DTU RESEARCH PITCHES
Sustainable Product/Service-Systems
A SHORT INTRO TO OUR GROUP

Sustainable Product/Service-Systems

Prof. Tim C. McAloone
• Product/Service Systems
• Sustainable Design Methodology
• Circular Economy
• DTU since 1998
• PhD in ecodesign from Cranfield (1998)
• Mechanical Engineering from Manchester (1993)

Assoc. Prof. Daniela Pigosso
• Sustainabillity Maturity Modelling
• Ecodesign
• Circular Economy
• DTU since 2012
• PhD in ecodesign maturity from USP (2012)
• Environmental Engineering from USP (2008)
SPSS RESEARCH FRAMEWORK

Sustainable Product/Service-Systems

- Business model innovation
- Product/service development
- Value chain
- Manufacturing
- Closing the loop

readiness
process maturity
results

leading
lagging

TBL
SPSS RESEARCH FRAMEWORK

MATChE – Making the Transition to Circular Economy

- Business model innovation
- Product/service development
- Value chain
- Manufacturing
- Closing the loop

readiness  process maturity  results

lagging

leading

TBL
MATChE
Making the transition towards Circular Economy

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The Situation

How do we get here and what should we prioritize first?

The project focuses on enhancing companies’ readiness and ability to adapt to a circular economy thinking and operation model.

MANUFACTURING COMPANIES

BENEFITS OF CIRCULAR ECONOMY

- Economic benefits
- Maximize value of resources
- Minimize environmental impacts

… So companies can reap the benefits of the circular economy
The project focuses on enhancing companies’ readiness and ability to adapt to a circular economy thinking and operation model.

But the companies lack overview of what is needed to transition, and where to focus their initiatives based on their current situation.

... So companies can reap the benefits of the circular economy.

**MANUFACTURING COMPANIES**

**PATHWAYS TO CIRCULARITY**

**BENEFITS OF CIRCULAR ECONOMY**

- Economic benefits
- Maximize value of resources
- Minimize environmental impacts
It offers an innovative method of assessing readiness to the circular economy, with tailored assistance to the transition process.

my.matche.dk
Effective transition towards CE

**Readiness assessment**
- Prioritized dimensions

**Tools & expertise**
- Strategic opportunities

**New readiness assessment**
- Implementing initiatives

**PROCESS**

- Enhanced knowledge in the readiness of at least 100 Danish manufacturing companies across eight dimensions
- Circular economy readiness pattern identification based on readiness and benchmarking data across and within industry sectors.
- Insights in effective transition routes backed by 10-15 new industry examples selected based on their readiness profile.

**OUTPUT**

... regarding sectors  ... regarding dimensions  ... regarding geography
SPSS research framework

CIRCit Norden – sustainability screening

Business model innovation  Product/service development  Value chain  Manufacturing  Closing the loop

Leading  Lagging

TBL
Sustainability Screening Framework of Circular Economy Initiative implementation

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Circular Economy

Business Model: subscription services, pay-for-performance, ...

Product Development: use of circular materials, design for ...

Manufacturing

Product In use: predictive maintenance, ...

Closing the loop: repair options, remanufacturing, recycling, ...
Circular Economy

- Business Model: subscription services, pay-for-performance, ...
- Product Development: use of circular materials, design for ...
- Manufacturing
- Product In use: predictive maintenance, ...
- Closing the loop: repair options, remanufacturing, recycling, ...

Sustainability

- How do the decision makers in a company >>
- decide which Circular Economy Initiative is worth pursuing sustainability-wise?
- know whether the proposed Circular Economy initiative is “good as it is” or needs to be further improved?
- monitor and measure to what extent has the implemented Circular initiative actually contributed to sustainability?
Sustainability screening framework of Circular Economy Initiative implementation

Research goal:

Conceptualize, develop, validate and implement a framework to assess the potential sustainability contribution of Circular Economy initiatives by

Set of KPIs

Sustainability dimensions

Specific business processes and Circular Economy Initiatives
Sustainability screening framework

- to provide decision-makers with **assistance in choosing** which Circular Economy initiatives should or should not be implemented, in order to ensure their contribution to **sustainability in both a short- and a long-term perspective**

A database of > 300 KPIs

**A step-by-step guide for KPI selection and sustainability scanning procedure**

**Contribution**

- Propose new KPIs (social, business)
- Test the framework in companies
- Enhance guidelines with decision trees for better guidance

**Future improvements**
Design and development of value chains for circular economy

Fenna Blomsma
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Value chain for circular economy
Value chain for circular economy

Explore, conceptualise and develop

CE inventory & analysis
Stakeholder value mapping
Determine next steps internal & external engagement

Depending on level and number of stakeholders engaged

Detail

Aligning interests across VC incentives, contracting, etc

Engagement series 01
Possible iterations t.b.c. in collaboration
Engagement series 02
SPSS research framework

**CIRCit Norden – Circular Business Model Innovation**
SPSS research framework

Green Fiber Bottle

- Business model innovation
- Product/service development
- Value chain
- Manufacturing
- Closing the loop

readiness

process maturity

results

lagging

leading

TBL
Supporting the use of quantitative LCA for ecodesign in dual innovation projects

Ellen Brilhuis-Meijer
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LCA for ecodesign in dual innovation

Identify improvement opportunities

Prioritize efforts

Reduce the impact before it happens

Uncertainty

Scaling up
LCA for ecodesign in dual innovation

Opportunity for significant changes

Large design freedom

High uncertainty about final result

Effects after introduction hard to predict
Case study: Green Fiber Bottle
SPSS research framework

AIM4CE – Service-based circular business models

Business model innovation
Product/service development
Value chain
Manufacturing
Closing the loop

leading
lagging

TBL
AIM4CE: Service-based circular business models: co-creating mobility disruption

Nicklas Christian Funk
ncfunk@mek.dtu.dk
“Service-based circular business models: co-creating mobility disruption”
The approach

- Business model opportunities
- Environmental assessment
- Economic assessment
- Readiness for partnerships and roadmap

Sustainable Pathways

circular business models
The challenges and opportunities

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<tr>
<td><strong>Develop a clear value proposition for engaging in a PSS</strong></td>
<td><strong>Aligning interests with a shared value proposition</strong></td>
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<td>Identification of technical and data needs for product performance monitoring</td>
<td>Building a win-win business relationship and the service component</td>
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<td>Managing assets and material flows</td>
<td>Digitalization enabling open and honest data sharing</td>
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<td>Infrastructure and service support for take-back and remanufacturing</td>
<td>Closing the loop and reducing the environmental impact</td>
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<td>Service-contracts and reality</td>
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Our ultimate goal: Develop a robust co-creation and feasibility evaluation approach that can allow for the servitisation of key players in the mobility industry.
SPSS research framework