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BIOTEXFUTURE
TRANSITION LAB

BASELINE FOR A SCENARIO APPROACH TOWARDS A BIO-BASED TEXTILE ECONOMY

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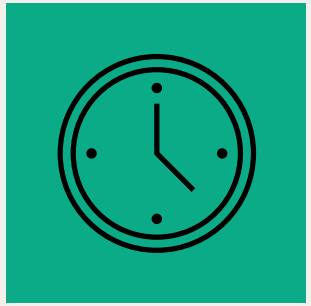
SCOPE OF THIS STUDY

- **Interviews were conducted with fashion and/or bioeconomy experts from the following types of organisations:**
  - 4 NGO & Foundations
  - 5 Science (incl. R&D)
  - 4 Company
  - 1 Fashion Brand

- **The aim of this study is to summarise and consolidate the opinions and assessments of experts on bottle necks and barriers to a bio-based future specificly for:**
- Sustainable Transformation
- Regulation

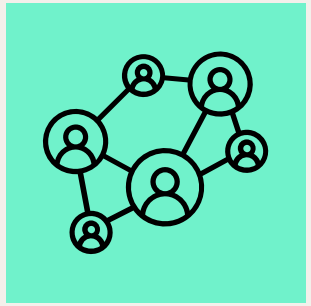
DATA

14 expert interviews:



TIMEFRAME

04.2022 – 10.2023



AIM

summarise and consolidate expert opinions

METHOD

Qualitative Content Analysis

EXPERT INTERVIEWS – KEY LEARNINGS

Circulation and circular economy

Three different levels of discussion were identified:

Within a cycle, the focus is on *responsibility and behavioural change*;

in *different cycles or across cycles*, the focus is on system change and

mixed forms of cycles, the focus is on the technological innovations at the material level

Regulation is a necessity

Regulation is necessary because it works, it builds trust, and it gives direction (but is usually too slow to be established)

Systemic change is the key to sustainability transition

Behavioural and technological solutions do not work alone, as they need require related changes in values, infrastructure, and business models

Naturalness may be a problem

Naturalness as a guiding principle can hinder sustainable solutions

BIOTEXFUTURE

GOALS OF THE SCENARIO ANALYSIS

Orientation

Anchor Points

Enable Communication and Visibility

Engage in Public and Transdisciplinary Discourse

Foresight

EXPERT INTERVIEWS – METHOD

Expert Interviews

Topic

- Circulation and circular economy
- Regulations
- Bio-based Materials (and circularity)
- (Naturalness and Sustainability)

Scenario Analysis

Dimension

1. Responsibility and behavioural change
2. Technological innovations at the material level
3. System changes

EXPERT INTERVIEWS – METHOD

Expert Interviews Topic	Scenario Analysis Dimension	Scenario Analysis Level
• Circulation and circular economy • Regulations • Bio-based Materials (and circularity) • (Naturalness and Sustainability)	• Responsibility and behavioural change • Technological innovations on the material level • System changes	1. High level (macro) 2. Medium level (meso) 3. Low level (micro)

EXPERT INTERVIEWS – BASELINE FOR THE SCENARIO ANALYSIS

Topic: Regulation

1. Inter-(national, conceptual, organisational) regulatory challenges and conflicts

Responsibility and behavioural change

- Bio-economy vs. biodiversity
- Need for policy framework vs. regulation by supply and demand
- Inconsistent national and international regulations

Technological innovations at the material level

- bio-based raw materials as a material and the political control of these raw materials by means of social processes of negotiation

System changes

- Introducing new (business/economic) models/concepts and eliminating old ones
- Abolition of fast fashion

2. Use and effect of regulations

A. Temporality of regulations

Responsibility and behavioural changes

- Useful life of products
- Political regulations start too late
- Change of awareness in companies needed
- Politicians must take responsibility
- Corporate responsibility and support through government regulation
- Industry slows down/ prevents regulations
- Shift in responsibility due to globalisation

Technological innovations at the material level

- Temporal component of textiles
- The "right" time for innovation

System changes

- Regulation of raw material use/reduction of production
- Faster decisions for regulations and the enforcement of regulations

2. Use and effect of regulations

B. Implementation and enforcement of regulations

Responsibility and behavioural changes

- Transparency in/of companies
- Policy needs to create framework for corporate responsibility vs. market regulates itself
- Industry prevents / slows down regulation, e.g. lobbying
- Communication as a problem/key (e.g. plastics)
- International standardisation of regulations (recycling culture, infrastructure, etc.)
- (Realistic) feasibility

Technological innovations at the material level

- Regulations for the implementation/enforcement of (innovative) technologies
- Research and science

System changes

- Monitoring compliance
- National and international regulations
- Infrastructure for better recycling/use of textiles and against fast fashion
- Regulations enshrined in law
- Political framework for regulations
- Achieving system change through workable regulations

EXPERT INTERVIEWS – BASELINE FOR THE SCENARIO ANALYSIS

Topic: Regulation

Rationalisation, moralisation, knowledge for consumption

- Responsibility and behavioural changes
  - No full consumer responsibility
  - Consumer responsibility through labelling and behaviour change
  - Unclear allocation of responsibility
  - Responsibility lies with manufacturers/producers
- Technological innovations at the material level
  - Technological progress as a solution to the problem
- System changes
  - Legislation as a necessary condition for change
  - Rethinking/changing behaviour regarding the useful life of clothing
  - Prefix „bio" vs. sustainability

EXPERT INTERVIEWS AND **SCENARIOS**

Expert Interviews

Topic

Regulations

Scenario Analysis

Level & Dimension

1. Inter-(national, conceptual, organisational) regulatory challenges and conflicts

- Responsibility and behavioural change:
  → Inconsistent national and international regulations
- Technological innovations at the material level:
  → bio-based raw materials as a material and the political control of these raw materials by means of social processes of negotiation
- System Changes:
  → Abolition of fast fashion

2. Use and impact of regulations

A. Temporality of regulations

- Responsibility and behavioural change:
  → Useful life of products
- Technological innovations at the material level:
  → The "right" time for innovation
- System changes:
  → Faster decisions for regulations and the enforcement of regulations

EXPERT INTERVIEWS AND **SCENARIOS**

Expert Interviews

Topic

Regulations

"[…] Lobbying is always a big issue and unfortunately it often leads to negative effects, I can see laws being weakened and so on because of lobbying, but this is not just in the EU".

Scenario Analysis

Level & Dimension

B. Implementation and enforcement of regulations

- Responsibility and behavioural change:
  → Industry prevents / slows down regulation, e.g. lobbying
- Technological innovations at the material level:
  → Regulations for the implementation/enforcement of (innovative) technologies
- System changes:
  → National and international regulations

3. Rationalisation, moralisation, knowledge for consumption

- Responsibility and behavioural change:
  → No full consumer responsibility
- Technological innovations at the material level:
  → Technological progress as a solution to the problem
- System changes:
  → Legislation as a necessary condition for change

EXPERT INTERVIEWS AND **SCENARIOS**

Expert Interviews

Topic

Circulation and circular economy

Scenario Analysis

Level & Dimension

1. Within a cycle

- Responsibility and behavioural change:
  → life cycle: consumers bear responsibility
- Technological innovations at the material level:
  → Contradictions between textile use and value chains

2. Between different cycles or across cycles

- System changes:
  → Comparison of different cycles (different dependencies need to be considered): Bio-based vs. sustainable - raw material vs. cycle
  → Political control as a necessary precondition for the circular economy, infrastructure creation

3. Mixed forms of cycles

- Technological innovations at the material level:
  → Processing and technical requirements ("Design for Circularity")
- System changes:
  → Economic growth vs. Circular economy

EXPERT INTERVIEWS AND **SCENARIOS**

Expert Interviews

Topic

Bio-based materials

Scenario Analysis

Level & Dimension

1. **Challenges for recyclable bio-based materials**
   - Technological innovations at the material level:
     → Sustainability assessment of bio-based materials
   - System changes:
     → Enlightenment by a higher authority: confusion and blurring of terms in linguistic usage
2. **Conditions and requirements for recyclable bio-based materials**
   - Responsibility and behavioural change:
     → Far-reaching brand responsibility in the textile system
   - Technological innovations at the material level:
     → High sustainability requirements for new fibres/materials
   - System changes:
     → Creating infrastructures for new types of fibres
3. **At the material level - concrete implementation**
   - Technological innovations at the material level:
     → Developing durable materials and technologies
   - System changes:
     → Re-developing alternative streams for bio-based materials

EXPERT INTERVIEWS – BASELINE FOR THE SCENARIO ANALYSIS

Topic: Circulations and circular economy

Within a cycle

- Responsibility and behavioural change
  - life cycle: consumers bear responsibility
  - Pooling of producer interests: Producer responsibility for the creation of cycles
  - Transdisciplinary exchange and collaboration, seeking to interface between previously separate communities
- Technological innovations at the material level
  - Contradictions between textile use and value chains
  - Recyclability vs. longevity of materials and biodegradability vs. recyclability
  - Technological optimism in recycling processes vs. technological realism
  - Bio-based circular economy/ technological optimism in bio-based textiles
  - Bio-based circular economy as an ideal circular model
- System changes

Between different cycles or across cycles

- Responsibility and behavioral changes
- Technological innovations at the material level
- System changes
  - Comparison of different cycles (different dependencies need to be considered)
    - Bio-based vs. sustainable - raw material vs. cycle
  - Resource consumption in the cycle/green growth
    - Planned transition; material development & consumption through transdisciplinary cooperation
  - Political control as a necessary precondition for the circular economy, infrastructure creation
  - Bio-economy vs. circular economy go together/do not go together

Mixed forms of cycles

- Responsibility and behavioural changes
- Technological innovations at the material level
  - Processing and technical requirements ("Design for Circularity")
- System changes
  - Economic growth vs. Circular economy

EXPERT INTERVIEWS – BASELINE FOR THE SCENARIO ANALYSIS

Topic: Bio-based Materials (and circularity)

Highest level of abstraction:

- Technological innovations at the material level
  - Circular challenges of (bio-based) materials
  - Sustainability assessment of bio-based materials
- System changes
  - Enlightenment by a higher authority: confusion and blurring of terms in linguistic usage

Intermediate level of abstraction: the conditions or prerequisites in the life cycle

- Responsibility and behavioural changes
  - Far-reaching brand responsibility in the textile system
  - Regulatory action through more sustainable materials policies
- Technological innovations at the material level
  - Bio-based textiles as a niche product
  - High sustainability requirements for new fibres/materials
  - Recycling requirements: Textile sorting and recycling of different synthetic fibres and technological processes
- System changes
  - More sustainable transformation of the textile industry: areas for adaptation
  - Creating infrastructures for new types of fibres

Lowest level of abstraction: Concrete realisation

- Technological innovations at the material level
  - Developing durable materials and technologies
  - Assessing the need for new material innovations
  - Applications and substitutes for bio-based materials
  - Utilisation of production by-products
  - Algae as a raw material for bio-based textiles
- System changes
  - Re-developing alternative streams for bio-based materials

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SCENARIO BASELINE – KEY STARTING POINTS

Circulation and circular economy

There are different kinds of talking about cycles:

- *Within a cycle*, the focus is on *responsibility and behavioural change*;
- in *different cycles or across cycles*, the focus is on system change
- *mixed forms of cycles, the* focus is on the technological innovations at the material level

The timing of Regulation

There are different kinds of regulation:

- A *standard* already in place
- Some measure *certainly coming* in the next years
- *Desired* additional forms of regulation, that maybe coming or not

Where systemic changes are needed

- *Existing or coming regulation* is mostly directed to behavioural or technological changes, while regulation towards systemic change is *desired*
- Talking about *one cycle* systemic change is not addressed

Connect/Disconnect Naturalness and Sustainability

Stronger coupling in expectations than in reality

To be evaluated further

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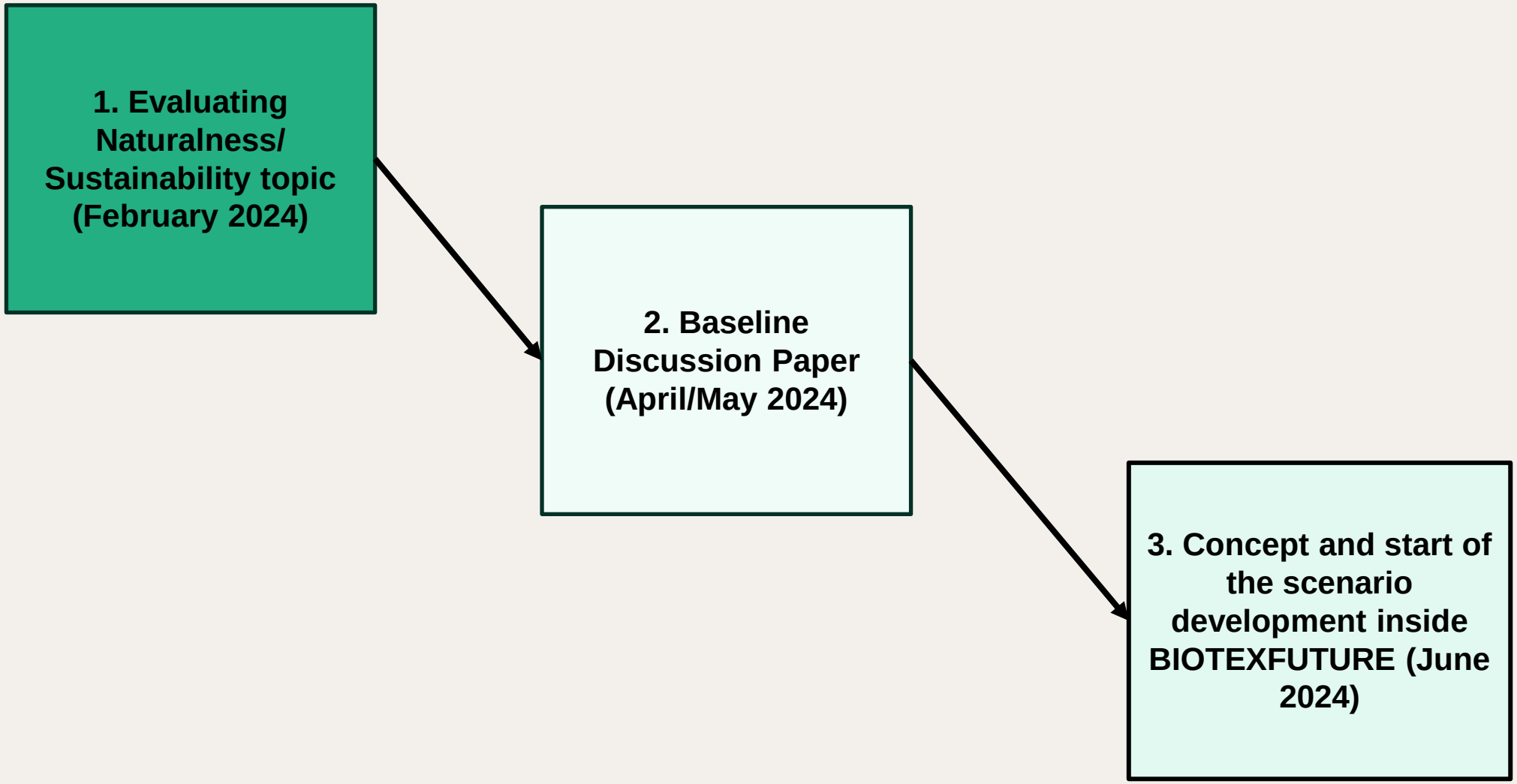
NEXT STEPS SCENARIO APPROACH



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