



Translation of Research to Commercialization

Luana Dessbesell

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Outline

Short description of the Aalto Bioinnovation Center

Professorship in Sustainable Bioproducts Innovation

Importance of science-based evidence and translation via sustainability lenses

Sustainability framework for supporting the translation of research to commercialization

Questions - if time allows



What is Aalto University Bioinnovation Center (BIC) ?

A **multidisciplinary** research and learning center to promote breakthroughs in'
bio-and circular economy, special focus on textiles and packaging.

Established in 2021 through a **10.5 M€** grant by the Jane and Aatos **Erkko Foundation**.

Professor Michael Hummel
Director

michael.hummel@aalto.fi

Susanna Ahola
Coordinator

susanna.ahola@aalto.fi

Elli Käpylä
Corporate Relations Manager

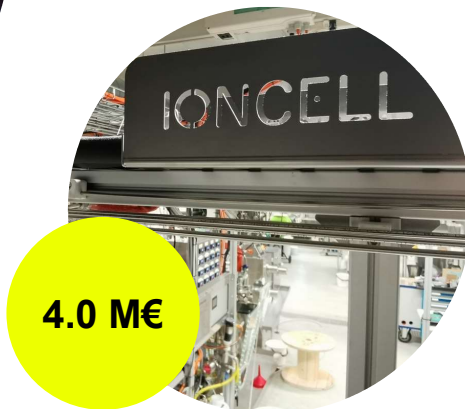
elli.kapyla@aalto.fi

Bioinnovation Center



3.5 M€

Doctoral School



4.0 M€

Infrastructure program



0.5 M€

Impact program



2.5 M€

Professorship

Opportunity - talent, resources and a mandate to support innovation commercialization

Aalto Bioinnovation Center

A multidisciplinary research and learning center to promote breakthroughs in the bio- and circular economy

Professorship

Interdisciplinary research on the transition of research to commercialization

Create and sustain an encouraging research environment for inventions and innovations through disciplinary and interdisciplinary collaboration

Sustainable
Bioproducts
Innovation

Know-how Collaborators

Strategic driving force with practical knowledge and tangible issues to tackle in support of bio- and circular economy development

Industry

Invested in the bioeconomy transformation via portfolio diversification in sustainable textile and packaging

Tech providers/manufacturers

Enablers of the bioeconomy transformation via technology de-risking seeking to deliver sustainable solutions

Research group: Sustainable Bioproducts Innovation

Prof. Luana Dessbesell

Focus areas

- Sustainability via techno-economic and life cycle assessments
- Value chain design for circularity
- Biorefining strategy design
- Textile and packaging applications

Examples of Projects

Sustainability of Lignin added-value applications

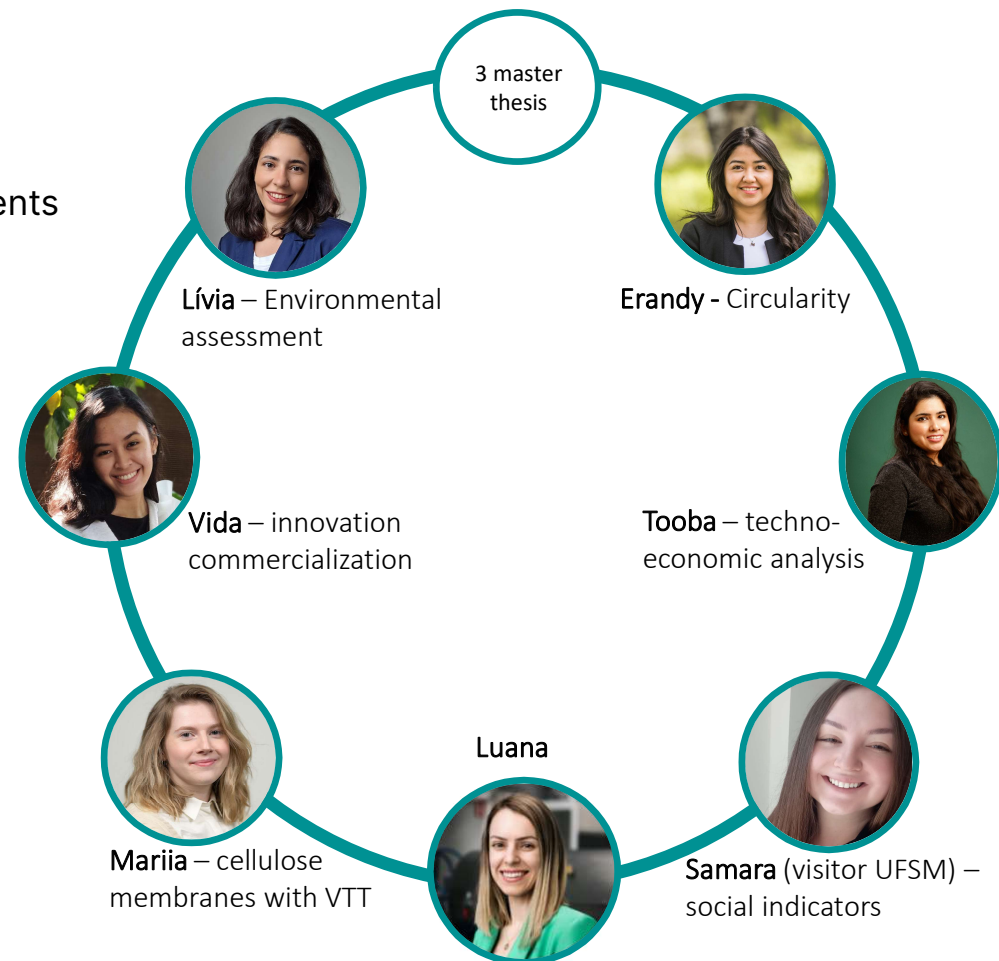
- PI, funded by FinnCERES (0.25M€)

Emissions Free Pulping (EFP)

- Co-PI, Business Finland (0.3M€).

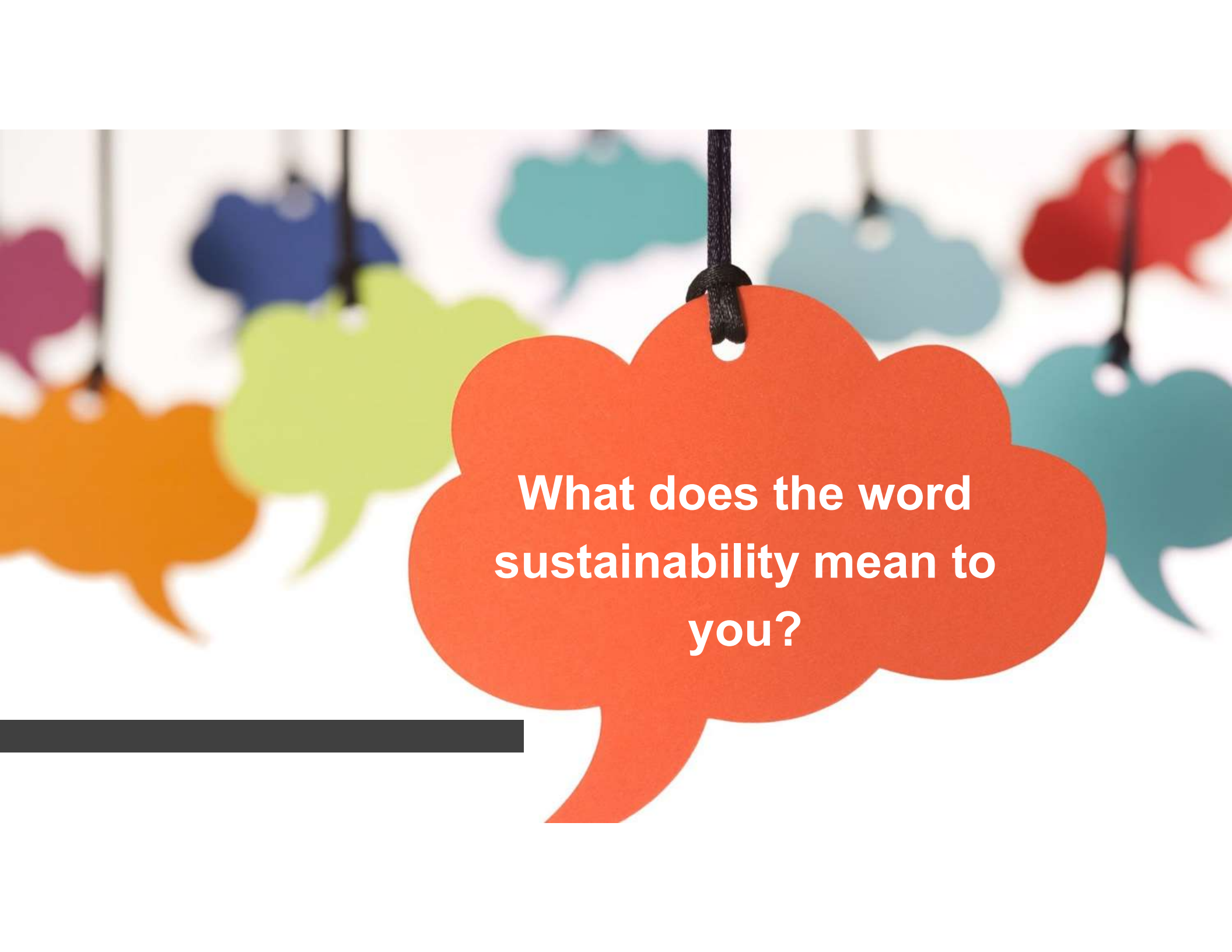
Economic feasibility of textiles from waste streams (CELLFIL)

- Co-PI, HORIZON-CIRCBIO (0.25M€) with 15 consortium members across the EU.





Importance of science-based evidence and translation via sustainability lenses



**What does the word
sustainability mean to
you?**

What is sustainability?

Sustainability dimensions

Techno-centric Concerns

Techno-economic analysis

Socio-centric Concerns

Human capital & social
expectations

Sustainability

We need to live within constraints

Enviro-centric Concerns

Natural resources & ecological capacity

Importance of science-based evidence

Exceptional quality scientific discoveries have exponentially increased; in contrast, the rate of academic scientific externalization (e.g., spin-offs and licensing) is significantly reducing.

Fink, et al. (2017). Nat. Commun.

Park, et al. (2023) Nature.

Academic spin-offs are an important mechanism for sustainable development.

Mihali et al. (2022). Sustainability.

Main challenges reside in the technical complexity, high technology development investment, in demonstrating bioproduct environmental performance and circularity at early stages of R&D.

Maine, et al. (2016). Nat. Mater.

Meramo, et al. (2022). Biotechnol. Biofuels Bioprod.

Holden, et al. (2022). Circ. Econ. Sustain.

Science translation for industry and government remain a challenge. Scientists and decisions makers often speak different 'languages'.

Kano, et al. (2021) Environmental Science and Policy



Sustainability framework for supporting the translation of research to commercialization

Core issue: not enough bioeconomy innovations are becoming a commercial reality

Lack of **technology de-risking** at early-stages

Failure to demonstrate and **communicate sustainability**

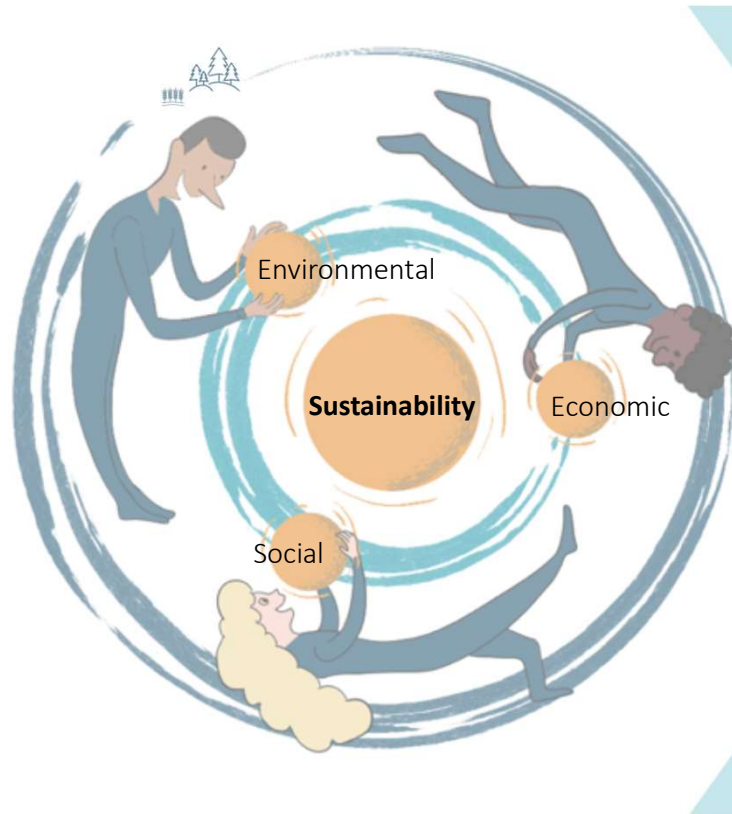
Lack of understanding of the **product lifecycle**

Aversiveness to **implement** new technologies/processes

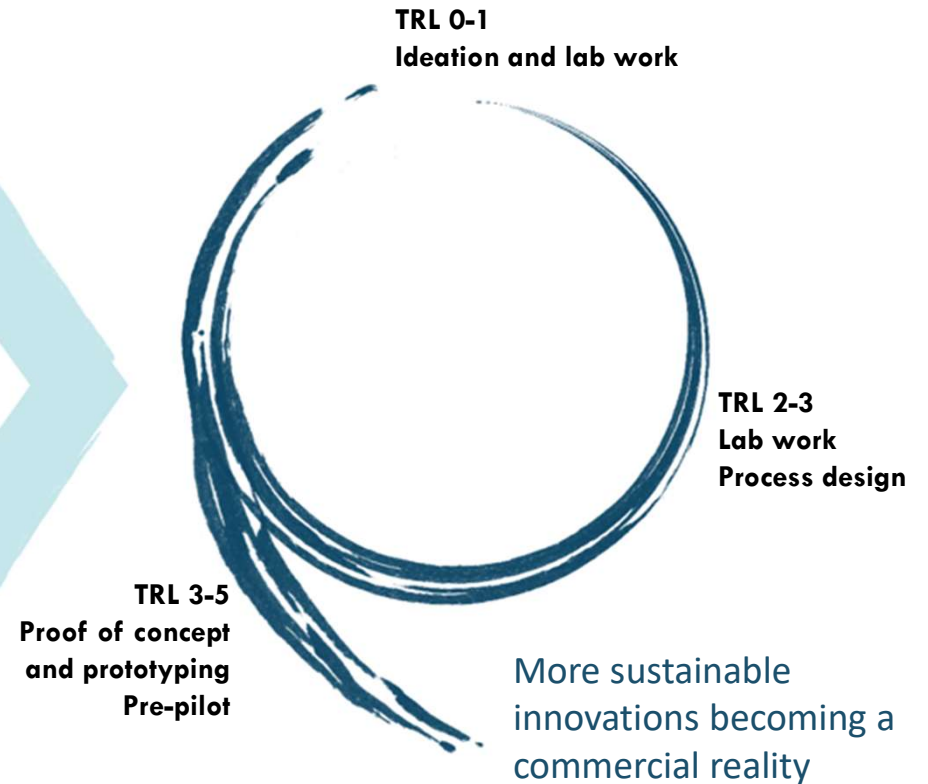


Could we leverage sustainability assessments to improve the science feedback loop?

A bioeconomy value chain needs to consider



Technologies strengthen and enable competitive value chains



Main objectives

1

To provide a comprehensive list of technology development risks and routes for supporting overcoming them.

2

To define and measure **bioproduct circularity** and identify of promising strategies and business models.

3

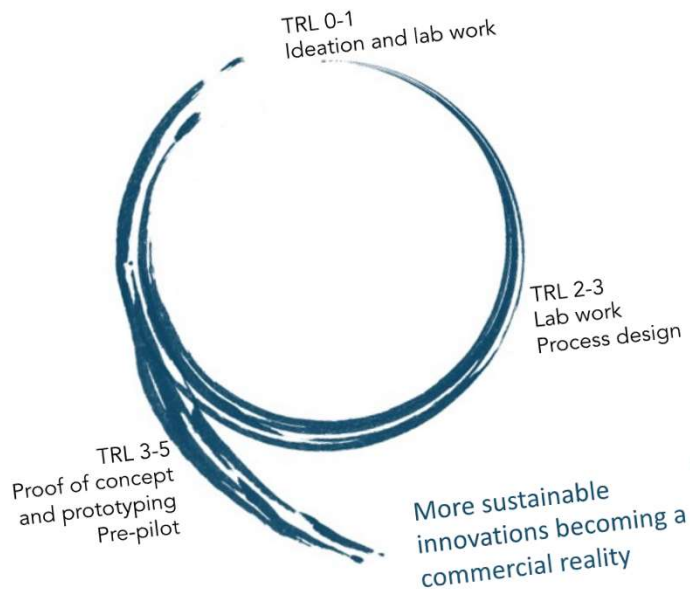
To assess the overall sustainability of bioinnovations proposing **indicators that translate the bioinnovation potential.**

4

To design a framework for accelerating the development and commercialization of sustainable bioproduct innovations.

Research Outcomes

Science feedback loop!



Development of robust sustainability KPIs that take into consideration:

- Techno-economic aspects for early-stage technology accelerated development (e.g., tech de-risking plan, phased-implementation and path to profitability).
- Socio-economic indicators from a value chain perspective considering integration scenarios and circularity potential.
- Environmental assessments adapted for the tech/product (e.g., hand and/or footprint and benchmark-driven research planning).

Hard-Science Translation Framework for Sustainable Bioproducts Innovation

- Provide a systematic tool to gather information, adapt and improve the KPIs for various types of applications in the bioeconomy.



Thank you!

Luana Dessbesell

Assistant Professor
Sustainable Bioproduct Innovations
luana.dessbesell@aalto.fi