

## 1. Background

The Green Deal transition towards a climate-neutral, resource-preserving and non-toxic Circular Economy (CE) creates new challenges for businesses. The EU Textiles Strategy aims to tackle the high waste generation and the low recycling rates and negative environmental and social impacts throughout the whole life-cycle. Textile apparel will become one of the first product groups subjected to Sustainable Product Policies (Ecodesign incl. Digital Product Passport). These policies imply value chain actors having access to detailed product information incl. material compositions: Trustworthy traceability of chemicals along supply chains is one central enabler for a non-toxic, resource-efficient and climate neutral Circular Economy. Knowledge of material composition allows (eco-)design, informed procurement and purchasing decisions, improved recycling processes, thus minimised risks for health and environment from chemicals during the use phase and after the end of life. Volatility, complexity and

supply chain structures, however, make it difficult for companies to work together and trace the chemicals in their products.

**ECHT aims to help the industry establish chemicals traceability for a circular economy by enabling the digital product passport.**

ECHT develops and implements the first traceability strategy with 3 action plans for actors of textile (1) apparel and (2) flooring value chains as well as for (3) policymakers at different levels. The action plans will draw from the learnings of innovative training schemes (capacity building). Results from the trainings and the insights gained in developing, testing and disseminating practical solutions are upscaled into a Knowledge Platform to support SME's of the textile and other sectors "beyond pure compliance" towards innovative business models.

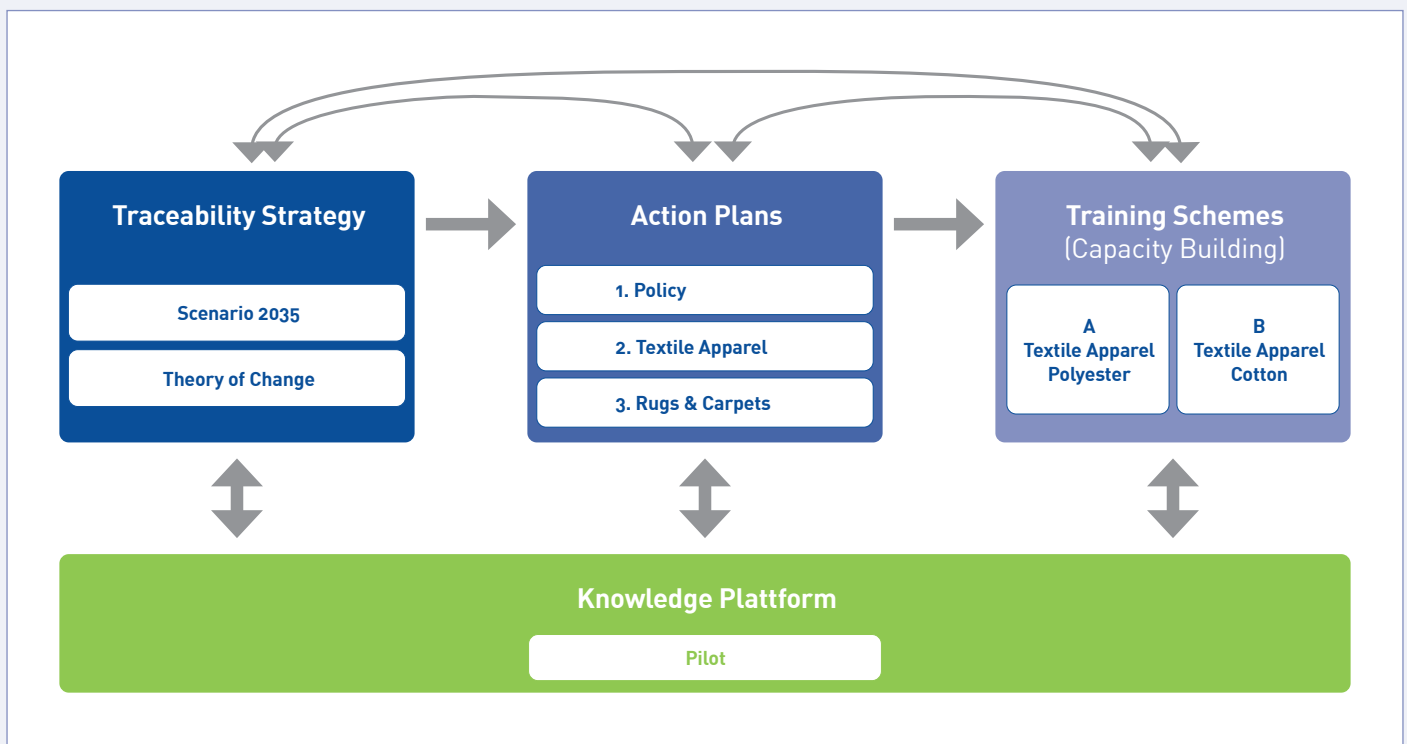


Fig. 1) Overall concept of the project ECHT

## 2. Scenario technique by Geschka as an instrument to develop the traceability strategy

To develop a traceability strategy, a clear vision on the preferred future state and the corresponding influencing factors as well as future projections are necessary. The apparel ecosystem shows a great variety of components, hampering a clear understanding what influencing factors create impact, form short-term to long-term, and which actors along the value chains need to provide which

behavioural (change) contributions in this respect. However, a future picture of the influencing factors must be coherent and free of contradictions. For this reason, the ECHT project uses Geschka's "scenario technique" as a methodological basis. The aim of the scenario process is to find a common understanding of the challenges and to develop solution strategies and concrete action steps.

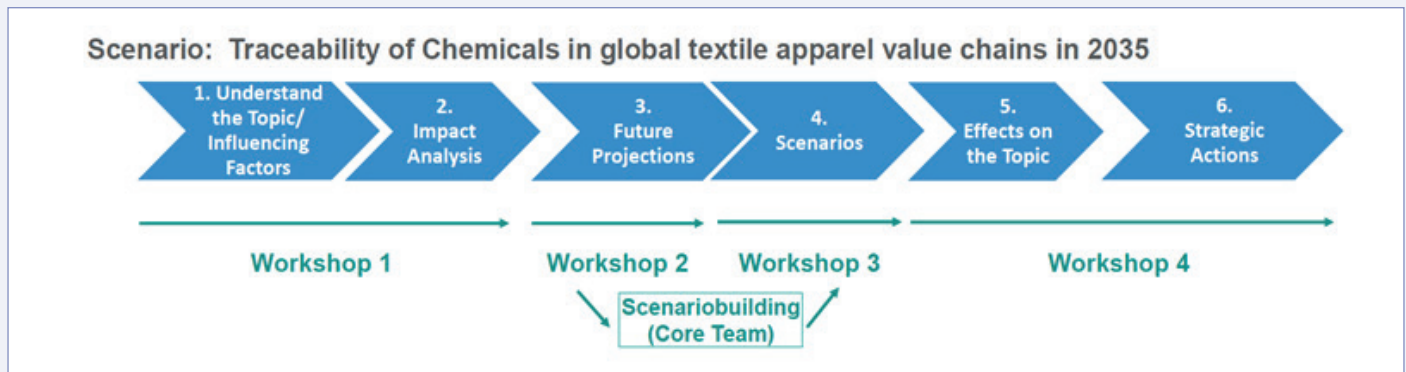


Fig. 2) Process for strategy development in the project ECHT

The starting point is the joint definition of a topic and the associated development of a common understanding of the problem. To this end, Darmstadt University of Applied Sciences organised a kick-off workshop in which interested participants from the textile apparel supply chain and related areas first defined the thematic and temporal boundaries of the system and analysed influencing factors with regard to the traceability of chemicals in textile

apparel. In a second (online) workshop, the influencing factors were analysed and put in relation to see how they affect one another. These factors formed the basis to create future projections for 2035 on how the factors might develop. The individual projections were then used in a third workshop to develop two different future scenarios that describe possible, realistic versions of the future.

### THIS DOCUMENT DESCRIBES THE PROCEEDINGS AND RESULTS OF THE THIRD WORKSHOP AND THE SCENARIO PROCESS PART III

## 3. Proceedings and results of the third workshop

### Workshop Specific

|            |  |
|------------|--|
| Date:      | 20.06.2024                               |
| Time:      | 09:30 – 16:30 h                          |
| Location:  | Ökohaus, Ka Eins Frankfurt/Main          |
| Organiser: | Darmstadt University of Applied Sciences |

13 representatives of textile apparel value chains and related stakeholders from 10 organisations and 7 countries as well as 5 members of the university team participated in

this third (on-site) workshop. After welcoming all participants and a short introduction, Martina Schwarz-Geschka started with a presentation on the current status of the project, explaining the underlying reasoning behind the results. From a methodological point of view, based on the work done so far by the project team and further preparatory evaluations by the university team, this third workshop focused on the development of (preferably) two different scenarios.

In order for this workshop to be efficient and constructive, a number of preceding tasks had to take place prior to the actual workshop:

### 3.1. Preparatory work part 1: Influencing Factors

Between workshop #2 and workshop #3, participants were asked to rank all 16 influencing factors in order of importance from their personal (or organisational) perspective. Each factor was given a number from 1 to 16 (1 = most important, 16 = least important). The university team then summarised the data using an

ordinal scale (no metric interpretation) and categorised the factors into three groups: high, medium and low (table 1). The categories are intended to provide guidance and a possible starting point for creating the different scenarios later in the process, but it is important to note that all 16 factors are of course highly pertinent.

| Influencing Factor  | Points Sum | Relevance / Category |
|---|------------|----------------------|
| 1 Regulatory framework EU for traceability of chemicals in textiles     | 14         | high relevance       |
| 4 Enforcement pressure in the industry                                  | 26         |                      |
| 3 Standardisation on EU- and global level                               | 28         |                      |
| 15 Cooperation along value chain on aspects of traceability             | 31         |                      |
| 2 Regulatory framework global for traceability of chemicals in textiles | 33         |                      |
| 12 Mindset in the industry  | 45         | medium relevance     |
| 13 Traceability capacity in the supply chain                            | 46         |                      |
| 7 Innovations in Traceability Technology                                | 49         |                      |
| 14 Cooperation among peers on aspects of traceability                   | 52         |                      |
| 9 Consumer behaviour  | 55         |                      |
| 5 Scientific Knowledge about chemical substances                        | 64         | low relevance        |
| 10 Critical public opinion  | 70         |                      |
| 8 Innovations textile technology  | 72         |                      |
| 11 Location factors (political, social, economical, ecological)         | 74         |                      |
| 6 Innovations in Detection methods                                      | 78         |                      |
| 16 Traceability related Business Models                                 | 79         |                      |

Table 1) List of ranked influencing factors

### 3.2. Preparatory work part 3: Consistency Matrix

Therefore, the university team prepared the Consistency Matrix and filled in all the fields before the workshop using the INKA 4.0 software. The aim was to identify which future states fit together/support each other and which do not fit together/contradict each other – or are unrelated. The university team assessed 448 relationships based on the descriptions and justifications of the influencing factors as well as reasoning (table 2, p. 4).

The next step was to calculate the consistency sum along (all) scenario paths. In this case there were 14 influencing factors with two projections each and one influencing factor with three projections. The

influencing factor 15 (“Cooperation along value chain on aspects of traceability”) has only one projection and was included in all potential scenarios and therefore did not require further evaluation. The software calculated a total of 49,152 scenarios. (Note: Future projections with a likelihood of less than 10% were not included in this process). From the large number of potential scenarios, only a few were selected for further consideration by the software. The criteria for the final selection by the university team were: (1) consistency of the scenario, (2) difference between the two selected scenarios and (3) plausibility of the content.

|   |  | 1.1   | 1.2   | 1.3  | 1.4   | 1.5   | 1.7  | 1.8  | 1.9   | 1.10 | 1.11 | 1.12 | 1.13  | 1.14  | 1.15  | 1.16  |       |   |
|---|--|-------|-------|------|-------|-------|------|------|-------|------|------|------|-------|-------|-------|-------|-------|---|
|   |  | a     | b     | a    | b     | a     | b    | a    | b     | a    | b    | a    | b     | a     | b     | c     | a     | b |
| 1.1 Regulatory framework EU                 | a Significantly stricter EU regulations    |       | -1 0  | 2 -1 | 3 -1  | -2 2  | 1 0  | 3 -2 | 0 0   | 2 -1 | 0 0  | 2 0  | 3 -2  | 2 2   | 2 2   | -3    | 2 -2  |   |
|   | b Continuously delay in planned chan...    |       | 1 0   | 0 2  | -3 0  | 1 -1  | -1 0 | 1 1  | 0 0   | -3 2 | 0 0  | -2 0 | -3 2  | -2 -1 | -1 2  | 3     | -1 1  |   |
| 1.2 Regulatory framework global             | a Higher level of deharmonisation          | -1 1  |       | -3 2 | 0 0   | 2 -2  | -3 1 | 0 0  | 0 0   | -1 2 | -3 3 | -1 2 | -2 -1 | -2 -1 | -3 1  | 2 -2  |       |   |
|   | b Slight harmonisation                     | 0 0   |       | 0 0  | 0 0   | 0 0   | 0 0  | 0 0  | 0 0   | 0 0  | 0 0  | -1 0 | -1 1  | -1 -1 | -1 -1 | -1 -1 |       |   |
| 1.3 Standardisation on EU- and globa...     | a Global standards established             | 2 0   | -3 0  |      | 2 2   | -1 2  | 3 -3 | 0 0  | 0 0   | 2 -1 | 2 -1 | 2 -3 | 3 -2  | 2 2   | 2 -2  | -3    | 2 -2  |   |
|   | b No significant improvements              | -1 2  | 2 0   |      | -1 -1 | 1 -1  | -2 2 | 0 0  | 0 0   | -1 1 | 0 0  | -1 2 | -2 2  | -2 -1 | -2 2  | 2     | -2 2  |   |
| 1.4 Enforcement pressure in the indu...     | a Strong, mainly exerted by authorities    | 3 -3  | 0 0   | 2 -1 |       | 0 0   | 2 -1 | 0 0  | 0 0   | 1 -1 | 0 0  | 2 1  | 2 -2  | 2 1   | 0 0   | -3    | 3 -2  |   |
|   | b Slightly more, exerted mainly by pee...  | -1 0  | 0 0   | 2 -1 |       | 0 0   | -1 2 | 0 0  | 0 0   | 0 0  | 0 0  | -2 1 | 0 0   | 2 2   | 0 -1  | -2    | 0 0   |   |
| 1.5 Scientific Knowledge about chem...      | a Only generic knowledge is generate...    | -2 1  | 2 0   | -1 1 | 0 0   |       | -1 1 | -1 1 | -3 -3 | -2 2 | -1 2 | -2 2 | -1 1  | -1 -1 | -2 2  | -1 2  |       |   |
|   | b Higher knowl.,detailed level, greater... | -2 -1 | -2 0  | 2 -1 | 0 0   |       | 2 -2 | 1 -1 | 2 2   | 2 -2 | 1 -2 | 2 -2 | 2 -1  | 2 2   | 2 -1  | -3    | 2 -2  |   |
| 1.7 Innovations in Traceability Techno...   | a Progress in high quality standardise...  | 1 -1  | -3 0  | 3 -2 | 2 -1  | -1 2  |      | 2 -2 | 0 0   | 2 -1 | 0 0  | 2 -2 | 3 -2  | 2 1   | 3 -1  | -3    | -3 -3 |   |
|   | b Many and less effective isolated sol...  | 0 0   | 1 0   | -3 2 | -1 2  | 1 -2  |      | -2 2 | -1 -1 | -2 2 | 0 0  | -2 2 | -3 2  | -2 -1 | -3 1  | 0     | -3 3  |   |
| 1.8 Innovations textile technology          | a Recycl.techn. have evolved,slow em...    | 3 1   | 0 0   | 0 0  | 0 0   | -1 1  | 2 -2 |      | 2 -2  | 0 0  | 0 0  | 1 -1 | 1 0   | 0 0   | 2 1   | -1    | -1 -1 |   |
|   | b Slow emergence of innovations            | -2 1  | 0 0   | 0 0  | 0 0   | 1 -1  | -2 2 |      | -2 2  | 0 0  | 0 0  | -1 1 | 0 0   | 0 0   | 0 0   | 2     | -1 1  |   |
| 1.9 Consumer behaviour                      | a Sustainability main purchasing crite...  | 0 0   | 0 0   | 0 0  | 0 0   | -3 2  | 0 -1 | 2 -2 |       | 1 0  | 1 -2 | 0 -1 | 1 0   | 0 0   | 0 0   | 0 0   | 0 0   |   |
|   | b Price main purchasing criterion; sec...  | 0 0   | 0 0   | 0 0  | 0 0   | -3 2  | 0 -1 | -2 2 |       | 0 1  | -1 2 | 0 1  | -1 0  | 0 0   | 0 0   | 0 0   | 0 0   |   |
| 1.10 Critical public opinion                | a Increased knowledge,understanding...     | 2 -3  | -1 0  | 2 -1 | 1 0   | -2 2  | 2 -2 | 0 0  | 1 0   |      | 2 -1 | 2 -2 | 2 -2  | 2 1   | 2 -1  | -3    | 0 0   |   |
|   | b Still fragmented, no access to infor...  | -1 2  | 2 0   | -1 1 | -1 0  | 2 -2  | -1 2 | 0 0  | 0 1   |      | -1 2 | -3 2 | -2 2  | -2 -1 | -2 0  | 2     | 0 0   |   |
| 1.11 Location factors (pol, soc, econ, ...) | a Globally more equalised location fac...  | 0 0   | -3 0  | 2 0  | 0 0   | -1 1  | 0 0  | 0 0  | 1 -1  | 2 -1 |      | 0 0  | 1 -1  | 0 0   | 2 1   | -2    | 0 0   |   |
|   | b Globally more unequalised location...    | 0 0   | 3 0   | -1 0 | 0 0   | 2 -2  | 0 0  | 0 0  | -2 2  | -1 2 |      | 0 0  | -1 1  | 0 0   | -2 -1 | 2     | 0 0   |   |
| 1.12 Mindset in the industry                | a More active and transparent mindset      | 2 -2  | -1 0  | 2 -1 | 2 -2  | -2 2  | 2 -2 | 1 -1 | 0 0   | 2 -3 | 0 0  |      | 2 -2  | 2 1   | 3 -2  | -3    | 2 -2  |   |
|   | b No interest for change in the indus...   | 0 0   | 2 0   | -3 2 | 1 1   | 2 -2  | -2 2 | -1 1 | -1 1  | -2 2 | 0 0  |      | -3 -2 | -3 -3 | -3 -2 | 2     | -2 2  |   |
| 1.13 Traceability capacity in the suppl...  | a Significantly increased capacities       | 3 -3  | -2 -1 | 3 -2 | 2 0   | -1 2  | 3 -3 | 1 0  | 1 -1  | 2 -2 | 1 -1 | 2 -3 |       | 1 1   | 3 2   | -3    | 2 -1  |   |
|   | b Slightly improved capacities             | -2 2  | -1 0  | -2 2 | -2 0  | 1 -1  | -2 2 | 0 0  | 0 0   | -2 2 | -1 1 | -2 2 |       | -1 -1 | -1 -1 | -1    | -1 1  |   |
| 1.14 Cooperation among peers on asp...      | a Widespread cooperation                   | 2 -2  | -2 -1 | 2 -2 | 2 2   | -1 2  | 2 -2 | 0 0  | 0 0   | 2 -2 | 0 0  | 2 -3 | 1 -1  |       | 1 0   | 0 0   | 0 0   |   |
|   | b Cooperation between bigger comp...       | 2 -1  | -1 1  | 2 -1 | 1 2   | -1 2  | 1 -1 | 0 0  | 0 0   | 1 -1 | 0 0  | 1 -3 | 1 -1  |       | 1 0   | 0 0   | 0 0   |   |
| 1.15 Cooperation along value chain o...     | a Intensive cooperation                    | 2 -1  | -3 -1 | 2 -2 | 0 0   | -2 2  | 3 -3 | 2 0  | 0 0   | 2 -2 | 2 -2 | 3 -3 | 3 -1  | 1 1   |       |       | 0 0   |   |
|   | b Limited cooperation (like in 2024)       | 2 2   | 1 1   | -2 2 | 0 -1  | 2 -1  | -1 1 | 1 0  | 0 0   | -1 0 | 1 -1 | -2 2 | 2 -1  | 0 0   |       |       | 0 0   |   |
|   | c Almost no cooperation (less than in...   | -3 -3 | 2 -1  | -3 2 | -3 -2 | -1 -3 | -3 0 | -1 2 | 0 0   | -3 2 | -2 2 | -3 2 | -3 1  | 0 0   |       |       | 0 0   |   |
| 1.16 Traceability related Business Mod...   | a Viable business models entered the...    | -2 -1 | -2 1  | 2 -2 | 3 0   | -1 2  | 3 -3 | 1 -1 | 0 0   | 0 0  | 0 0  | 2 -2 | 2 -1  | 0 0   | 0 0   |       |       |   |
|   | b Only few and rather niche oriented ...   | -2 1  | 2 -1  | -2 2 | -2 0  | 2 -2  | -3 3 | -1 1 | 0 0   | 0 0  | 0 0  | -2 2 | -1 1  | 0 0   | 0 0   |       |       |   |

Table 2) List of all assessments (Consistency Matrix)

| Influencing Factor  | Szenario 1  | Szenario 2  |
|---|---|---|
| 1 Regulatory framework EU for traceability of chemicals in textiles     | Significantly tightened EU regulations                                      | No significant changes in EU regulations                                    |
| 2 Regulatory framework global for traceability of chemicals in textiles | Global Agreement  | Higher level of deharmonisation   |
| 3 Standardisation on EU- and global level                               | Global standards established  | No significant improvements   |
| 4 Enforcement pressure in the industry                                  | Strong, mainly exerted by authorities                                       | Slightly more, exerted mainly by peers                                      |
| 5 Scientific Knowledge about chemical substances                        | Higher knowledge, detailed level, greater dissemination                     | Higher level of knowledge, generic level, uneven distribution               |
| 6 Innovations in Detection methods                                      | Variety of elaborated methods, increased standardisation and automatization | Variety of elaborated methods, increased standardisation and automatization |
| 7 Innovations in Traceability Technology                                | Progress in high quality standardised solutions                             | Many and less effective isolated solutions                                  |
| 8 Innovations textile technology  | Recycling technologies have evolved, slow emergence of other                | Slow emergence of innovations   |
| 9 Consumer behaviour  | Sustainability main purchasing criteria; new business models                | Price main purchasing criterion; secondhand attractive                      |
| 10 Critical public opinion  | Increased knowledge, understanding, trust, cooperation                      | Still fragmented, no access to information; lobby                           |
| 11 Location factors (political, social, economical, ecological)         | Globally more equalised location factors                                    | Globally more unequalised location factors present                          |
| 12 Mindset in the industry  | More active and transparent mind-set  | No interest for change in the industry                                      |
| 13 Traceability capacity in the supply chain                            | Significantly increased capacities  | Slightly improved capacities  |
| 14 Cooperation among peers on aspects of traceability                   | Widespread cooperation  | Very limited cooperation  |
| 15 Cooperation along value chain on aspects of traceability             | Intensive cooperation   | Almost no cooperation (less than in 2024)                                   |
| 16 Traceability related Business Models                                 | Viable business models entered the market                                   | No viable business models   |

Table 3) List of selected future projections for scenario 1 and 2

The first part of the workshop comprised of a comprehensive illustration and discussion of the processes and results presented above. Here, Martina

Schwarz-Geschka elaborated on the specific mathematical reasoning behind these calculations.

### 3.3. Relevance and impact characteristics of Influencing Factors

Another interesting interpretation and discussion was initiated when Martina Schwarz-Geschka opposed the ranked influencing factors (and the three categories) with the impact characteristics of the factors (driven, driving and balanced). Although this is not a truly scientific analysis, the visualisation shows that there

might be a correlation between highly ranked and driving factors as well as low ranked and driven factors. Especially the highly relevant driving factors were recommended as a potential starting point for the following group work.




|           |                    | Impact characteristic   |   |  |
|-----------|--------------------|---|---|--|
|           |                    |  Driven Factor                   |  Balanced Factor                                       |  Driving Factor   |
| Relevance | High Rank (1-5)    |   | 3 Standardisation on EU- and global level<br>15 Cooperation along value chain on aspects of traceability                                | 1 Regulatory framework EU for traceability of chemicals in textiles<br>2 Regulatory framework global for traceability of chemicals in textiles<br>4 Enforcement pressure in the industry |
|           | Medium Rank (7-11) | 13 Traceability capacity in the supply chain<br>7 Innovations in Traceability Technology                          | 5 Scientific Knowledge about chemical substances<br>12 Mindset in the industry<br>14 Cooperation among peers on aspects of traceability | 9 Consumer behaviour   |
|           | Low Rank (12-16)   | 6 Innovations in Detection methods<br>8 Innovations textile technology<br>16 Traceability related Business Models | 10 Critical public opinion<br>11 Location factors (political, social, economical, ecological)   |  |

Table 4) Illustration of relevance and impact characteristic

### 3.4. Future Scenarios

Martina Schwarz-Geschka then presented the theory and aim of the scenario building process. In order to ideate and illustrate a plausible, realistic and conceivable idea of the future, the participants had to develop two scenario stories. These scenarios were based on the previously developed future projections for the 16 influencing factors and the selected sets based on the aforementioned Consistency Matrix Analysis (see above). Since these projections lacked details and a coherent narrative structure, the goal of this step was to create a story that elaborates on the combination of the projections as a whole, similar to the work of a writer.

After the presentation and explanation of the previous process for the development and selection of the two different scenarios, Martina Schwarz-Geschka and Jonas Rehn-Groenendijk presented the task for the workshop. The aim was to elaborate and detail the scenario structure, including all 16 factors and their selected future projections. The participants were divided into two groups and given a set of materials (including visuals, pictures, pens, post-its, etc.) to illustrate the world in 2035 in which their set of future projections had become reality.

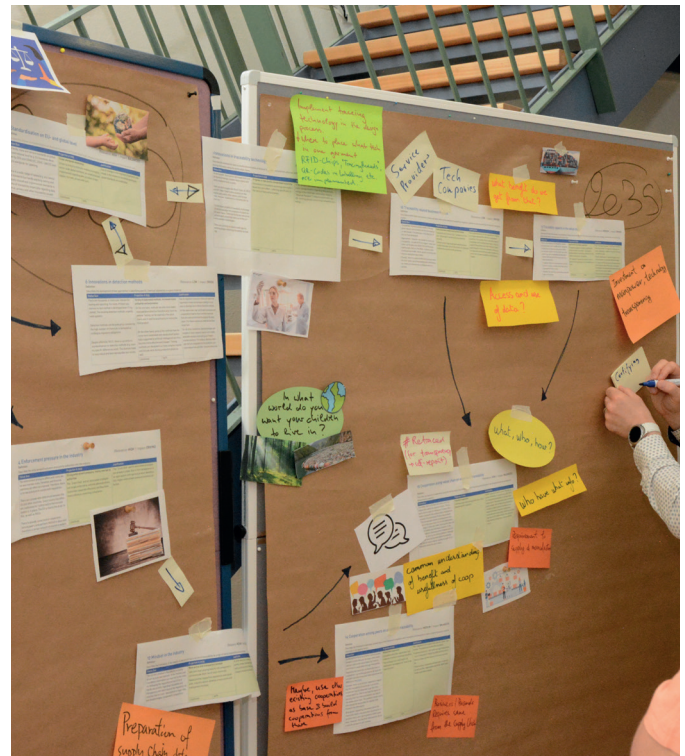


Fig. 3 and 4) Impressions of the co-creative process of developing both scenario stories

### 3.5. Results

The two scenarios give the impression of a best and worst case scenario, which was not the intention, but rather a result of the process and the projections inserted. In addition, the perception of positive and negative in this case is highly dependent on the lens of the viewer/target group, as their needs may be very different. Overall, both scenarios should represent plausible and equally possible versions of the future.

In the following two hours, each of the groups worked on one of the future scenarios; the participants were randomly assigned. After familiarising themselves with the content of the list of factors and projections –

first individually, then in small (whispering) groups – the whole group placed all the factors/projections on the wall, arranged them in relation to each other and visualised the “world” around the factors in as much detail as possible. Two members of the university team accompanied each of the two groups, facilitating and documenting the discussions and the whole process. Finally, the groups formulated a title for their story and prepared a presentation, which was then given to the entire group of participants (including a discussion to answer any still open questions of understanding and to reach a common agreement on which scenario was chosen to move forward).

#### Scenario 1:

### EMPOWERED BY TRANSPARENCY

A success story of an industry that is on the right way – and is still making money with it

#### Scenario 2:

### NO P(L)ACE FOR TRACE

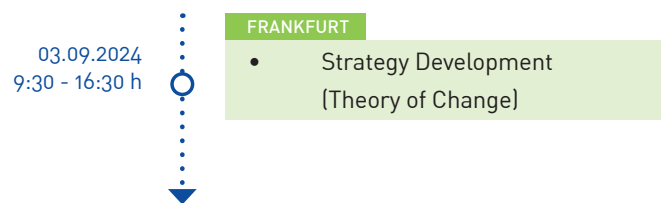
Chemical traceability lost in the Bermuda triangle of consumer ignorance, industry unwillingness and lack of political ambition

At the end of the workshop day, the university team had prepared three evaluation questions. Jonas Rehn-Groenendijk facilitated the process and ensured that the participants agreed on one of the scenarios in order to commit to a common goal/vision for the project. Each participant was given one vote (not anonymous) and all voted for scenario 1 („Empowered by Transparency”). A discussion followed which showed that there was not only a commitment to Scenario 1,

but also explicitly against Scenario 2. This means that in the upcoming process not only steps and action plans are needed to realise Scenario 1, but also steps to actively prevent Scenario 2. This was also evident when participants were asked to rate the likelihood of the two scenarios, which showed some scepticism about the likelihood of scenario 1. Participants were also asked to visualise their potential support in different areas to make Scenario 1 a reality.

## 4. Timeline and future steps

To complete the scenario process, the university team will use the presentations of the two scenarios to create a detailed storyline that will form the basis of the fourth workshop in September, which will aim to develop a specific strategy (Theory of Change) that will guide the path to the chosen scenario.



## 5. Tasks & Assignments

We kindly ask the entire consortium of ECHT, including those, who were not able to attend the workshop, to support this project by attending to the following task **until July 31st, 2024**:

### a.) Review and comment this short report

Have a careful look at this short report and comment on aspects you consider worth noting or addressing (e.g. if you have another opinion or want to add something). We will then publish this report on our project website.

### b.) Review and comment the two scenario stories

Take a close look at the two scenarios that are distributed with the report. Please comment on any aspects that you think should be noted or addressed (e.g. if you have a different opinion or want to add something). Also consider the pictures and aesthetic framing, whether this helps tell the overall story. This document will form the basis for many future decisions and will be shared widely.

For questions and remarks contact

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