REPORT NO. 12

BIOTEXFUTURE TRANSITION LAB

SCENARIO DEVELOPMENT

Marco Schmitt – STO
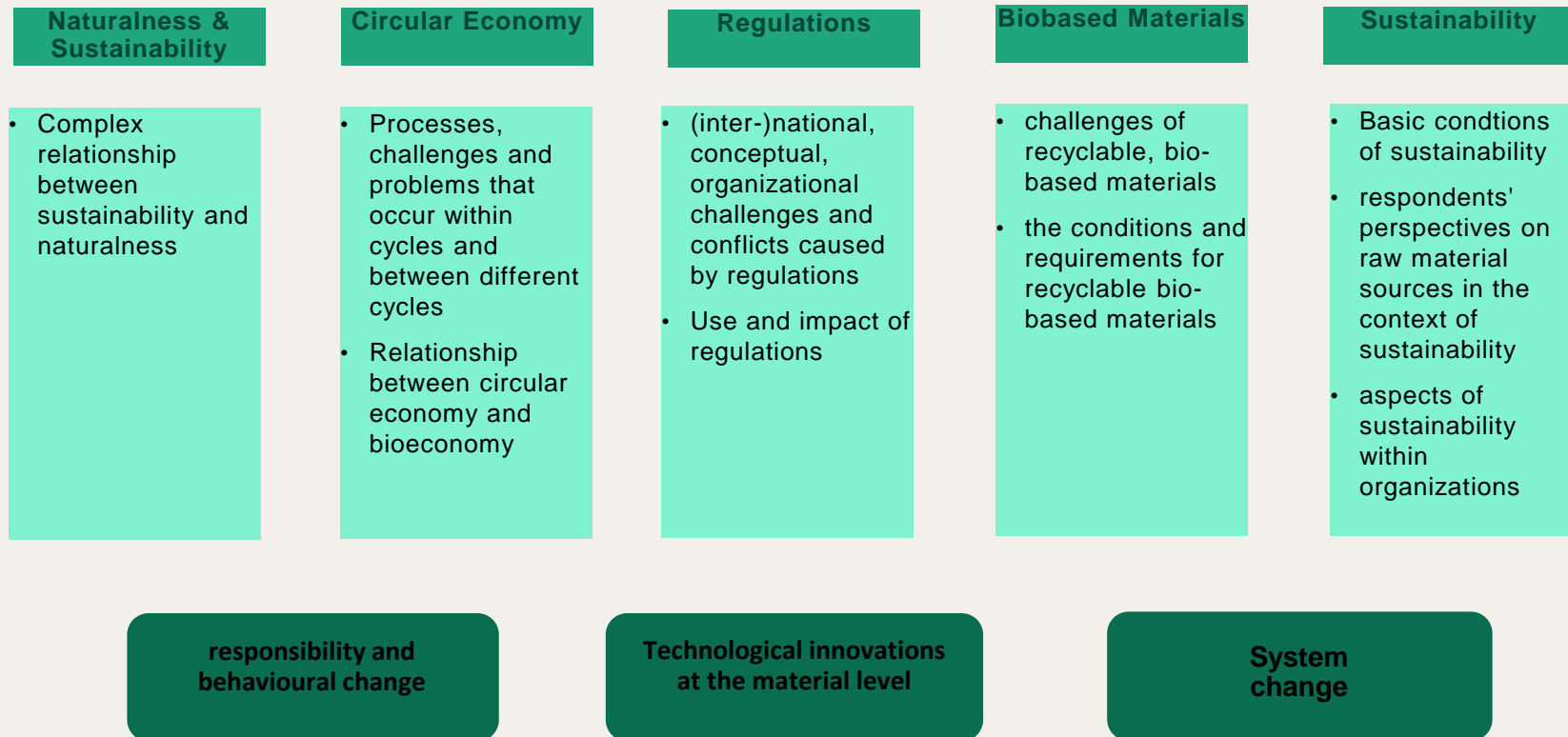Nadine Diefenbach – STO
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13-12-2024
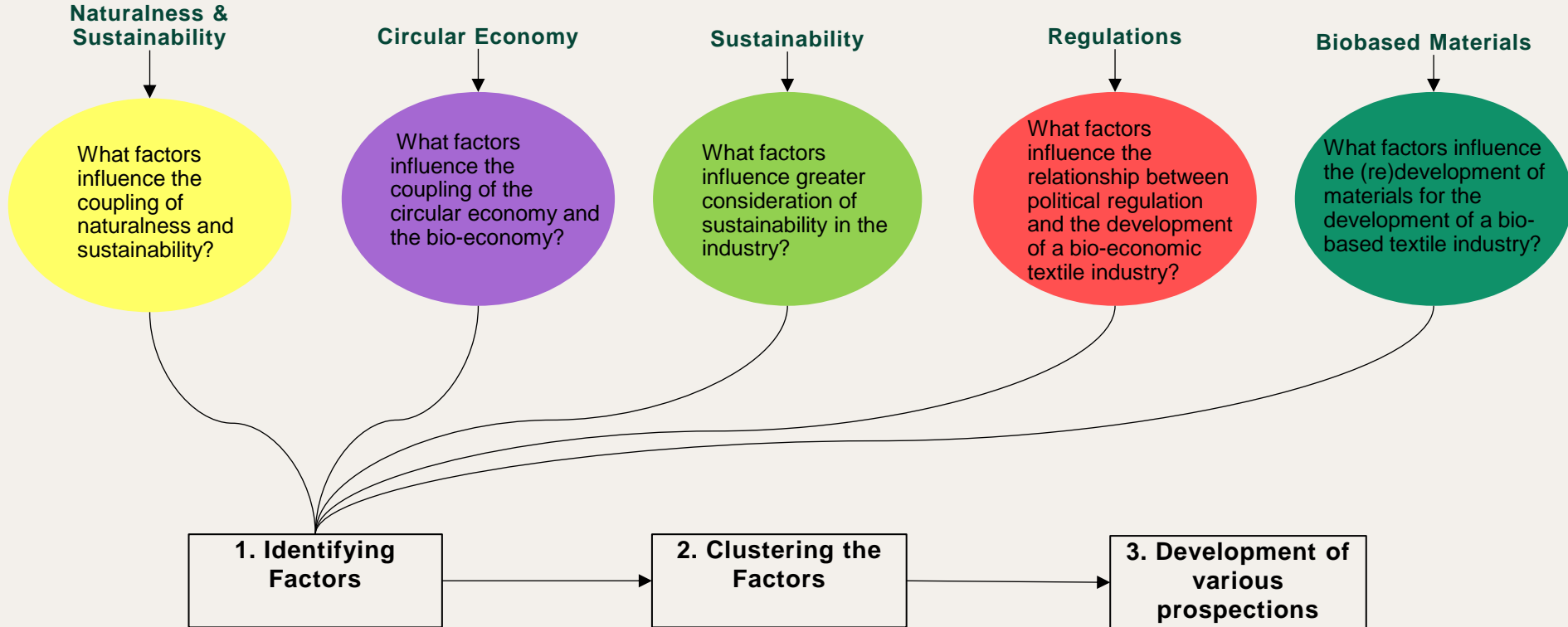
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SCENARIO DEVELOPMENT: FROM THE BASELINE PAPER TO THE WORKSHOPS

The Narratives

Naturalness & Sustainability	Circular Economy	Regulations	Biobased Materials	Sustainability
• Complex relationship between sustainability and naturalness	• Processes, challenges and problems that occur within cycles and between different cycles • Relationship between circular economy and bioeconomy	• (inter-)national, conceptual, organizational challenges and conflicts caused by regulations • Use and impact of regulations	• challenges of recyclable, bio-based materials • the conditions and requirements for recyclable bio-based materials	• Basic condtions of sustainability • respondents' perspectives on raw material sources in the context of sustainability • aspects of sustainability within organizations

responsibility and behavioural change

Technological innovations at the material level

System change

SCENARIO DEVELOPMENT: THE WORKSHOP

Naturalness & Sustainability

What factors influence the coupling of naturalness and sustainability?

Circular Economy

What factors influence the coupling of the circular economy and the bio-economy?

Sustainability

What factors influence greater consideration of sustainability in the industry?

Regulations

What factors influence the relationship between political regulation and the development of a bio-economic textile industry?

Biobased Materials

What factors influence the (re)development of materials for the development of a bio-based textile industry?

1. Identifying Factors → **2. Clustering the Factors** → **3. Development of various prospections**

KEYRSULTS OF THE SCENARIO WORKSHOP

KEYRSULTS OF THE SCENARIO WORKSHOP

Innovation dimension	Innovation dimension	Innovation dimension	Identities
responsibility and behavioural change	technological innovations at the material level	system change	Poltics Consumers Production/Companies Science/Education Designer

Prospection: Implementation of bans

Prospection: Implementation of incentives

What happens if the legislator uses mainly positive incentives? (red) (bundle of factors: incentives and bans)

Wer trägt Verantwortung für die Um- und Durchsetzung?

- Verantwortung für Anreize liegt bei der Politik
- (-) Gefahr, dass Anreize nicht (in vollem Umfang) genutzt werden

Braucht es neue technologische Innovationen zur Um- und Durchsetzung?

- (+) Produkte müssen ein positives Alleinstellungsmerkmal haben (Performance, Langlebigkeit, ...)

Braucht es neue technologische Innovationen zur Um- und Durchsetzung?

- mehr Freiheiten bei Materialauswahl und Entwicklung (enge Bindung an Bereich 5)

Prospection: R&D should receive less government support

Prospection: R&D should be strongly supported by the state

To what extent can research and development be supported or mandated by the state? (dark green) (bundle of factors: R&D of materials (production of materials in the background))

Braucht es neue technologische Innovationen zur Um- und Durchsetzung?

- eine Richtung kann auch staatliche (schwer zu korrigierende) Pfadabhängigkeit bedeuten
- weniger Ideenreichtum bei Materialentwicklung (?)
- technologische Innovationen? größere durch die Verteilung der finanziellen Last denkbar

Identifiying Factors

Developing different Prospections

Clustering the Factors
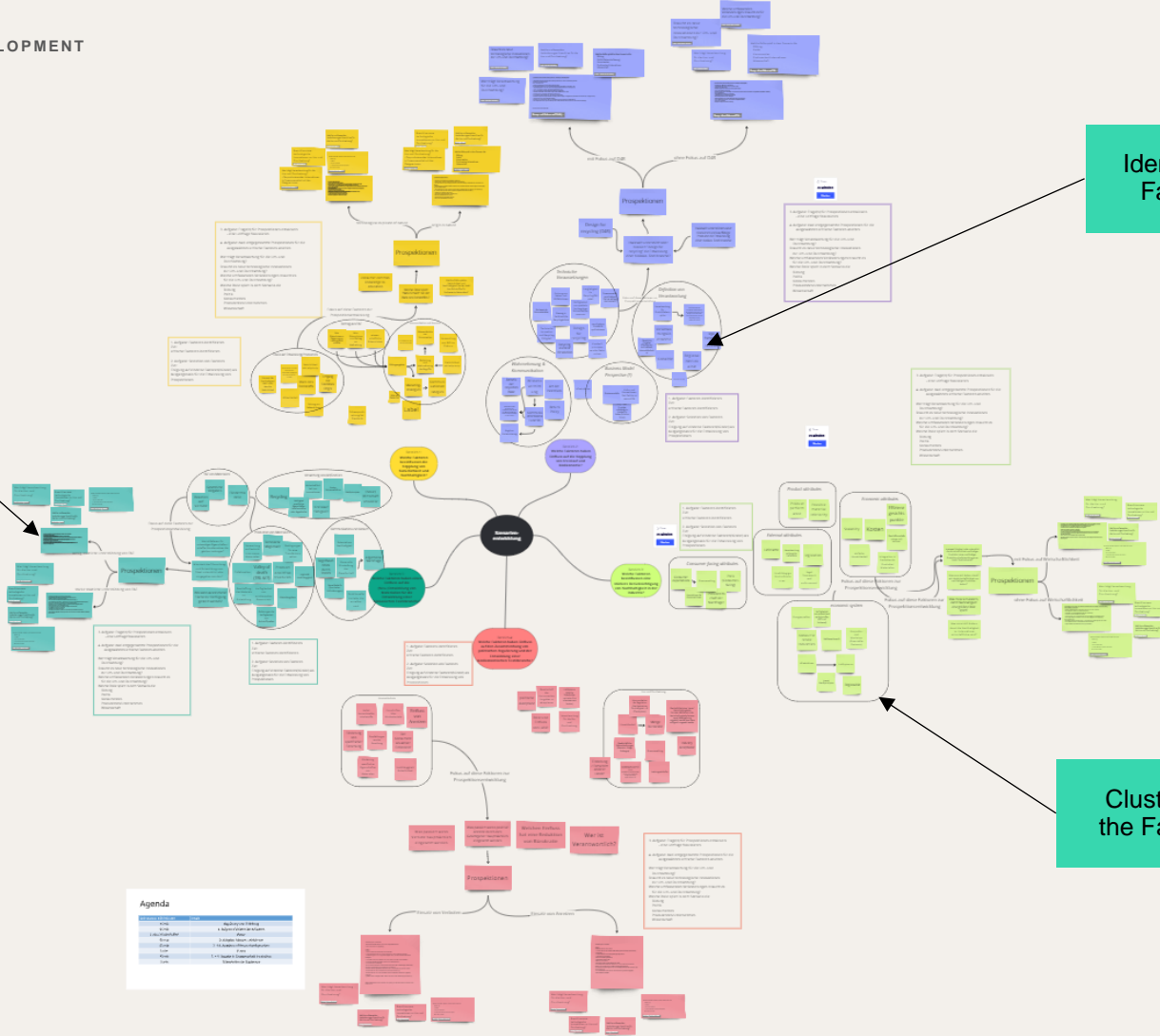
Agenda

SCENARIO DEVELOPMENT: KEY RESULTS OF THE WORKSHOP

What role does "naturalness" play in raw material selection?

- Technological duplicate of nature
- Origin in nature

How does economic efficency of sustainable products/production block or support the development of a bio-economic textile industry?

- With focus on economic efficency
- Without focus on economic efficency

How much should R&D be supported or mandated by government?

- High government support for R&D
- Low government support for R&D

How does D4R support or block the development of a bio-economic textile industry?
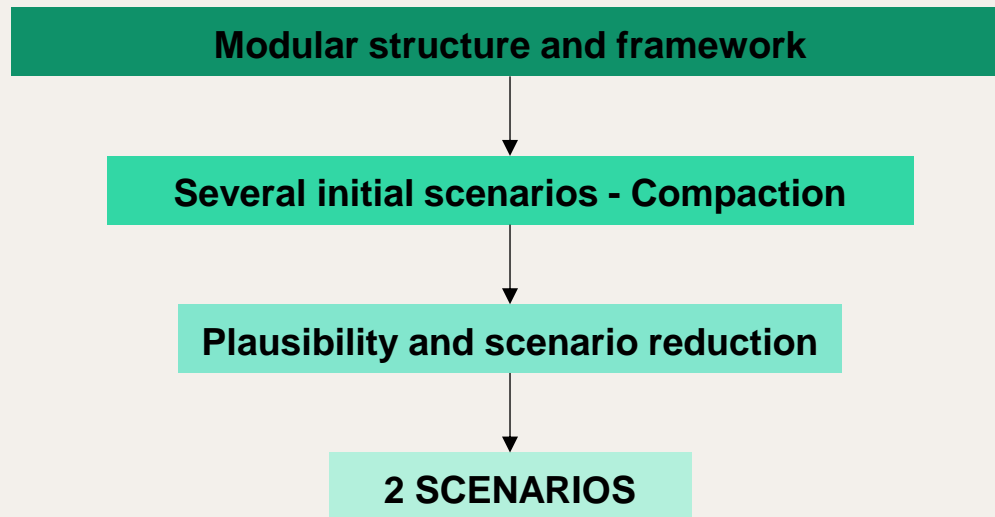
- With focus on D4R
- Without focus on D4R

What happens when positive incentives are used primarily by legislators?
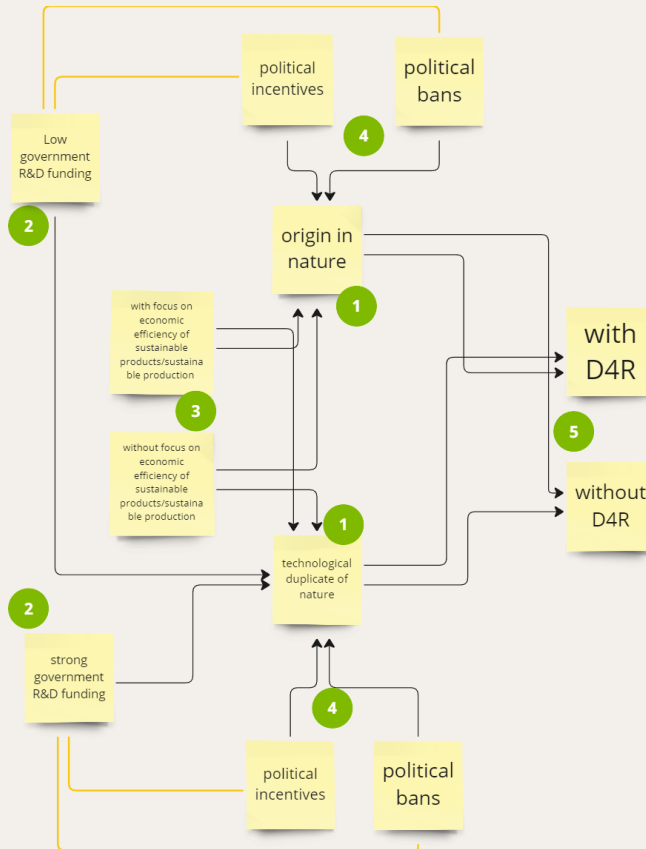
- Using bans
- Using incentives

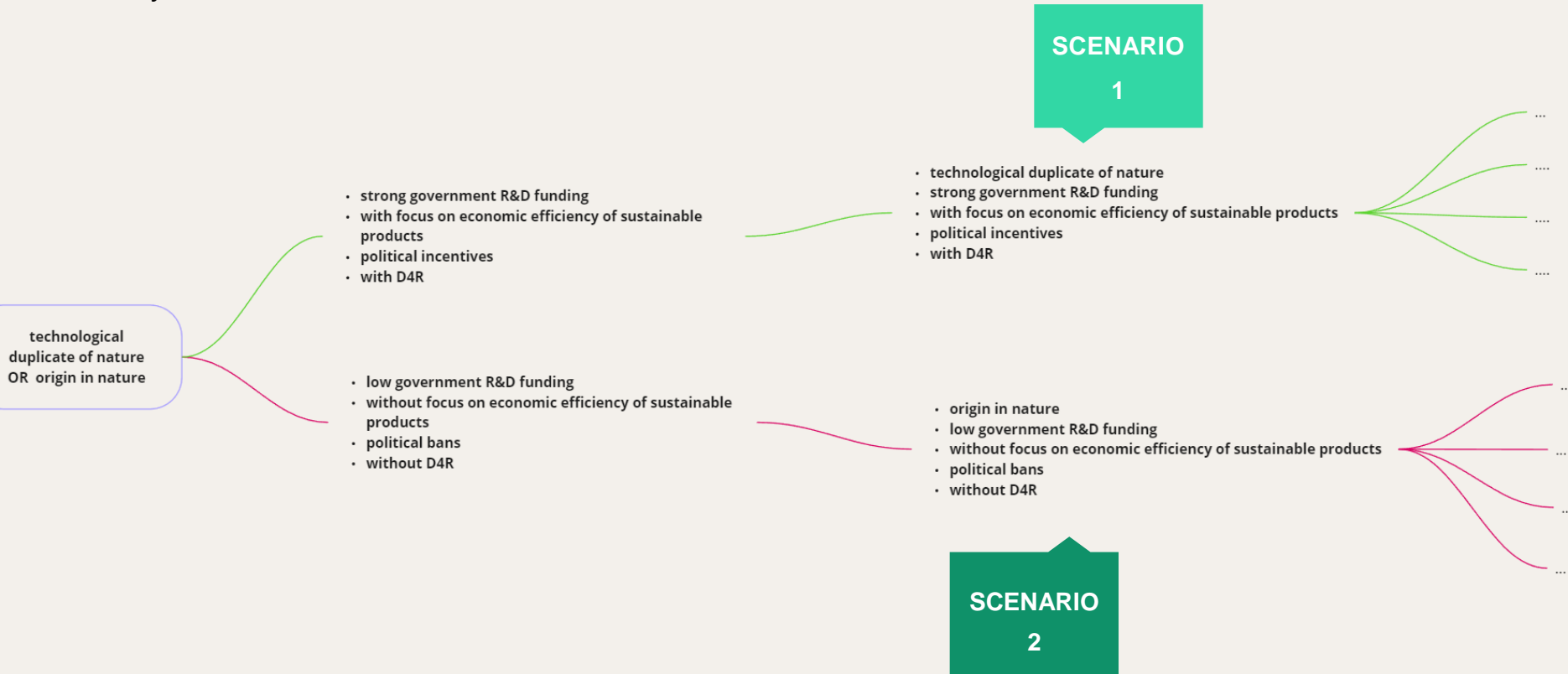# METHODOLOGY OF THE SCENARIO DEVELOPMENT

Overview

Modular structure and framework

- Specific group perspectives
- Starting point: fibre/textiles development and production, not the dichotomy of politics vs. consumers
- Five decisions with the focus on the innovation dimensions:
    - Responsibiity and behavioural change
    - Technological innovations at the material level
    - System change

- And identities:
    - Politics
    - Consumers
    - Production / Companies
    - Science / Education
    - Designer

- Scenarios for the development of a bio-based, bio-economic textile industry in 5-10 years
- Use of ChatGPT and RWTHgpt
    - Development of a broad range of scenarios
    - Influence of dominant discourses and narratives

Plausibility and scenario reduction – the two scenarios

SCENARIO 1

- strong government R&D funding
- with focus on economic efficiency of sustainable products
- political incentives
- with D4R

- technological duplicate of nature
- strong government R&D funding
- with focus on economic efficiency of sustainable products
- political incentives
- with D4R

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technological duplicate of nature OR origin in nature

- low government R&D funding
- without focus on economic efficiency of sustainable products
- political bans
- without D4R

- origin in nature
- low government R&D funding
- without focus on economic efficiency of sustainable products
- political bans
- without D4R

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SCENARIO 2

SCENARIO 1

Technological duplicate of nature

- Driven by technological innovations
- Growing awareness of environmental responsibility
- Biotechnology and sociotechnical innovations are taking centre stage

Companies: transparent supply chains and circular business models

Consumers: Naturalness ≠ organically grown, long-term stability of textiles, use of chemicals

Designer: important role in the transformation, designing modularity for separation + pure fraction recycling of components

Science / education: promoting interdisciplinary approaches to materials development, curricular adaptations

Politics: tax breaks, subsidies for R&D programmes for recyclable material samples with natural properties, fair use of funds

Modular assumptions: Fibers are a technological duplicate of nature, strong government R&D funding, political incentives, with focus on economic efficiency of sustainable products, with D4R

SCENARIO 2
Origin in nature

Modular assumptions: Fibers are origin in nature, low government R&D funding, political bans, without focus on economic efficiency of sustainable products, without D4R

- Driven by political bans
- Degradability of textiles
- Infrastructure changes, e. g. waste management
- Trans- and interdisciplinary collaboration

Companies: Creating closed-loop systems through biodegradable products; innovative strategies needed, problem: waste management

Consumers: Naturalness = biodegradable, transparency & support for disposal; high product costs strengthen second-hand market

Designer: "Designs for disassembly" – Modularity of textile for fashion changes,

Science / education: Focus on socio-environmental impacts, innovation slowed by low R&D funding, more collaboration with industry

Politics: Textile biodegradability system, infrastructure development for collection and disposal of used textiles

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KEY RESULTS: SCENARIO DEVELOPMENT

- Political approach
- Incentives vs. bans

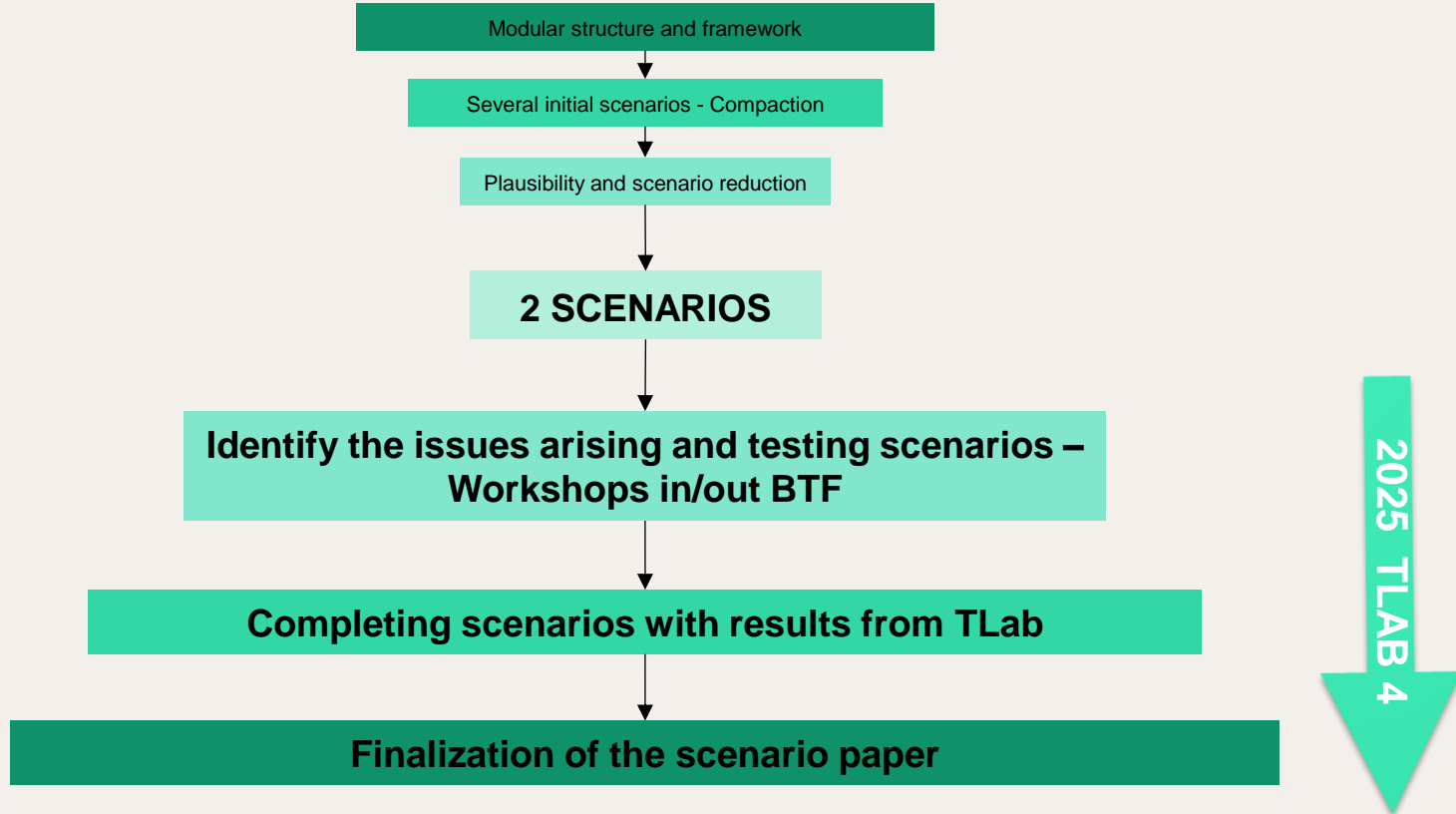Political Incentives / bans

- Government support for research and development
  - e.g. funding programmes, etc.

Low / strong R&D funding

- Role of specific identities, such as designers
- Trans- and interdisciplinary collaboration

Role of specific groups

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NEXT STEPS SCENARIO APPROACH

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Thank you for your attention!

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