Sustainability driven product development – some challenges and opportunities for aero industry

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Presentation

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- Sustainable Product Innovation
- PhD-thesis: A Foundation for Sustainable Product Development
- Post-doc at Volvo Aero: Implementation of sustainability aspects in the product innovation process

Blekinge Institute of Technology

- Sweden’s most distinctly profiled institute of technology
- Sustainable Assessments Group
Sustainability driven product development
– some challenges and opportunities for aero industry

Outline

• What is sustainability driven product development?
• Why important?
• How could it be improved?
• How is it now?
• Some challenges and opportunities for aero industry
• Summary and recommendations
What is sustainability driven product development?

• Is it about participating in European research projects - like Clean Sky?

• Is it about developing a new product concept to reduce the environmental load?

• Is it about investigating a more efficient use of the product?
What is sustainability driven product development?

It can be defined as:

- Strategic product-service system development towards a well defined sustainability goal.

This means to have:

- processes, methods and tools to systematically include sustainability aspects in the daily decisions, both for tactical short- and strategic long term perspectives.
What are the development steps for sustainability driven product development?

**PAST**
- Environmental Reports
- CSR Reports, ISO 14001

**NOW**
- Environmental & CSR Reports, ISO 14001
- Assessment tools and standard lists

**FUTURE**
- Reports, Assessment tools
- ISO 14001 and standard lists
- Sust. aspects implemented
- Product Innovation Process

Sustainability driven product development
Product Innovation Process

Formulating goals and strategies

Generating and selecting ideas

New Business Ideas

Product designing

Product Design

Production

Distribution and sale

Use

Production development

Production Plan

Marketing planning

Marketing Plan

Policy Formation

Idea Finding

Product Planning

Strict Development

Product Development

Realization

Innovation

Roozenburg and Eekels 1995
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Why important?

Growing global sustainability problems and product contributions to the sustainability problems
Why important?

Resource Funnel:

- Climate change
- Soil erosion
- Species extinction
- Increasing population
- Increasing polarization
- ...

TIME
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How could it be improved?

Sustainability driven product development:
- Strategic product-service system development towards a well defined sustainability goal.

This means to have processes, methods and tools to systematically include sustainability aspects in the daily decisions, both for tactical short- and strategic long term perspectives.
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How is it now?

- Economical
  "Be profitable"
- Ecological
  "Global facts"
- Social
  "Responsibility – customer values"
How is it now?

New design
New fuels
New flight routes
High reliability
Lightweight
Environmental aspects
Material extraction
Component scrapping
Full life cycle responsibility
Emission reduction
Noise reduction
Competitive at the market
Social aspects
Economical
Ecological
Economic
Eco
Environmental
Social
Full life cycle
How is it now?
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Some challenges and opportunities for aero industry?

Results based on in-depth interview studies at Volvo Aero:

- **Aware of that a change is slow**
  - A whole network of companies has to move in the same direction simultaneously

- **An overview is necessary to avoid sub-optimization**
  - A joint initiative to collaborate between companies developing aircraft is necessary. Current focus should be a flexible platform for the next focus
Some challenges and opportunities for aero industry?

- Improved efficiency in the product innovation process is possible
  - Identify the sustainability features early
  - Consider these sustainability features with the same importance as other features in the product development process
  - Purchasers/buyers should be involved earlier in the concept- and product development phases
  - Consider to use more recycled materials
  - Use the work from the Environmental Impact Assessments more systematically to increase the knowledge in later projects
Some challenges and opportunities for aero industry?

- Use the advantage of high competence in-house:
  - Volvo Aero has a tradition to build up competence and knowledge within the company
  - Part of a proactive corporation like AB Volvo
  - Key is to identify situations where sustainable improvements are aligned with business advantages
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• Why important?

• How should it happen?

• Some challenges and opportunities for aero industry?

• Summary and recommendations
Summary and recommendations

• Collaborate with stakeholders in the value chain even more

• Simulate the sustainability consequences over time

• Introduce improvement measures in the product innovation process
  - Identify sustainability features early
  - Consider sustainability features with the same importance as other features
  - Introduce purchasers/buyers in the decisions in the early concept phase
  - Investigate if more recycled material (metals) can be used
  - Use the EIA results more systematically to increase knowledge in future projects

• Tools and methods, based on backcasting and a framework for strategic sustainable development, can be used as support
Backcasting

A PLANNING METHODOLOGY OF “BACKCASTING” BASED ON SUSTAINABILITY PRINCIPLES

1. Begin with the end in mind
2. Move backwards from the vision to the present
3. Move step by step towards the vision
Framework for Strategic Sustainable Development
A shared language for understanding sustainability, planning and decision making.

**A FIVE LEVEL MODEL FOR PLANNING IN COMPLEX SYSTEMS**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems level</td>
<td>The system with the organization, within society within nature, thermodynamics, biogeochemical, ...</td>
</tr>
<tr>
<td>Success level</td>
<td>Overall principles for organization, social and ecological sustainability</td>
</tr>
<tr>
<td>Strategic level</td>
<td>The strategic guidelines for selecting and prioritizing actions that lead to success</td>
</tr>
<tr>
<td>Actions level</td>
<td>Actions planned and carried out in line with the strategic guidelines</td>
</tr>
<tr>
<td>Tools level</td>
<td>The methods &amp; tools used to support all of the above</td>
</tr>
</tbody>
</table>

**SCIENTIFIC PRINCIPLES FOR SOCIO ECOLOGICAL SUSTAINABILITY**

In a sustainable society, nature is not subject to systematically increasing...

- Concentrations of substances extracted from the Earth’s crust,
- Concentrations of substances produced by society,
- Degradation by physical means, and, in that society...
- People are not subject to conditions that systematically undermine their capacity to meet their needs.

**A PLANNING METHODOLOGY OF “BACKCASTING” BASED ON THE SUSTAINABILITY PRINCIPLES**

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**ABCD PROCESS TO INCORPORATE BACKCASTING AT STRATEGIC LEVEL**

- Awareness
- Baseline
- Creative Solutions
- Decide on Priorities

Does it move us in the right direction?
Is it a flexible platform?
Is it a good return on investment?
Thank you for your attention!