



Sustainability in PPE: addressing the
challenges through standardization
18th March 2021 - 9:30 to 16:00

Welcome to the Breakout Session 1A: General aspects and business models!

We will start soon

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Your moderators

Andreas Schumacher

Board Member, Small Business Standards (SBS)



Valeria Botta

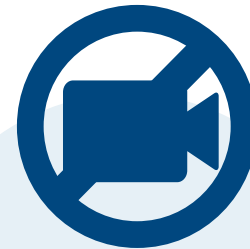
Programme Manager, European Environmental Citizen's Organisation for Standardisation (ECOS)



House Rules



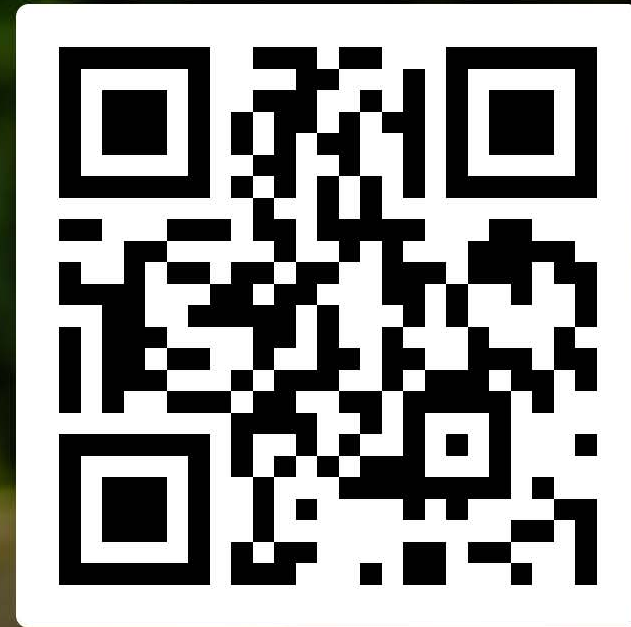
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1A: General aspects and business models


Carl Dalhammer Associate Professor, International Institute for Industrial Environmental Economics, University of Lund

Gilda Santos CITEVE - Technological Centre for the Textile and Clothing Industries of Portugal

Marie Mawe Sustainability Stakeholder Engagement Director for Gore Fabrics Division, W. L. Gore & Associates Inc.

Rahel Krause and Lars Wollert M.Sc.; Institut für Textiltechnik of RWTH Aachen University





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European Standardization Organizations

The circular economy – business and policy challenges

Carl Dalhammer

Associate Professor, International Institute for Industrial Environmental Economics, University of Lund

Circular Business models



Bioeconomy

New products and markets (e.g. wood construction, biobased plastics & products, biorefineries, wood-based textiles), industrial ecology in supply chains etc.



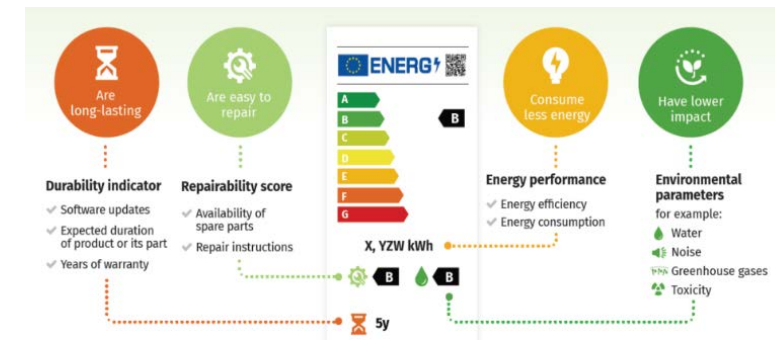
Manufacturing

Remanufacturing, repair, re-use, sharing & renting (cars, tools etc.), PSS & functional sales, recycling modular design, design for durability & repair, digitalization, electrification, automation, recycling etc.



Need for policies & standards

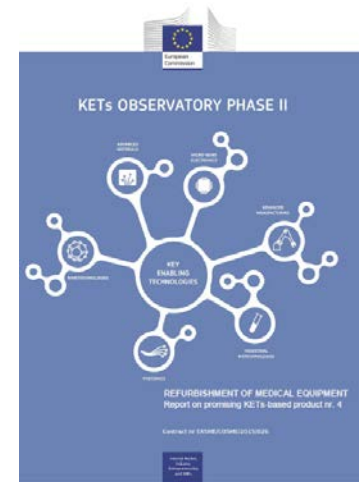
- Circular business models need support - governmental policies!
- Important policies are ecodesign laws, waste laws, rules on chemicals in products and materials, labeling, and public procurement
- Standardization is also very important
 - Product durability and testing standards
 - Product 'repairability' and 'recyclability'
 - Components and materials (e.g. EV batteries, plastics)
 - Interoperability of products and systems



Source: ECOS www.ecostandard.org

'Circular' healthcare: examples and potential

- Remanufacturing of medical equipment is already a big business, and could grow even more
 - Supports healthcare in developing countries
- Several examples of toxic-free products (e g PVC-free)
- Materials: Some examples of products made of bio based plastics
 - One example concerns medical aprons made of biobased polymers
- Significant potential for multiple-use products
 - PPE, textiles, some equipment like catheter insertion kits
 - Less suitable for some products



Realizing the potential requires political will and expertize (LCA, markets, regulation, innovation processes etc.)

Tack så mycket! Thank you! Merci! Danke schön!

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- **Greening the Economy: Lessons from Scandinavia**
How can we live a good life on one planet with over seven billion people?
- **Greening the Economy: Sustainable Cities**
How can we shape our urban development towards sustainable and prosperous futures?
- **Circular Economy: Sustainable Materials Management**
How can we create a circular economy through sustainable materials management?
- **Urban Nature: Connecting Cities, Nature and Innovations**
How can we work with nature to design and build our cities?
- **Sharing Cities: Governance and Urban Sustainability**
How can we govern the sharing economy in our cities?





Sustainability in PPE: addressing the
challenges through standardization

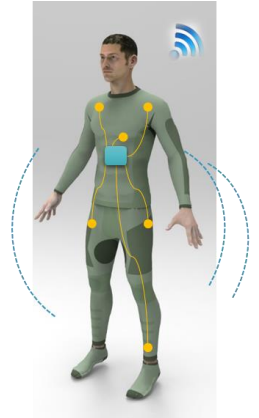
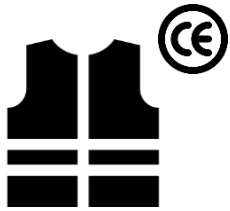
18th March 2021 - 9:30 to 16:00

Sustainable PPE – what does this really mean?

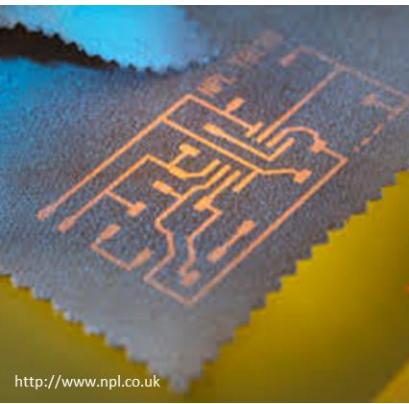
Gilda Santos
gsantos@citeve.pt



PPE/PPS | Smart PPE/PPS?



Smart PPE/PPS are even more complex and challenging ...

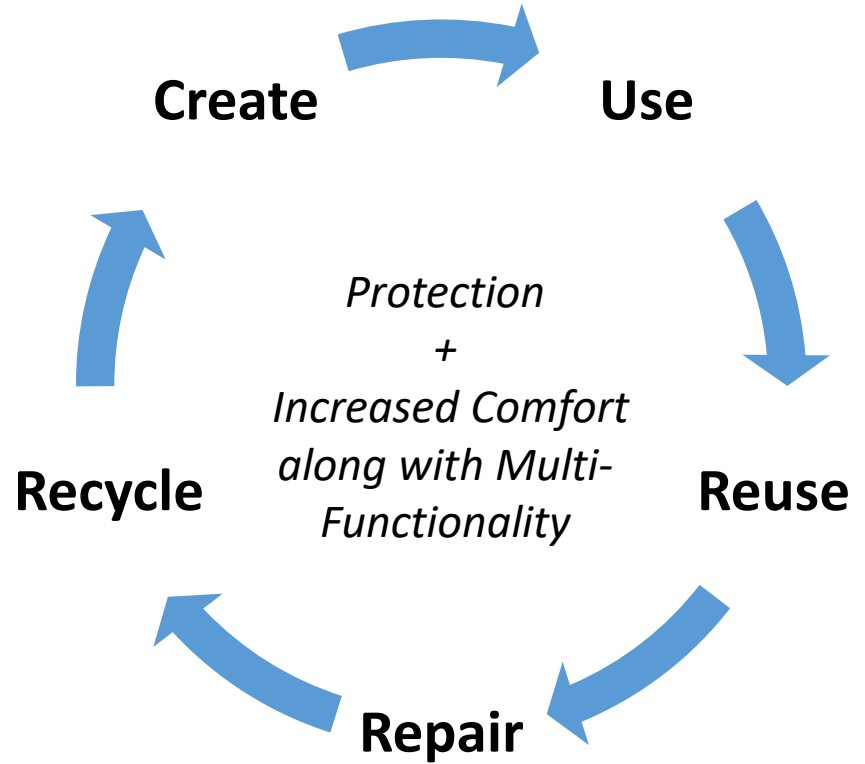




Sustainable PPE/PPS | Smart PPE/PPS?



Producing & using sustainably is about living with the means of our natural systems...



“development that meets the needs of the present without compromising the ability of future generations to meet their own needs” by the 1987 Bruntland Commission Report

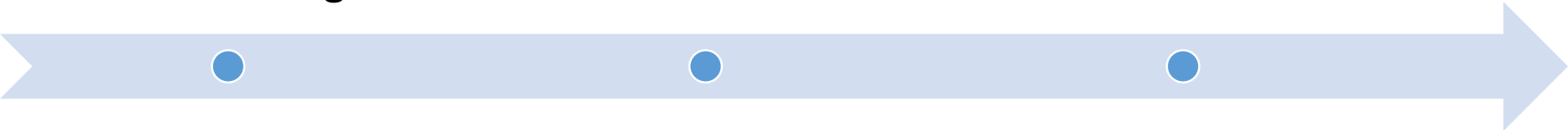


Sustainable PPE/PPS | Smart PPE/PPS?



Circular design

Circular behaviour



Circular business
model



The challenge



Manufacturing/Supply chain process

Idea/
Concept



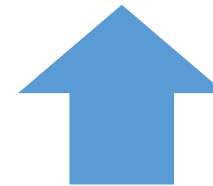
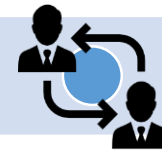
R & D

Manufacturing

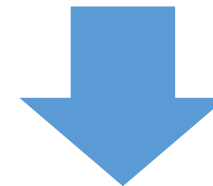


Testing/
Certification

Market/
Sales



Transportation
& logistics



Customer use
& disposal



Circular & Digital Bioeconomics

End-user needs	Sustainable & circular design	Digitization & Industry 4.0	IoT functionalities & applications	Key interdisciplinary technologies
Recovered vs virgin materials	Innovative raw materials sources	Materials engineered to biodegrade	Product & Technology validation	Product & process certification
Technical testing protocols & methods	Management Systems Maturity Assessment tools	Life cycle assessment & sustainability metrics	Cleaning & maintenance	End-user engagement
Responsible consumption & production	Recyclability	Transparency & competition	Circular business models	...

- **Barriers/challenges ...**
...but also opportunities!

- **Circular and Digital Bioeconomics**

 - Transition & Sustainable Development**

 - a sound institutional boost

 - a strong stakeholders' response

Thank you for your attention!

Gilda Santos

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MISSING LINK IN MEASURING SUSTAINABILITY OF PPE

Marie Måwe
Sustainability Stakeholder Engagement
Fabrics Division
W.L. Gore & Associates

March 18, 2021

Together, improving life

Missing Link in Measuring Sustainability of PPE

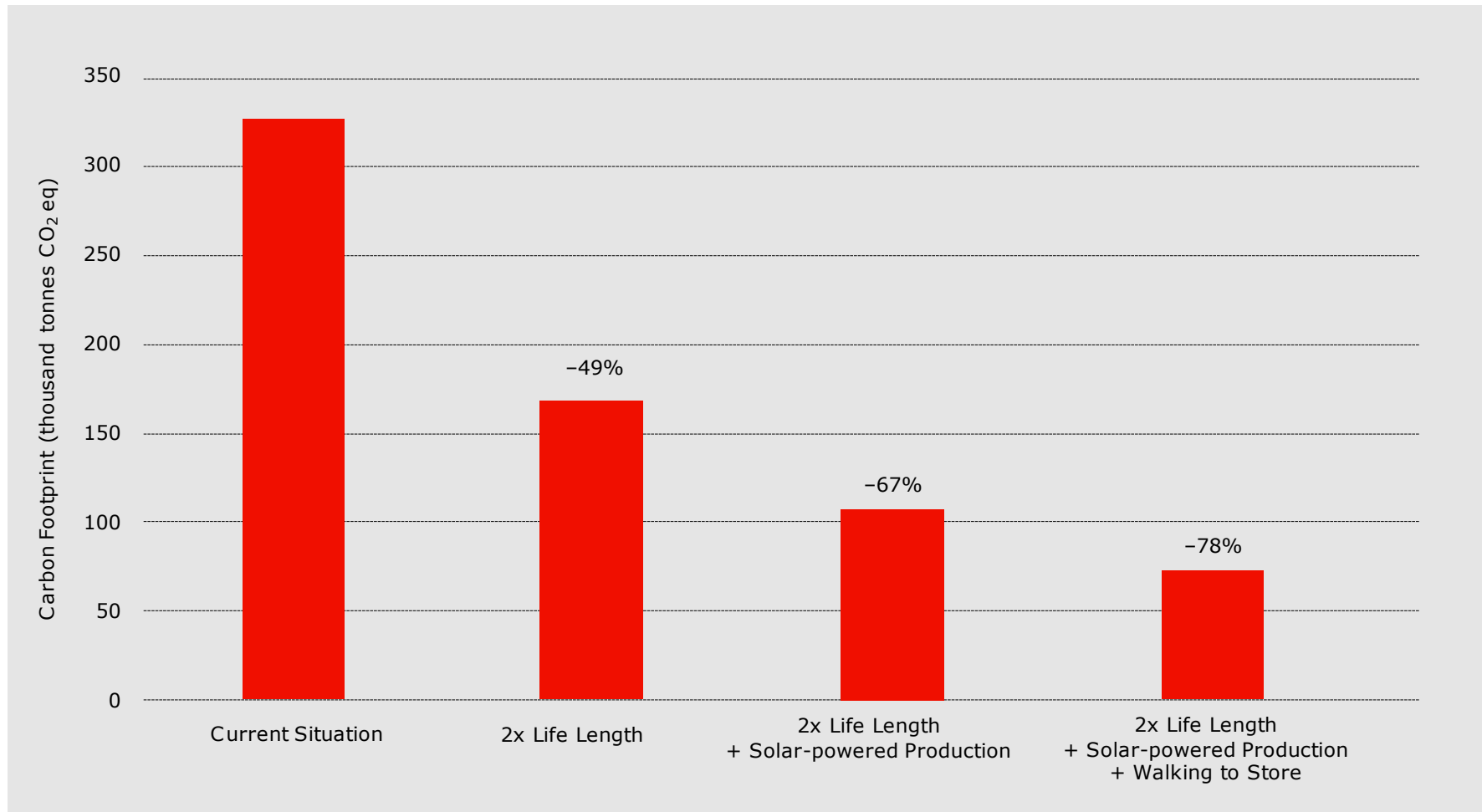


OPTIMIZED BALANCE OF COMFORT, PROTECTION AND SUSTAINABILITY IN THE FIELD

Our Sustainability Principles: Science – Transparency – Cooperation



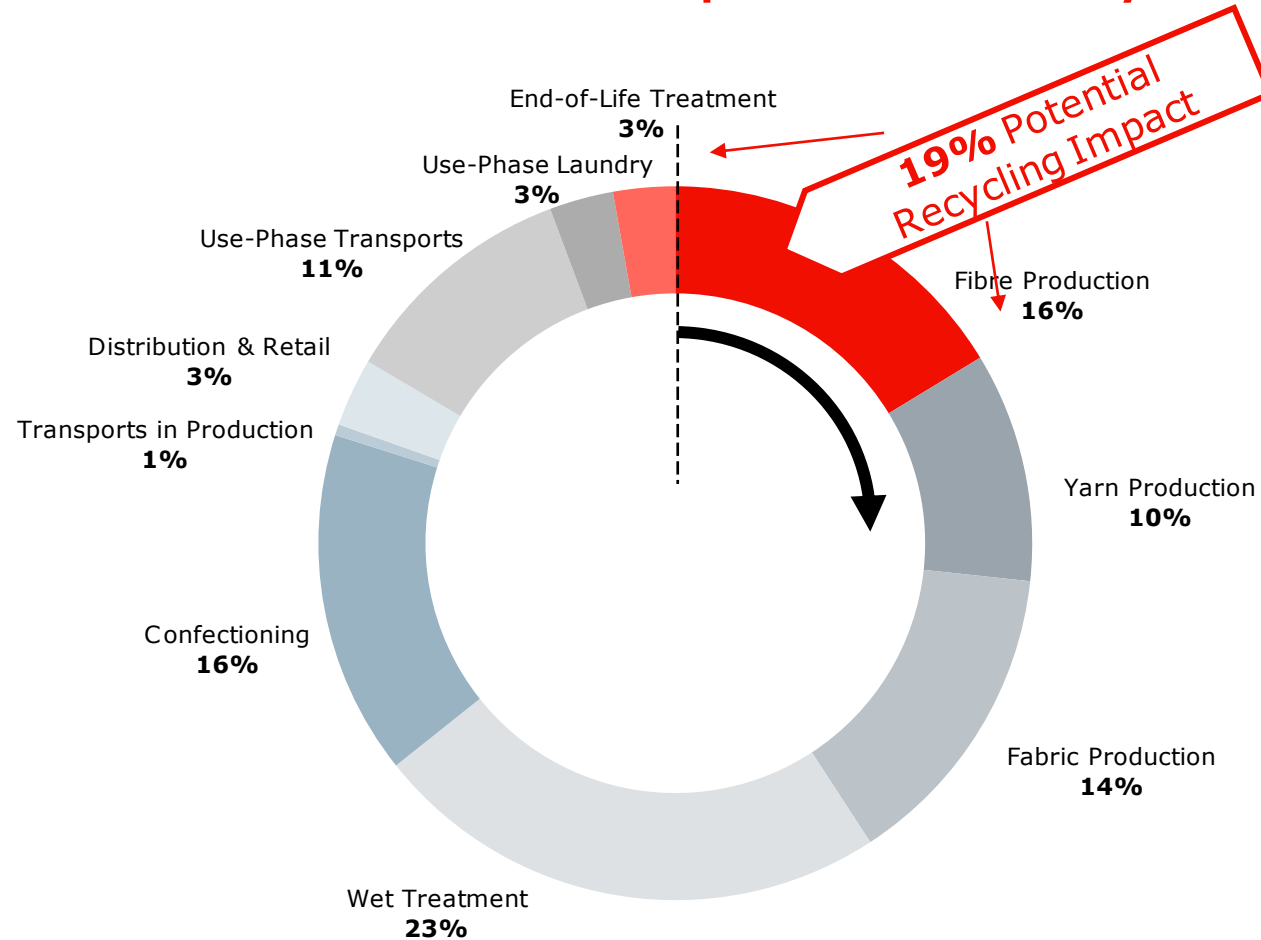
Climate Impact of Long Product Life



- Longer Use is the single most important factor to lower climate impact

Source: Sandin G. et al.(2019); "Environmental assessment of Swedish clothing consumption"; Mistra Future Fashion Report; RISE.

Potential Climate Impact of Recycling



- Recycling is desirable, but if it reduces product lifetime it may be counterproductive

Source for graph and data (conclusions made by Gore): Sandin G. et al.(2019); "Environmental assessment of Swedish clothing consumption"; Mistra Future Fashion Report; RISE.

Climate Impact (CO₂ eq) of Swedish Clothing Consumption, Contribution of Lfe-Cycle Phases

Sustainability Benefits of Durability

Adding the Lifetime Aspect to Sustainability Assessments

- Durably performing products enable lower environmental impact over time
- Durable products support Circular Business Models:
 - Increased number of rental circles and hence income
 - Increased value and options of resale
 - Repair and service “worth the effort”
 - Typically higher quality outcome of mechanical recycling

PROBLEM:

No common standard for assessing relative lifetime of PPE exists

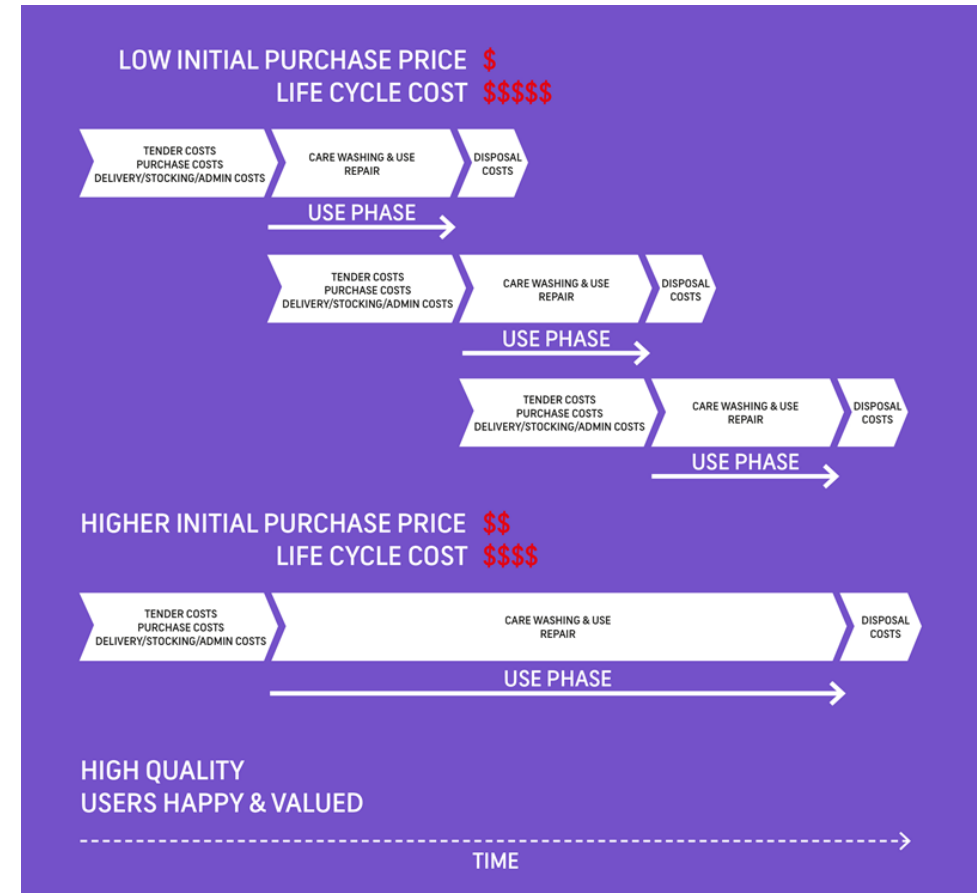


The Missing Link - a Garment Durability Standard

For Sustainability and Life Cycle Costing Calculations for PPE

A Durability Measurement Standard would enable:

- Improved sustainability calculations, by adding the lifetime factor
- Independent comparability of product lifetime
 - will empower end users, circular businesses and public purchasers to make informed choices
- Using Life Cycle Costing calculations:
 - proper assessment enables saves on the environmental footprint but also on financial costs
- Regulatory incentives for long lived products

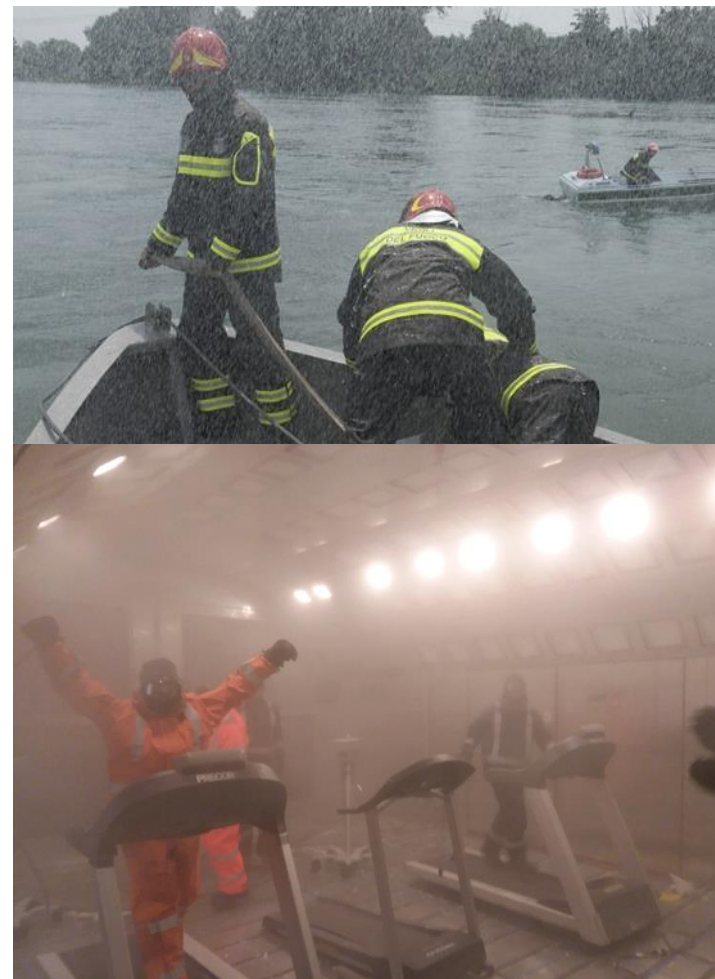


The Way Forward?

Cooperate to Get to an Independent Standard

Suggested Method Steps:

- Starting from „Failure Modes“ identification
 - Analyse used products from end-users or field tests
 - Depending on product type and intended use: when and why does it fail?
- Translating into lab replication
 - Leverage, modify, or combine relevant existing test standards
 - Identify any missing test standard needs
 - Identify relevant testing ranges / benchmarks
- Relative lifetime differences can be assessed by using product specific combinations of durability tests



GORE-TEX
BRAND

Thank You!

mmawe@wlgore.com



PPE and Sustainability at ITA



Rahel Krause, Lars Wollert, Thomas Gries
PPE Sector Forum - Sustainability in PPE
18.03.2021

Textile PPE Products



2

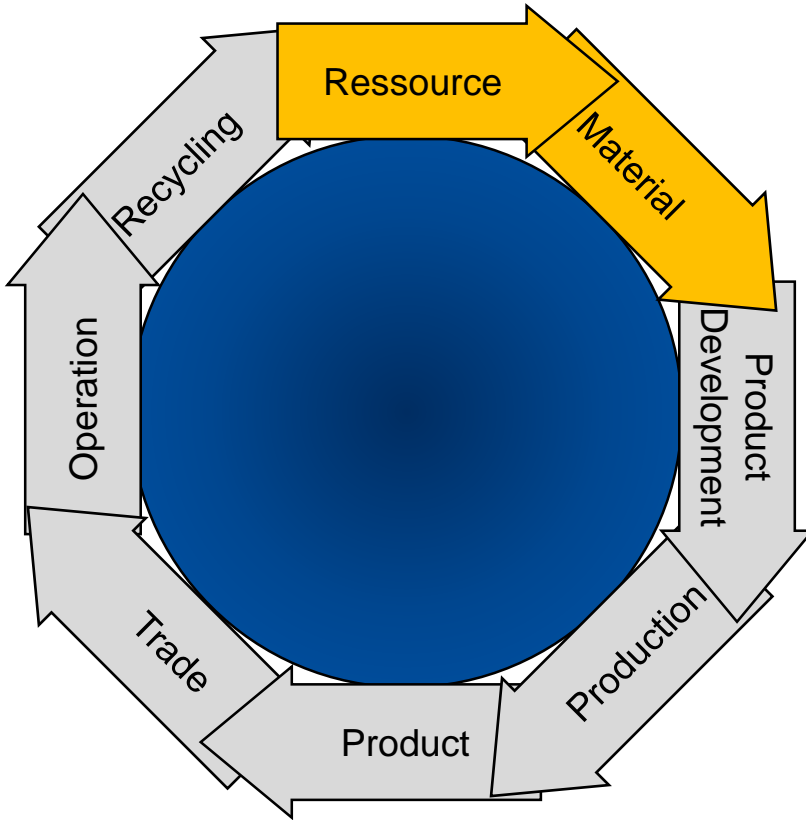
¹ www.bornack.de

² www.upperhand.co

³ www.safeguardclothing.com

⁴ www.pixabay.com

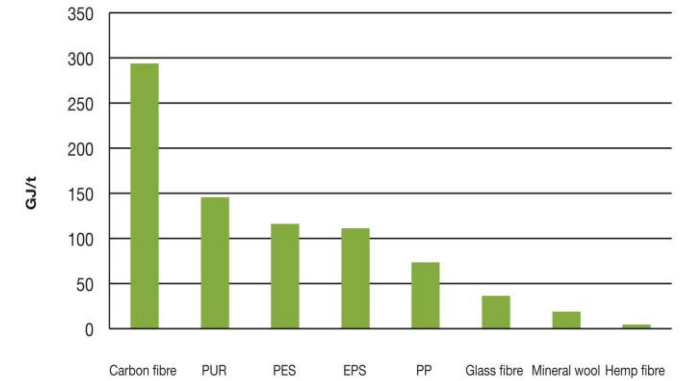
Product Life Cycle



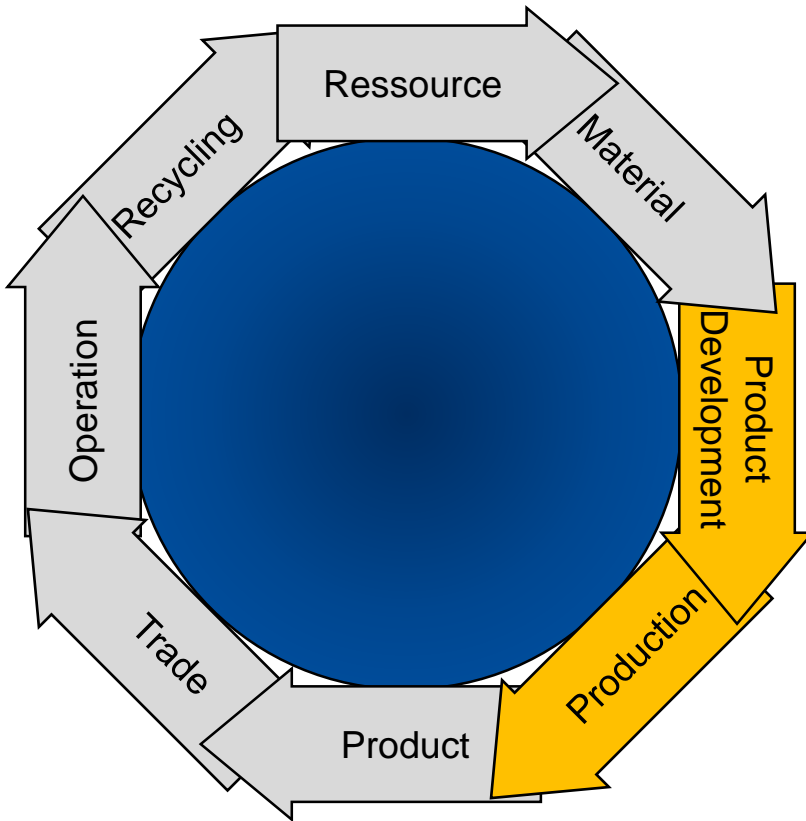
- Ressource:
 - Bio based, biodegradable
- Material:
 - Mono-material



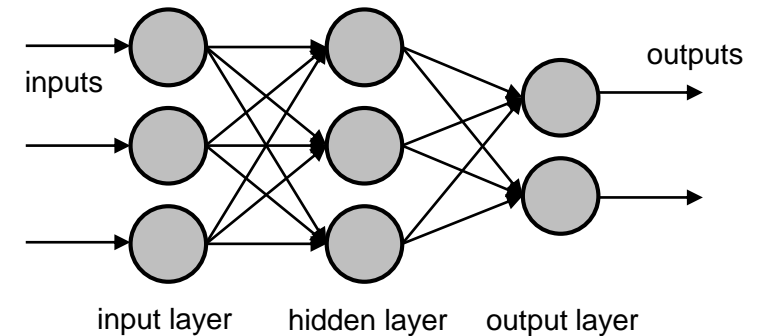
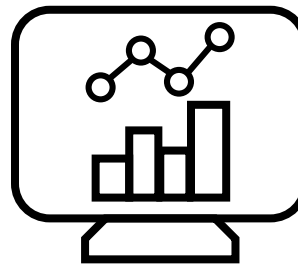
Primary energy demand



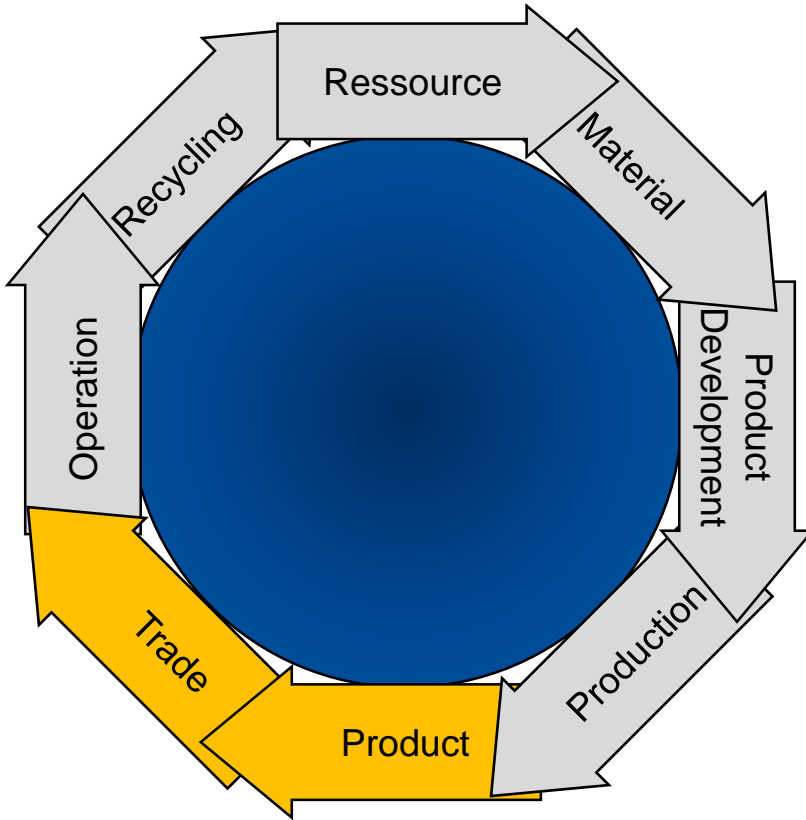
Product Life Cycle



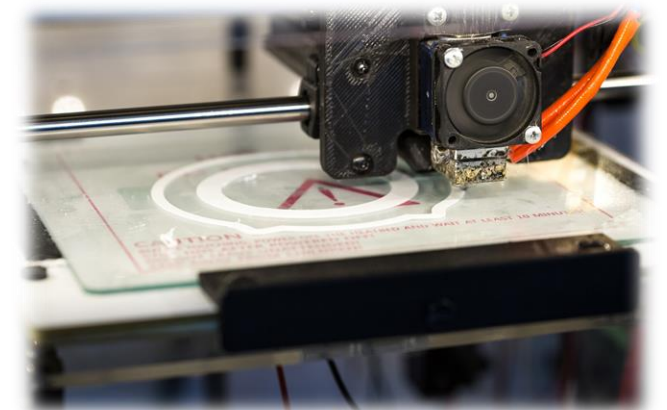
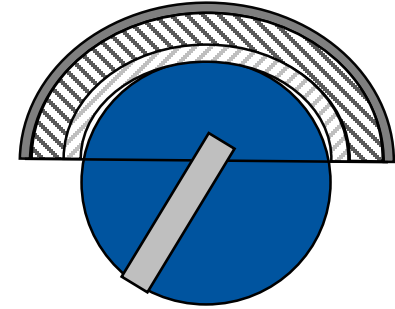
- Product development:
 - Digitally supported
- Production:
 - On demand production, efficient processes
 - I4.0



Product Life Cycle

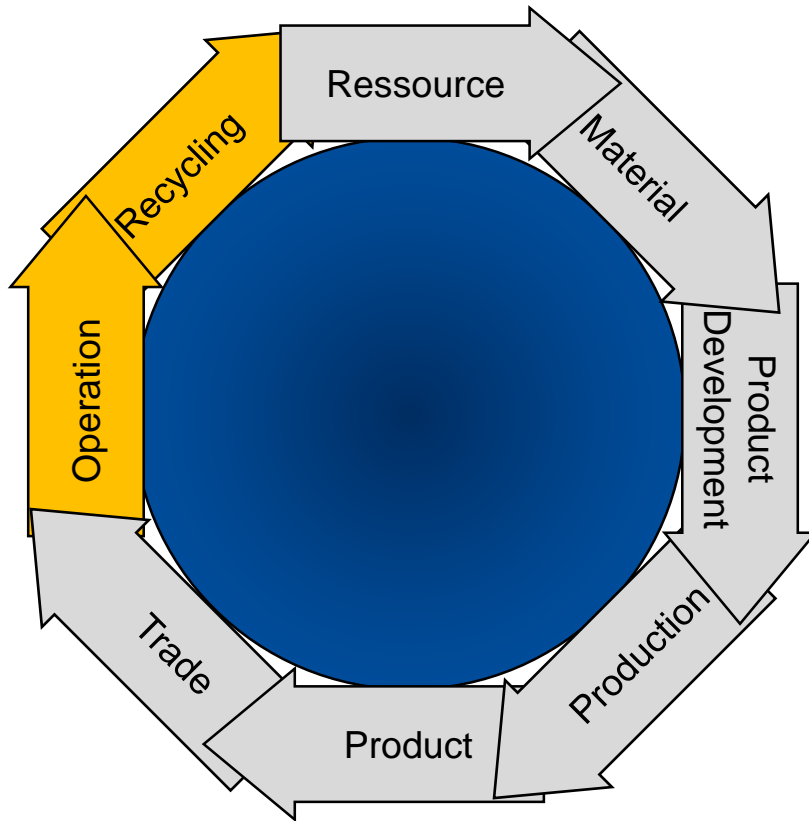


- Product:
 - Efficient design
 - Modular design
- Trade:
 - Local production

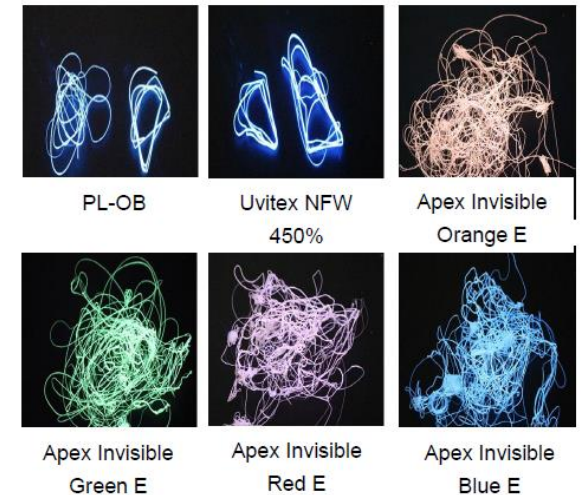
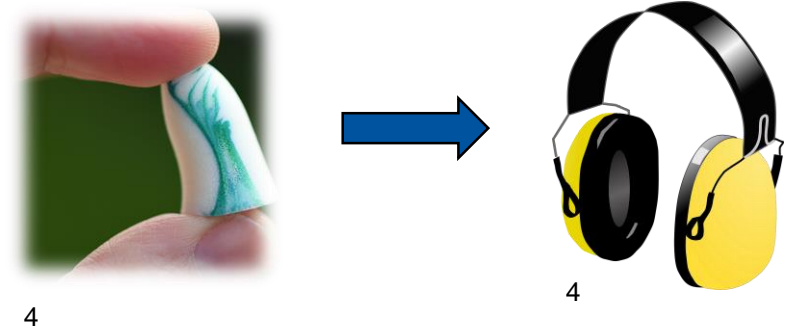


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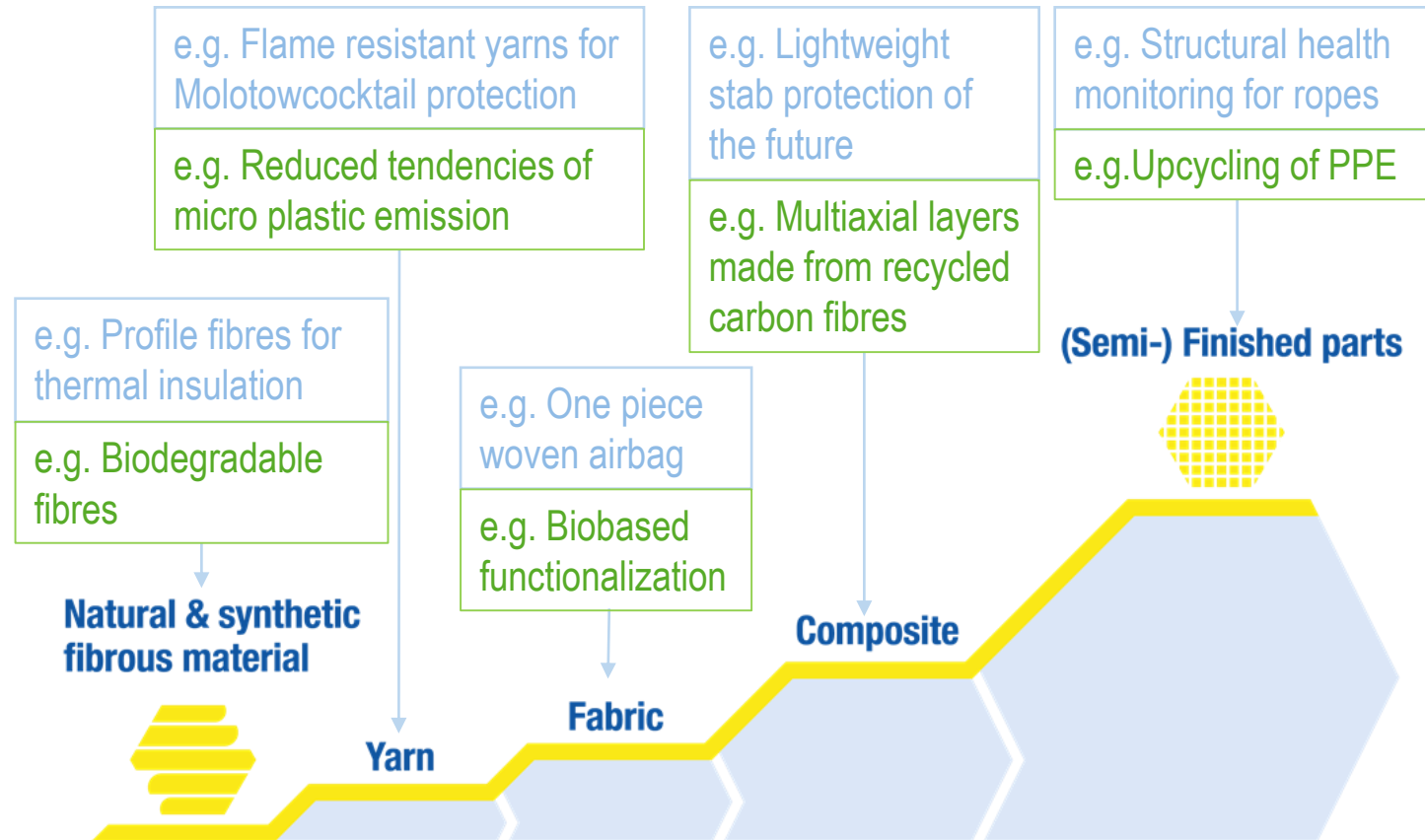
Product Life Cycle



- Operation:
 - Durability
 - Multi use
 - Easy reparable
- Recycling
 - Circular economy
 - Infrastructure
 - Upcycling



PPE and Sustainability along the Textile Value Chain



Determine needs

Creating innovations

Market launch

Projects and Networks

- ZIM cooperation network “ReNewTex”

- Topics

- Information transparency
- Decentralised recycling networks



- Examination rooms

- Carpets
- Clothing
- **PPE**

- German-French ZIM network “InnoPPE”

- Topics

- Innovative PPE
- Manufacturing 4.0
- Sustainability in PPE
- Circular Economy



Your contact:

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Lars Wollert, M.Sc.

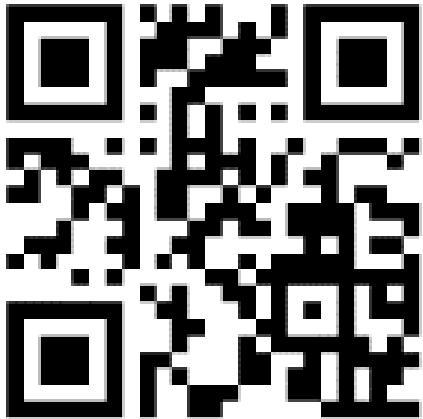
Lars.wollert@ita.rwth-aachen.de

**Thank you
for your attention!**

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Discussion



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What's next?

13:15 - 15:15

Showcase of developments, experiences and concerns with standards

13:15 - 14:10

- 1A: General aspects and business models
- 1B: International views on sustainability and global resources
- 1C: Procurement and user needs

Change of sessions

14:20 - 15:15

- 2A: Design of garments facilitating repair, maintenance and recycling
- 2B: Choices and recycling of materials
- 2C: Experiences with different types of PPE



Please check your confirmation email for your choice of parallel session 2



Links to rooms will be published in the chat. Make sure to close this room before moving to the next

See you at the next session. Thank you!

