



FOX – Innovative down-scaled food processing in a box

Documentation of the food circle scenario workshops

D5.2
Fraunhofer ISI



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817683. www.fox-foodprocessinginabox.eu | #FOXfoodinabox

Document Identification

Project Acronym	FOX
Project Full Title	Innovative down-scaled FOod processing in a boX
Project ID	817683
Starting Date	01.06.2019
Duration	54 months
H2020 Call ID & Topic	SFS-16-2018 – Towards healthier and sustainable food
Project Website	http://www.fox-foodprocessinginabox.eu/
Project Coordinator	German Institute of Food Technologies (DIL)

Work Package No. & Title	WP 5: Foresight and business models
Work Package Leader	Fraunhofer
Deliverable No. & Title	D5.2: Documentation of the food circle scenario workshops
Relevant Task	
Type	Report
Dissemination Level	Public
Responsible Partner	Fraunhofer
Authors	Björn Moller, Ariane Voglhuber-Slavinsky, Ewa Dönitz
Version (date)	V1 (27.09.2021) Final 30.09.2021
Status	Final

Table of Contents

<i>Food circle scenario workshops</i>	4
Preparation and invitation to the Food Circle Scenario Workshops	4
Implementation of the Food Circle Scenario Workshops	5
<i>Documentation of the Food Circle Scenario Workshops</i>	5
Food Circle Sessions	7
<i>Food Circle 1</i>	8
Task 1.1: Prioritization and assessment	8
Task 1.2: Technology assessment in each future scenario	9
Task 1.3: Discussion of the scenarios as a whole	10
<i>Food Circle 2</i>	11
Task 2.1: Prioritization and assessment	11
Task 2.2: Technology assessment in each future scenario	13
Task 2.3: Discussion of the scenarios as a whole	13
<i>Food Circle 3</i>	14
Task 3.1: Prioritization and assessment	14
Task 3.2: Technology assessment in each future scenario	15
Task 3.3: Discussion of the scenarios as a whole	16
<i>Food Circle 4</i>	17
Task 4.1: Prioritization and assessment	17
Task 4.2: Technology assessment in each future scenario	19
Task 4.3: Discussion of the scenarios as a whole	19

Food circle scenario workshops

In Task 5.1., Framework Scenarios for the European Food Sector have been developed. These results are described in deliverable 5.1 and are published in the Brochure “Three scenarios for Europe’s food sector in 2035”. In task 5.2 these framework scenarios are used as a starting point, to develop more specific scenarios taking the particularities of the different technologies and regions into consideration. Therefore, food circle scenario workshops were conducted, one for each food circle. Experts from the relevant regions as well as experts for the respective technology were invited to discuss future assumptions for further food circle specific key factors. The assumptions will then be used to extend the framework scenarios to get two to four specific scenarios for each food circle.

Milestone 19 shows how the workshop was planned and who registered for the workshop. Due to the COVID-19 pandemic, however, the Food Circle Scenario Workshops have been replaced by four parallel online workshops, one for each food circle. These group sessions were flanked by a plenary session, in which the 3 framework scenarios were introduced to all participants. After the group work, the findings in each food circle were presented shortly to the whole plenum.

This deliverable summarizes the key aspects that were discussed during the workshops. These information are the base for further analyses. In the next steps, in depth interviews and literature review will be used to validate, enrich and sharpen the arguments. As a final result, possible future impacts of the different scenarios on the four food circles will be presented.

Preparation and invitation to the Food Circle Scenario Workshops

The Food Circle Scenario Workshops were planned for the first half of 2021. A stakeholder mapping process was used to identify key actors from industry, research, and policy to be invited to the workshop. The workshop should include external stakeholders from the different regions as well as the different technologies.

On May 21st, 2021, invitations to 96 stakeholders have been sent out. In order to keep the timeline and the due dates for all milestones and deliverables of work package 5, we decided in consultation with the FOX coordination to replace the initially planned scenario workshop by an online Scenario-Process and a preceding internal scenario workshop. By doing this, we could make sure, that we would still have sufficient valuable input by internal and external experts on the one side, and would be able to get the future scenarios before the due date of deliverable 5.1. (July 2020).




4




Implementation of the Food Circle Scenario Workshops

The workshop was run on June 14th 2021 via Microsoft Teams. In addition a virtual whiteboard was used for discussion and documentation. One week before the workshop, the agenda and technical information have been communicated to the participants.



Agenda



FOX Foresight Scenario Workshop June 14th 2021				
8:45 – 9:00	dial in and technical check			
9:00 – 9:15	Welcome and introduction Presentation of the FOX project			
9:15 – 10:00	Foresight approach and presentation of the 3 framework scenarios			
10:00 – 12:00	Implications on the 4 food circles - Split in smaller groups -			
(coffee break 10:45-11:00)	Food Circle 1	Food Circle 2	Food Circle 3	Food Circle 4
	Group discussion	Group discussion	Group discussion	Group discussion
12:00 – 12:45	Wrap up of each food circle (5-10 min each)			
12:45 – 13:00	Next steps and closing			

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817683.

Documentation of the Food Circle Scenario Workshops

After a welcome and some introductory words, Kerstin Pasch (DIL) gave a short overview of the FOX project. Subsequently the Fraunhofer team presented the foresight approach used in this work package and presented the 3 framework scenarios.

Scenario 1

Policy secures sustainability - Welfare states centrally ensure national food security

This scenario drafts a future world where the states own agricultural land, produce food according to local conditions and care for the well-being of all their citizens. Consumers do not understand the complexity of food production nor do they care about how it influences the environment around them. They trust their government in providing nutritious food and ensuring accessibility for all citizens. The awareness for the necessity of environmentally friendly and sustainable food production is present and promoted by science. In this future, politicians have recognised that sustainable agriculture is vital to national food security. However, the state not only owns and manages agricultural land, it also has data sovereignty and access to data along the whole food value chain, e.g. to the purchase data of all e-commerce grocery stores. The scenario deals with the questions, how citizens' freedom of



choice is influenced, what drives the buying criteria for food, how important labels will be and what role indoor farming will play.

Scenario 2

Society drives sustainability - Consumers enjoy a green and healthy lifestyle

In this future, people are driving developments forward through their search for a healthy lifestyle in harmony with nature. They are aware of many interconnections and see the big picture. Sustainable behaviour is in the heart of society. Economic growth is no longer the main paradigm to follow. Agricultural land is in the hand of many, especially local biodiversity is of high value and many fresh foods are produced within a 1-mile radius.

In this future, the role of the national government is limited, but there are well-organised governments at the local level. Consumers' opinions are significantly determining a sustainable and local production of food. This has an effect on the availability of certain products, but for other reasons than in scenario 1. Further important aspects, like which values the society thrives for is further explained. The role of local communities in reaching high levels of self-sufficiency in food production and the contribution of individuals in living a sustainable life is elaborated. Why high food prices are accepted, whether consumers become producers, how the relationship between citizens and farmers evolved, which role retailers play in logistics, and what other properties food must fulfil is at the core of this future world. Additionally, "Food as a Service" evolves as a distinctive concept combining technological innovation with decentralisation and resource savings.

Scenario 3

A CO₂-currency and retailers dominate trade and consumption - In a globalised world, markets and technologies ensure prosperity for top performers

High-specialised global markets rule the world. Dynamic technological progress, a competitive surrounding and unlimited growth characterise this future scenario best. Retail and sales have huge market power, e-commerce is mainly in the hands of the big box retailers and the shift towards online consumption of food is completed.

In this world, flexibility is highly valued by consumers. Willingly provided transparency about consumer data gives retailers data sovereignty. Foodservice platforms evolve and are in the large part successful because of consumer profiling.

Agricultural production has to be efficient and economically successful in the first place. The effects on land and biodiversity are of minor importance. Agricultural and processing technologies evolve in this environment.

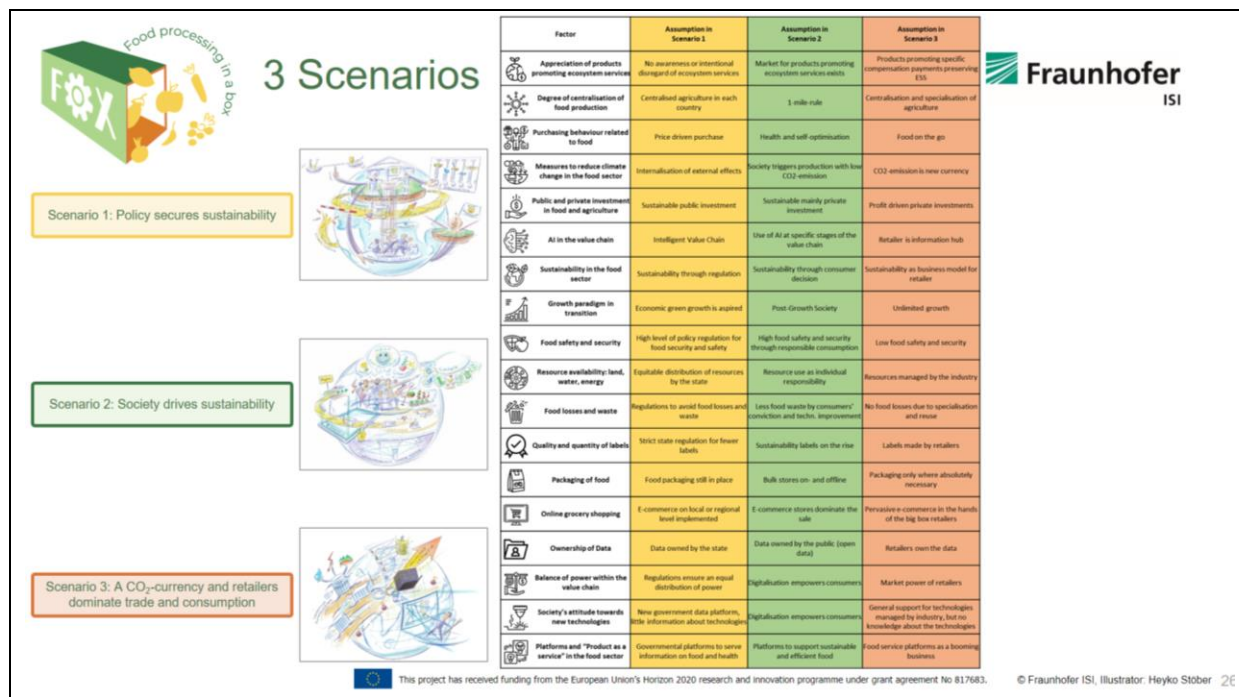
The role of global trade on the variety and prices of food as well as on its security is as central in this future as CO₂-prices, the largescale industrial processing of food and the use of side streams. Other questions are how powerful national and local governments remain, how AI and new digital solutions are used to help consumers, why circular economy is the new paradigm to follow, and why natural resource and biodiversity protection, as well as climate change mitigation, are still of importance.



6



An overview of all factors and their future assumptions is shown in the following figure.



Food Circle Sessions


In the group discussions, the framework scenarios were used and elaborated with regard to specific aspects of the regions and the specific technologies that are developed by the FOX project partners. Therefore, three main questions were asked:

- Get familiar with the scenarios. Use the overview table (factors + future assumptions)
 - Prioritize the factors by sticking stars (8 ★ per person). **Which are in your opinion the most relevant factors?**
 - Assess the future assumptions for each factor (starting with the most relevant one). Is this assumption probable (●), possible (●), or unlikely (●) in your food circle? What are specific aspects of your food circle that have to be considered? Maybe some elements of some scenarios are already visible?
- Imagine the technology in each future scenario
 - What elements of scenario 1, 2, and 3 would promote or inhibit the technology developed?**
- Have a look at the scenarios as a whole
 - Which scenario would be your favorite? Which scenario do you consider as most probably? What are the challenges to reach this scenario?**



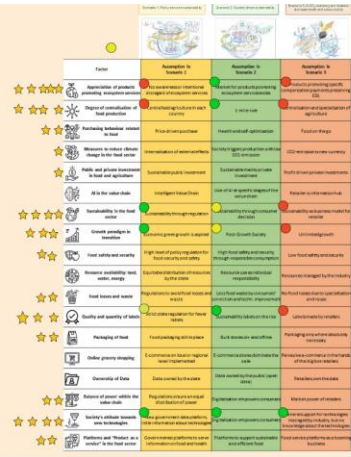
The group discussions took place on a virtual white board (www.miro.com)

Food Circle 1



Fresh, local and healthy juice in a mobile container

Food Circle 1



Task 1

Get familiar with the scenarios. Use the overview table (factors + future assumptions)

- Prioritize the factors by sticking stars (8 stars per person). Which are in your opinion the most relevant factors?
- Assess the future assumptions for each factor (starting with the most relevant one). Is this assumption probable (●), possible (●), or unlikely (●) in your food circle? What are specific aspects of your food circle that have to be considered? Maybe some elements of some scenarios are already visible?

Prioritization
Take up to 8 stars (by copy (Strg-C) and paste (Strg-V) and stick them on the factors with the highest relevance

Task 2

Imagine the technology in each future scenario
What elements of scenario 1, 2, and 3 would promote or inhibit the technology developed?
Write your ideas on post-its and place them on this board

Task 3

Have a look at the scenarios as a whole
Which scenario would be your favorite? Which scenario do you consider as most probable? What are the challenges to reach this scenario?
Write your ideas on post-its and place them on this board

Task 1.1: Prioritization and assessment

The table shows the factors in descending order of their relevance according to the number of votes.

Factor	Votes
Appreciation of products promoting ecosystem services	★★★★★
Degree of centralisation of food production	★★★★
Sustainability in the food sector	★★★★
Society's attitude towards new technologies	★★★★
Growth paradigm in transition	★★★
Quality and quantity of labels	★★★
Purchasing behaviour related to food	★★

Food safety and security	★ ★
Food losses and waste	★ ★
Packaging of food	★ ★
Balance of power within the value chain	★ ★
Platforms and "Product as a service" in the food sector	★ ★
Measures to reduce climate change in the food sector	★
Public and private investment in food and agriculture	★

The group discussed the future assumptions for the most relevant factors, and whether this assumption is **probable**, **possible** or **unlikely** in this food circle.

Factor	Assumption in Scenario 1	Assumption in Scenario 2	Assumption in Scenario 3
Appreciation of products promoting ecosystem services	No awareness for or intentional disregard of ecosystem services	Market for products promoting disregard of ecosystem services	Products promoting specific compensation payments preserving ESS
Degree of centralisation of food production	Centralized agriculture in each country	1-mile rule	Centralization and specialization of agriculture
Sustainability in the food sector	Sustainability through regulation	Sustainability through consumer decision	Sustainability as business model for retailer
Society's attitude towards new technologies	New government data platform, little information about technologies	Technologies directly serve social demand and are therefore widely accepted	General support for technologies managed by industry, but no knowledge about the technologies
Growth paradigm in transition	Economic green growth is aspired	Post-Growth Society	Unlimited growth
Quality and quantity of labels	Strict state regulation for fewer labels	Sustainability labels on the rise	Labels made by retailers

Task 1.2: Technology assessment in each future scenario

These are the main arguments that promote the technology of food circle 1:

- FOX technology allows to buy local apples (one variety, one tree, one farm) as juice
- Traceability will enhance the trust in local production



- The support of local farmers is a key driver and can be implemented with FOX technology
- Regional food is on the rise at the Bodensee region (more and more greenhouses offer locally produced food)
- time to product is shorter by local products
- PEF module can be rent instead of owned: no big investment needed on farmer side. This is essential for the economic acceptance of the FOX business idea
- PEF juice is fresh and fits to a healthy lifestyle.

These are the main arguments that could inhibit the technology of food circle 1:

- There is not enough knowledge about the technology
- Consumers could avoid the new technology because “it may not be safe”, however consumers at this region could be open to new technologies
- PEF treated will be more expensive
- For the final FOX containers, investors are needed
- FOX container could be seen as competitors to small juice producer. Especially relevant in this region since there are more than 200 small juice producer.

Task 1.3: Discussion of the scenarios as a whole

These are the points of discussion from food circle 1:


- Food circle 1 fits best to scenario 2
- Scenario 2 is the best one, the most democratic and almost too good to be true
- If food circle 1 wants to be successful, we need elements from scenario 1, especially regulation, and from scenario 3, the involvement of industry
- The FOX technologies need good business models to make the technologies successful. These business models have to answer questions like “who owns the container” etc.
- The last 20 years could lead to the assumption that scenario 3 is not unrealistic since the power of retailers increased significantly
- Weekly farmers markets are on the rise at the Bodensee region. This leads to increasing support of local and natural products.
- Important questions are: How to reach low economic social groups and how much are consumers willing to pay for food? The Bodensee region is above average and not representative for Germany.



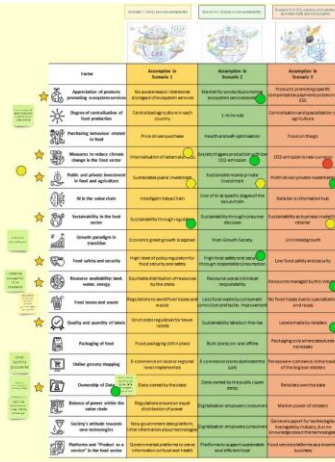
10



Food Circle 2



Food Circle 2




Task 1

Get familiar with the scenarios. Use the overview table (factors + future assumptions)

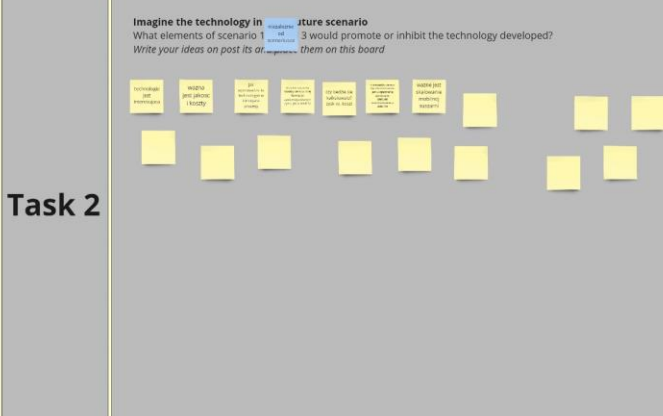
- Prioritize the factors by sticking stars (8 stars per person). Which are in your opinion the most relevant factors?
- Assess the future assumptions for each factor (starting with the most relevant one). Is this assumption probable (green), possible (yellow), or unlikely (red) in your food circle? What are specific aspects of your food circle that have to be considered? Maybe some elements of some scenarios are already visible?

Prioritization
Take up to 8 stars (by copy (Strg-C) and paste (Strg-V) and stick them on the factors with the highest relevance



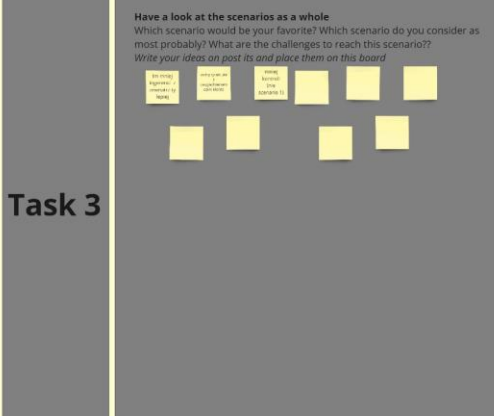
Task 2

Imagine the technology in scenario 1
What elements of scenario 1 would promote or inhibit the technology developed? Write your ideas on post-its or draw them on this board



Task 3

Have a look at the scenarios as a whole
Which scenario would be your favorite? Which scenario do you consider as most probable? What are the challenges to reach this scenario? Write your ideas on post-its and place them on this board



Task 2.1: Prioritization and assessment

The table shows the factors in descending order of their relevance according to the number of votes. The voting was made as a group decision.

Factor	Votes
Appreciation of products promoting ecosystem services	★
Measures to reduce climate change in the food sector	★
Public and private investment in food and agriculture	★
Sustainability in the food sector	★
Food safety and security	★



Resource availability; land, water, energy	★ (water is particularly important)
Quality and quantity of labels	★
Ownership of Data	★ (impact on competitiveness, not on production)
Additional factors	Comments
Degree of centralisation of food production	delivery time 24 hours, production centered around processing
Growth paradigm in transition	in the long run
Food losses and waste	adequate supply management can reduce the impact of this factor
Online grocery shopping	increasingly popular
Balance of power within the value chain	influence on the direct market, not on production

The group discussed the future assumptions for the most relevant factors, and whether this assumption is **probable**, **possible** or **unlikely** in this food circle. In some cases there was no preference.

Factor	Assumption in Scenario 1	Assumption in Scenario 2	Assumption in Scenario 3
Appreciation of products promoting ecosystem services	No awareness for or intentional disregard of ecosystem services	Market for products promoting disregard of ecosystem services	Products promoting specific compensation payments preserving ESS
Measures to reduce climate change in the food sector	Internalisation of external effects	Society triggers production with low CO2-emissions	CO2-emission is new currency
Public and private investment in food and agriculture	Sustainable public investment	Sustainable mainly private investment	Profit driven private investments
Sustainability in the food sector	Sustainability through regulation	Sustainability through consumer decision	Sustainability as business model for retailer
Food safety and security	High level of policy regulation for food security and safety	High food safety and security through responsible consumption	Low food safety and security



12



Resource availability; land, water, energy	Equitable distribution of resources by the state	Resource usage as individual responsibility	Resources managed by the industry
Quality and quantity of labels	Strict state regulation for fewer labels	Sustainability labels on the rise	Labels made by retailers
Ownership of Data Additional assumption: Relevant data should be voluntary, collection should not be coercive	Data owned by the state	Data owned by the public (open data)	Retailers own the data

Task 2.2: Technology assessment in each future scenario

These are the main arguments that promote the technology of food circle 2:

- This is an interesting technology regardless of the certain scenario.
- A mobile dryer would make sense in a different form (in an automated cycle, as in case of juice) for larger producers or big farmers
- In the case of vegetables (e.g. carrots) it is important to take yields into account, as some are contracted and some are not.
- Scaling of the mobile dryer has to be considered.

These are the main arguments that could inhibit the technology of food circle 2:

- Quality and cost are important
- Will it be profitable? Profit vs. cost-analysis
- How to incorporate this technology into existing processes?

Task 2.3: Discussion of the scenarios as a whole

These are the points of discussion from food circle 2 - the elements of the favourite future:

- Free market, but taking into account customer feedback
- The less external intervention the better (from producer point of view).
- Less control (not as in scenario 1).



13



Food Circle 3

Food Circle 3

Task 1

Get familiar with the scenarios. Use the overview table (factors + future assumptions)

- Prioritize the factors by sticking stars (8 stars per person). Which are in your opinion the most relevant factors?
- Assess the future assumptions for each factor (starting with the most relevant one). Is this assumption probable (green), possible (yellow), or unlikely (red) in your food circle?
- What are specific aspects of your food circle that have to be considered? Maybe some elements of some scenarios are already visible?

Prioritization
Take up to 8 stars (by copy (Strg-C) and paste (Strg-V) and stick them on the factors with the highest relevance

Task 2

Imagine the technology in each future scenario
What elements of scenario 1, 2, and 3 would promote or inhibit the technology developed?
Write your ideas on post-its and place them on this board

Task 3

Have a look at the scenarios as a whole
Which scenario would be your favorite? Which scenario do you consider as most probable? What are the challenges to reach this scenario?
Write your ideas on post-its and place them on this board

Task 3.1: Prioritization and assessment

The table shows the factors in descending order of their relevance according to the number of votes.

Factor	Votes
Packaging of food	★★★★★★
Measures to reduce climate change in the food sector	★★★★★
Food losses and waste	★★★★★
Public and private investment in food and agriculture	★★★★
Sustainability in the food sector	★★★★
Food safety and security	★★★★
Appreciation of products promoting ecosystem services	★★★



Purchasing behaviour related to food	★ ★ ★
Resource availability; land, water, energy	★ ★ ★
Purchasing behaviour related to food	★ ★ ★
AI in the value chain	★ ★
Balance of power within the value chain	★ ★
Platforms and "Product as a service" in the food sector	★

The group discussed the future assumptions for the most relevant factors, and whether this assumption is **probable**, **possible** or **unlikely** in this food circle (no agreement was reached). The factors with four or more stars were discussed.

Factor	Assumption in Scenario 1	Assumption in Scenario 2	Assumption in Scenario 3
Packaging of food	Food packaging is still in place	Bulk stores on- and offline	Packaging only where absolutely necessary
Measures to reduce climate change in the food sector	Internalisation of external effects	Society triggers production with low CO2-emissions	CO2-emission is new currency
Food losses and waste	Regulations to avoid food losses and waste	Less food waster by consumers' conviction and techn. improvement	No food losses due to specialisation and reuse
Public and private investment in food and agriculture	Sustainable public investment	Sustainable mainly private investment	Profit driven private investments
Sustainability in the food sector	Sustainability through regulation	Sustainability through consumer decision	Sustainability as business model for retailer
Food safety and security	High level of policy regulation for food security and safety	High food safety and security through responsible consumption	Low food safety and security

Task 3.2: Technology assessment in each future scenario

These are the main arguments that promote the technology of food circle 3, as well as topics which have to be considered in future:

- Regulation on food waste can be beneficial for the technology.
- Scenario 2: Blockchain-like technologies will help with the implementation of traceability, this is connected to packaging.



- Ownership Data: Data must be decentralized and anonymized. Data serves food security by checking and guaranteeing food quality. Therefore, data is need, but at the same time the privacy has to be guaranteed.
- Labelling is very important. The food pyramid is contradicting the Nutri Score in some elements.
- Labels in scenario 1: We must agree to a common European labeling system integrating and supporting our producers and market requirements.
- Food losses: Industry should use all the products that are produced, as most of the waste is in production.
- Scenario 2: in order to secure sustainability new technologies have to be promoted.
- Scenario 2: Information must be available throughout the chain from production to the consumers in order to secure sustainability.
- Scenario 2: the Food Circle 3 technology will help to achieve this.
- Scenario 1: FOX technology must be regulated and approved in order to be legally implemented.

These are the main arguments that could inhibit the technology of food circle 3:

- AI in the value chain: in scenario 3 the retailer is the information hub; but all members of the Value chain, public bodies and consumers need to have access to the information.
- Food losses in scenario 3: We need more pedagogical asset to consumers. There is a big gap and lack of knowledge to consumers about the importance of their behavior.
- Packaging in scenario 3: Farm to fork strategy and Green Deal aim to reduce packaging production to reduce plastics.
- Scenario 1: packaging should only be allowed if indispensable. It has to be stated that packaging in general has to be avoided, but there are certain applications, where packaging is needed and serves sustainability.

Task 3.3: Discussion of the scenarios as a whole

These are the points of discussion from food circle 3:

- An intelligent value chain is needed
- Some participants were in favor of scenario 2, but saw scenario 3 as more probable. ("I think scenario 3 is the most likely. The large chains are going to have more and more weight.")
- To promote the scenario 2 we need to provide the free information to consumers.
- 1st and 3rd scenario are most probable, but the 2nd scenario is most desirable.
- But not only society can reach scenario 2; policy is needed, as well as the participation of market forces; in general more actors are needed to reach scenario 2.
- It is important to increase the talent of local people and companies.



16



Food Circle 4

Food Circle 4

Task 1

Get familiar with the scenarios. Use the overview table (factors + future assumptions)

- Prioritize the factors by sticking stars (8 stars per person). Which are in your opinion the most relevant factors?
- Assess the future assumptions for each factor (starting with the most relevant one). Is this assumption probable (), possible (), or unlikely () in your food circle? What are specific aspects of your food circle that have to be considered? Maybe some elements of some scenarios are already visible?

Factor	Assumption 1 Scenario 1	Assumption 2 Scenario 2	Assumption 3 Scenario 3
Appropriation of publicly available innovation resources	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Degree of centralisation of food production	Centralised food production in few regions	Centralised food production in few regions	Centralised food production in few regions
Purchasing behaviour related to food	Focus on premium products	Focus on premium products	Focus on premium products
Measures to reduce climate change in the food sector	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Public and private investment in food and agriculture	Sustainable public investment	Sustainable public investment	Sustainable public investment
Attitude towards food	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Sustainability in the food sector	Sustainable public investment	Sustainable public investment	Sustainable public investment
Growth paradigm in transition	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Society's attitude towards new technologies	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Resource availability: land, water, energy	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Food losses and waste	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Quality and quantity of diets	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Processing of food	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Urban growth planning	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Ownership of data	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Balance of power within the value chain	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Society's attitude towards new technologies	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services
Political and "hidden" power in the food sector	High innovation potential through innovation services	Medium innovation potential through innovation services	Low innovation potential through innovation services

Task 2

Imagine the technology in each future scenario

What elements of scenario 1, 2, and 3 would promote or inhibit the technology developed? Write your ideas on post-its and place them on this board

Task 3

Have a look at the scenarios as a whole

Which scenario would be your favorite? Which scenario do you consider as most probable? What are the challenges to reach this scenario? Write your ideas on post-its and place them on this board

Task 4.1: Prioritization and assessment

The table shows the factors in descending order of their relevance according to the number of votes.

Factor	Votes
Resource availability: land, water, energy	★★★★★★
Food losses and waste	★★★★
Measures to reduce climate change in the food sector	★★
Sustainability in the food sector	★★
Growth paradigm in transition	★★
Society's attitude towards new technologies	★★
Degree of centralisation of food production	★
Purchasing behaviour related to food	★

AI in the value chain	★
Ownership of data	★
Balance of power within the value chain	★
Platforms and "Product as a service" in the food sector	★

Remarks about the factors

- comes more important how sustainable a product is
- AI related to processtimator
- food losses and waste
- Main topic: resources availability. e.g. protein shift
- Margin
- Balance of power - trade agreements and safety regulations - has to do with responsibility. Sometimes now waste is used as feed, both there are more valuable side stream. The question remains how much the farmer will get for his products.
- New technologies - what is the perception of the consumer using products that would otherwise be lost. Especially looking to the protein shift. People might like plant based products, but might dislike the processing. Although you can limit the processing
- 'Service' individualization can lead to factors that are in conflict. Processtimator is a service/ tool on its own. But it is an expert tool, someone needs to guide you to use it.

The group discussed the future assumptions for the most relevant factors, and whether this assumption is **probable**, **possible** or **unlikely** in this food circle.

Factor	Assumption in Scenario 1	Assumption in Scenario 2	Assumption in Scenario 3
Food losses and waste	Regulations to avoid food losses and waste	Less food waste by consumers' conviction and technological improvement	No food losses due to specialisation and reuse
Measures to reduce climate change in the food sector	Internalisation of external effects	Society triggers production with low CO2-emission	CO2-emission is new currency
Society's attitude towards new technologies	New government data platform, little information about technologies	Technologies directly serve social demand and are therefore widely accepted	General support for technologies managed by industry, but no knowledge about the technologies



18



Climate change

- A high preference for scenario 2, leading to lower emission. 1 and 3 are somehow similar. Although... external effects go way beyond emissions. Internalization of costs are highly needed. This costing will change processing, as well as ingredient use.
- No good to have scenario 3. There would be a lot of lobbying and no or little action.
- Scenario 2 is nice, but will it happen?

Food losses and waste

- Whatever scenario, food waste will reduce. Geography is an important issue here. we may get more regulation in the North, less in the south

Society's attitude towards new technologies

- It is a question of how to inform consumers about the technologies and how they work. Consumers don't really like high processed food, especially those that are concerned about diets. We should help them understand that it is not something bad to process food. In scenario 2, the consumers is better informed. There are lots of people not interested in their food. We are talking about very small percentage of people. We discussed the parallel with the nutriscore, which has especially an impact on the industry.

Task 4.2: Technology assessment in each future scenario

What elements would promote or inhibit the technology developed:

- Internalization of external cost: fibers from carrots, if you would include all costs and inform the consumer, that would be helpful
- Intelligent value chain. As processors, I would like to have data from the sector - much more transparency on the food value chain (scenario 1). Government support data sharing.
- Balance in the food chain. It would promote technology. It is better for technology if there is a better balance. We are working on side stream, than it is better to have a better balance.

Task 4.3: Discussion of the scenarios as a whole

These are the points of discussion from food circle 4:

- For the society's attitudes, scenario 2, is more beneficial.
- for climate change, we prefer scenario 1 - with internalization
- focusing on the technology, the third scenario as a whole, is the most interesting (really apart from all other aspects)
- challenges in scenario 3 - can it really drive the sustainability aspects as a whole: reducing climate change, increase efficiency,
- We try to make optimal use of the resources that we have. If that technology, they are not interested in investing in the rest of the chain.



19



- Our technology is more for a diverse world, and in scenario 3, it is probably more on homogenization.

