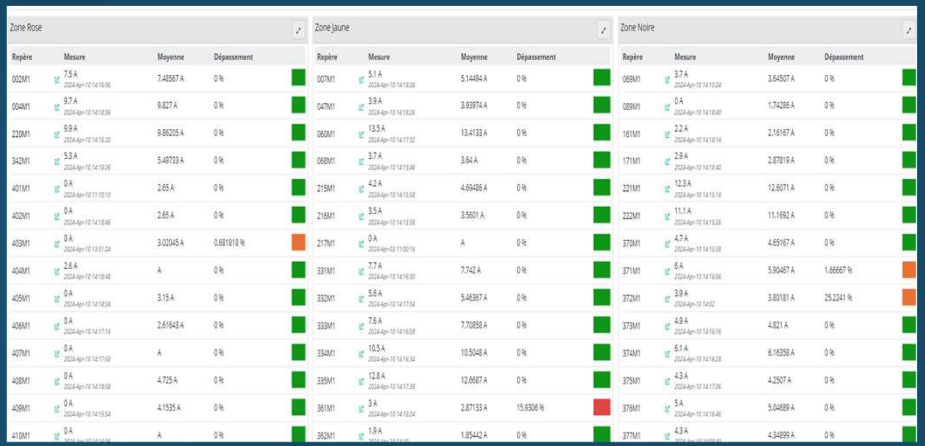
OUR ASSETS

- **DATAmaestro software** to embed AI at scale in factories
- **OPTImaestro methodology** to transform workforce and foster AI adoption in factories

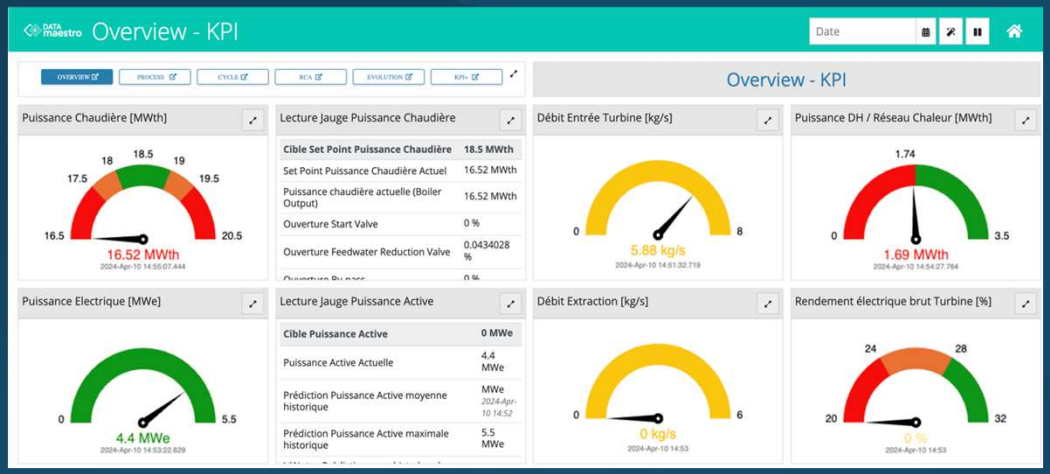
Use case 1: waste sorting plant







Use case 2: waste to energy



Use case 3 : steel casting

Scrap Low Quality

Scrap High Quality

Pure Alloy

%

%

%

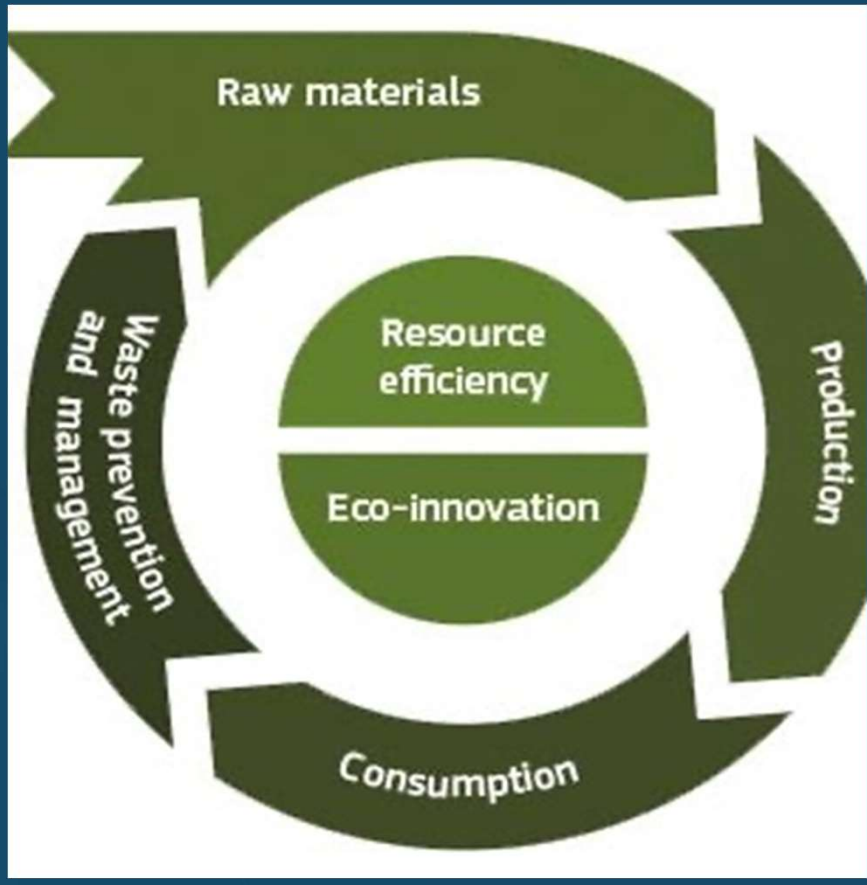
D A T A

AI is used to continously **minimize consumption** of pure alloy extracted from Earth.

Conclusions

Impact of digital and AI is almost at every step of products circularity:

- Reducing waste
- Recovering and processing waste
- Re-use processed waste
- Design new sustainable products and processes (genAI).



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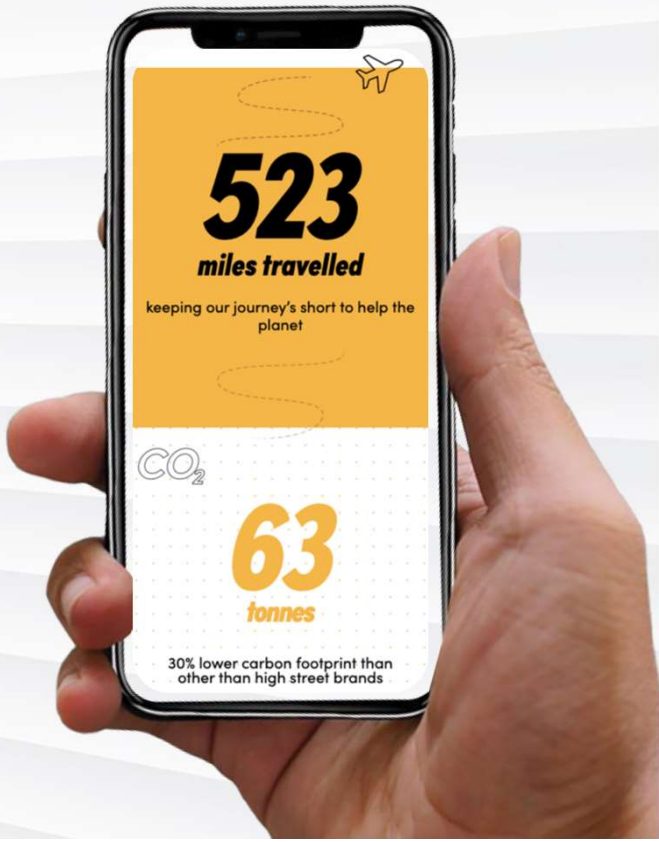
Implementing the EU Digital Product Passport Challenges and Opportunities

Emilie Bartolini, Government Affairs Lead EMENA, Avery Dennison

The EU Digital Product Passport is coming: challenges faced by brands

1. Where to begin?
    - Uncertainty regarding the legislative timeline
    - Uncertainty regarding specific requirements
    - They need guidance for implementation. This is especially true for small and medium enterprises (SMEs)
    - Regulatory fragmentation challenge: European DPP vs. the rest of the world
2. Retrieving data from the supply chain
    - Many suppliers' systems are obsolete and difficult to integrate
3. Ensuring data quality, consistency and integrity



Challenges facing the mattress industry

Impact of mattresses on climate change

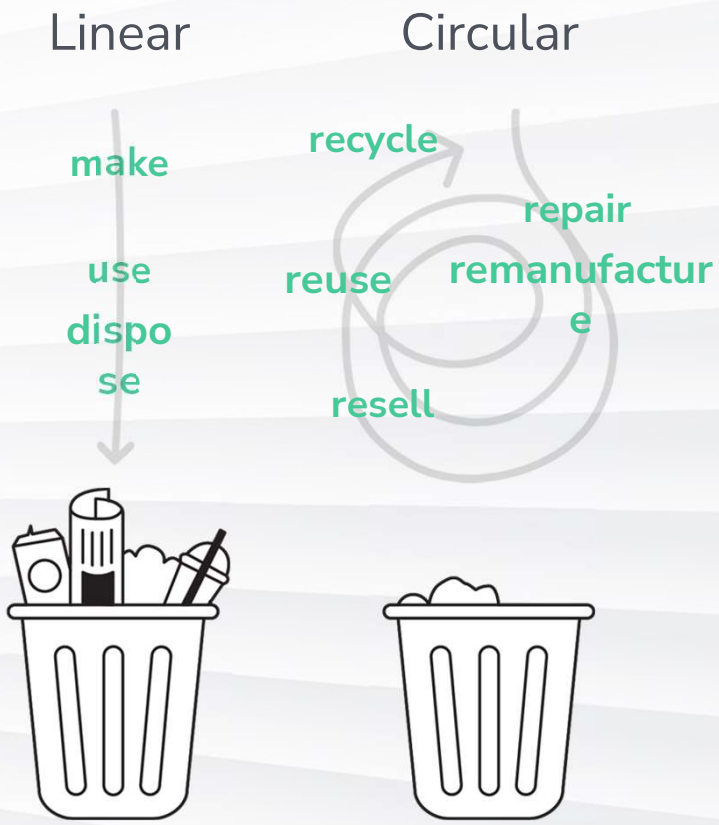
- Raw material usage and waste generation
- Energy consumption and emissions
- CO_2 footprint

Waste handling

- 60% landfilled – 40% incinerated
- However, 85% potentially can be recycled

Data gaps preventing circularity

- Material composition
- Consumer care and sorting instructions
- Repair instruction



Case study: enabling circularity of the bedding industry via information flows

Step 1

Design physical item & its digital twin

- Design for dismantling, repair, refurbishing,
- Material efficiency
- Recycled materials

Step 2

Activate a data carrier

- Reduce Carbon footprint
- Reduce waste
- Recycle manufacturing waste
- Industry 4.0

Step 3

Consumer scanning of QR code

- Selection guidance
- Maintenance instructions
- Refurbish options
- End of Life instructions

Scan me!

Step 4

Enable Reverse Logistics via data sharing

- Take back program
- Collect in store
- Recycling park

Step 5

Optimize dismantling operations

- Specific dismantling instructions
- Material composition & destination information
- Safety (electronic parts)

Collaboration between TripleR, Avery Dennison (Atma.io), and Aquinos

What companies need from legislators to implement DPP

Regulatory Framework

- A consistent and clear legislative framework
- Standardization of data vocabulary, access requirements and more
- Arrange for a single transaction to access all necessary tools; DPP as a one-stop-shop for product data reporting
- Harmonization across across jurisdictions

Support Implementation

- Guidance and tools for small companies
- Best practice sharing of DPP-enabled circular business models
- Use-cases built through pilots, partnerships & research projects

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Europe 's leading role in mainstreaming circular practice

01

How Open Science and AI could scale up the circular economy practice?

Bart.Dooms@VITO.be

slido

What is the weirdest hallucination you ever got back from ChatGPT?

ⓘ Start presenting to display the poll results on this slide.

Insights and learnings?

> 5000 studies VITO

> 300 experiments VLAIO and Vlaanderen Circulair

> 700 Europese experiments CE

Public and private advisers amplifier

Questions SME

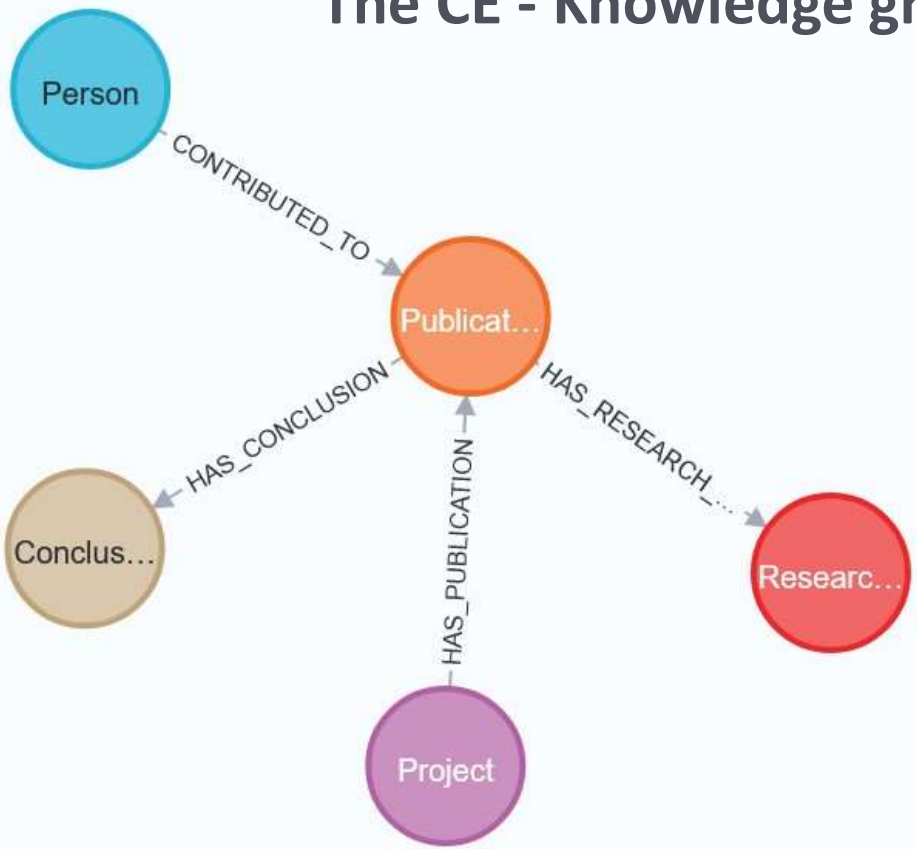
CIRCULAIR = FUTURE PROOF

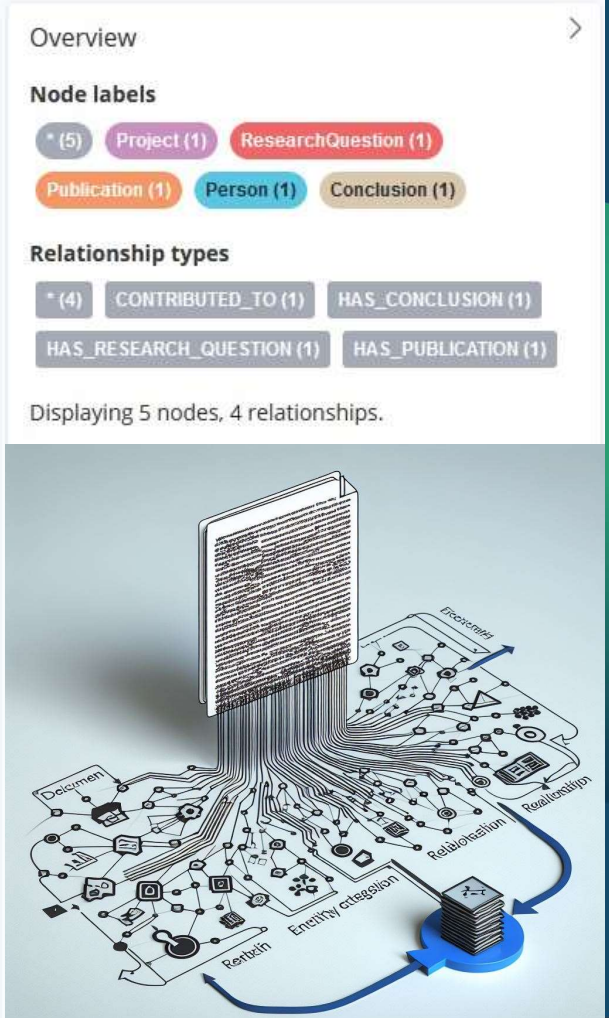
How to scale business?

Sustainable entrepreneurship?

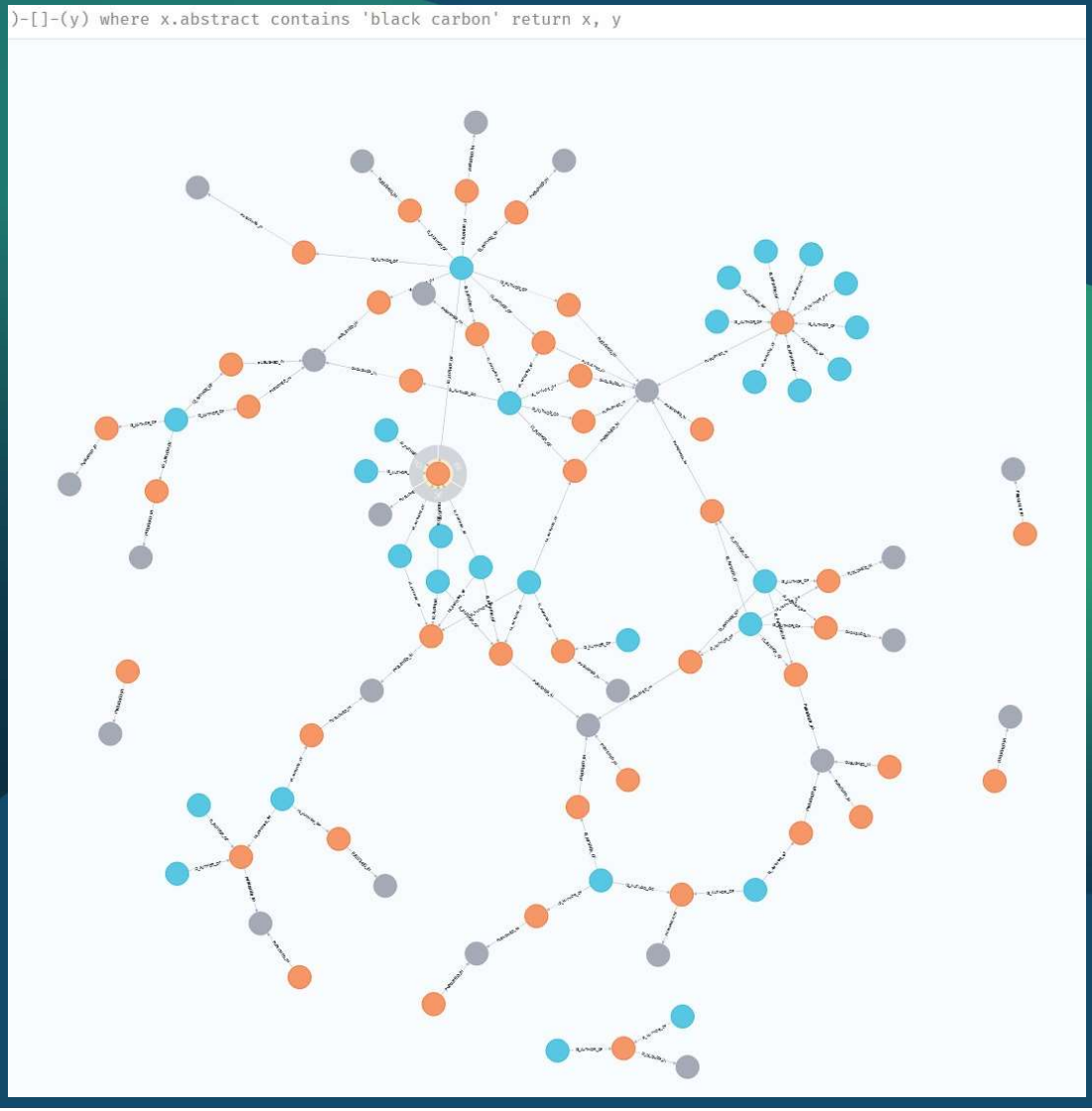
01 Using Large Language Models (LLM) to extract research question and conclusion from existing projects/publications

The CE - Knowledge graph scheme

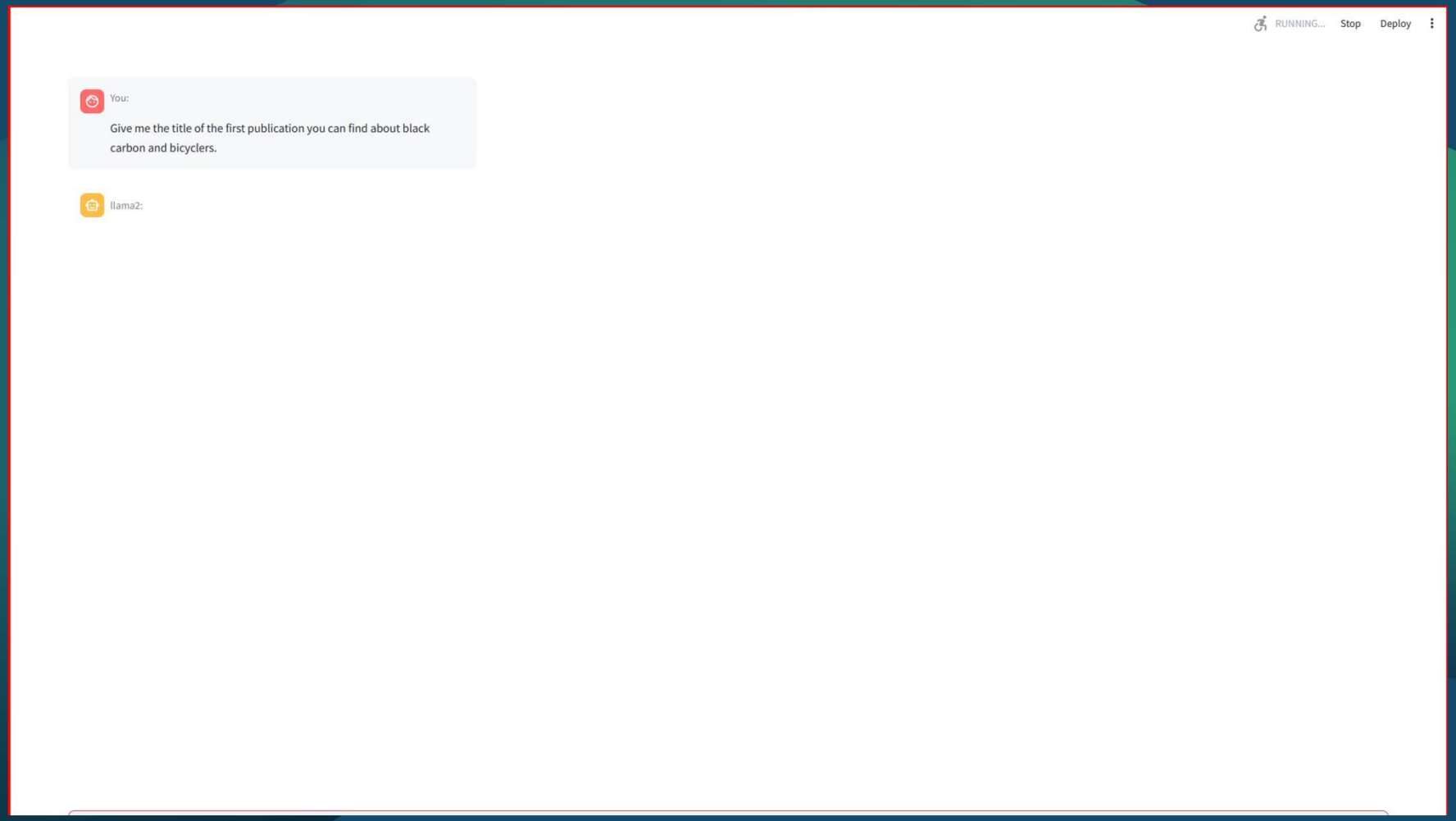




02 using LLM and the CE-knowledge graph scheme to retrieve the relevant information



03 Using Retrieval-Augmented Generation (RAG) and LLM to give an anwser



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